Climate Change Policies and Agendas: facing implementation challenges and guiding responses

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Abstract

Climate policies are known to be very important in attempts to pursue climate change mitigation and adaptation. However, there is a paucity of international studies where the status of climate change policies is analysed. Consequently, this paper reports on research undertaken in a sample of 13 highly diverse countries, in regards to their geography, socioeconomic development, vulnerability elements, adaptation, and climate-risks. The results draw attention to the spread and standardisation of climate change policies globally, through the adoption of comprehensive National Adaptation Plans/Strategies (NAPs/NASs), that include mitigation measures, and evaluation mechanisms. Although NAPs tend to include different non-governmental stakeholders, they are still mainly state-centred (e.g. in a country´s Ministry of Environment) in most of the 13 studied countries.

The results show that NAPs objectives translate more a global agenda and less the national/regional vulnerabilities and contexts. In fact, despite the different human and socioeconomic development, diverse climate-risks, and dissimilar vulnerability and readiness status among countries, the examined NAPs usually refer to the same critical sectors and objectives. Notwithstanding the similarities, our results highlight two different logics of adaptation reflected on the NAPs: one focused on economic risks and opportunities, characteristic of developed countries; and other focused on the natural resources and conservation, characteristic of developing countries. The implications of the study are analysed, and prospects are described.

Keywords:

Climate Change; Climate change policies; National adaptation plans; Global/Local vulnerabilities; Definition/Implementation of Climate Change Policies

Highlights

- Climate change policies are central to mitigation and adaptation strategies
- There are many implementation challenges which hinder the design or appropriate responses
- In order to succeed, National Adaptation Plans/Strategies (NAPs/NASs) need broad support
- Mitigation measures need to be complemented by evaluation mechanisms
- Limited participation of non-governmental stakeholders in the development of NAPs constraint the effectiveness of responses.

1 Introduction

1.1.Background

The growing threat of global climate change induced by human activity requires climate change policies addressing this problem at global, national and local levels of governance. There are two types of climate change management, mitigation policies, and adaption policies. United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, the Cancún Adaptation Framework (CAF), Durban Platform for Enhanced Action and Paris Climate Agreement are some of the relevant climate management policies.

The UNFCCC (1992) defined such terms as ‘adverse effects of climate change', ‘emissions' and ‘greenhouse gases'. The Convention's ultimate objective to "stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (United Nations, 1992) underlay following climate change policies. The document entered into force in March 1994 and had been ratified by 195 countries (UNFCCC, 2018). Also, the latest agreement was adopted by 195 nations at the Paris Climate Conference (Conference of the Parties “COP21”) in December 2015. The Paris agreement is due to enter into force in 2020 (European Commission, 2018a). The deal aims to strengthen the global response to climate change by keeping the average global warming to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels (UNFCCC, 2018).

Adaptation is a crucial component of climate policy, yet we have a limited and fragmented understanding of if and how adaptation is currently taking place (Ford et al. 2015). Adaptation in the Paris Agreement establishes "enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change" and adaptation communications (periodically submit an adaptation communication to the UNFCCC) should include a nationally determined contribution (NDC), a national adaptation plan (NAP) and/or a national communication (NC). The CAF enables parties to formulate and implement NAPs as a means of identifying medium- and long-term adaptation needs and developing and implementing strategies and programmes to address those needs. (https://unfccc.int/topics/adaptation-and-resilience/workstreams/national-adaptation-plans).

The Paris Agreement Article 7.9 encourages all Parties to engage in the formulation and implementation of NAPs. Together with the NAPs, the national adaptation monitoring and evaluation systems is considered by the UNFCCC as a condition of adapting to climate change, "enabling Parties to better address climate risks, improve the effectiveness of adaptation

114 measures, and increase accountability" (Vallejo, 2017) to strengthening vertical integration in
115 NAPs processes (Dazé et al., 2016) and Climate Resilient Development Framework (Kim et
116 al., 2017).
117 This paper focuses on the formalised NAPs that have been designed for adoption by national
118 policymakers across various socio-economic, cultural, environmental and geographical
119 regions. NAP's are a powerful policy tool for countries for its comprehensive approach to the
120 climate change challenges and support to central climate policies, compared with other sectoral
121 and/or national isolated instruments. Simultaneously, it is also a powerful analytical tool that
122 enables systematic comparison and analysis across different countries in terms of
123 environmental policies and challenges. The designation, structure, and focus of the NAPs differ
124 between countries, but often they provide a comprehensive overview of the main impacts and
125 vulnerabilities in a state and propose measures to adapt to the impacts projected (Biesbroek et
126 al., 2010).In this regard, the COP22 saw a reaffirmation of the importance of NAPs, and
127 adaptation planning, in supporting the Paris Agreement, particularly for least developed (LDC)
128 and developing countries (COP22, 2016) but are also important in Europe and Central Asia
129 (UNDP, 2018). A National Adaptation Programme of Action (NAPA) is a type of plan linked
130 with NAPs submitted by LDC to the UNFCCC
131 (http://unfccc.int/national_reports/items/1408.php).
132 To date, 25 European Union (EU) member states have adopted a national adaptation strategy
133 (NAS), and 15 have developed a NAP, the latter mostly on freshwater management, flood risk
134 management, agriculture, and forestry (EEA, 2018). Termeer et al. (2012) found several
135 weaknesses of the governance institutions involved in the NAS in the Netherlands, the United
136 Kingdom, Finland and Sweden, causing tensions on the long term, e.g., strong one-sided
137 reliance on scientific experts, and tension between top-down policy development and bottom-
138 up implementation.
139 The novelty of this study is the questioning of the prevailing imposition of a unique one-size-
140 fits-all adaptation model (NAPs/NASs) at the global level which is not sufficiently suited to
141 the local vulnerability context. That is why we also emphasise on the complementary sectoral
142 and local-level plans.
143
144 *1.2.Research Framework*
145 The main research question addressed in this paper is: i) How are the studied countries defining
146 NAPs (along with NDCs, NCs and NASs,) to overcome the observed climate adaptation
147 limitations and guide their responses? This question requires understanding: i) what are the

vulnerabilities and objectives identified in the different NAPs? ii) what are the NAPs objectives similarities and differences between the involved countries? iii) how different national contexts and vulnerabilities are considered or not in the NAPs; iv) how are the primary agents placed in the NAP's agenda? v) what kind of participatory mechanisms are being used to involve the different stakeholders into the NAP's agenda and among other things, in responses to their climate challenges?

This paper aims to analyse and compare public climate change policies (e.g. objectives, stakeholders, participatory mechanisms) based on the NAPs on the one hand, and complementary plans and measures (e.g. NASs, sectoral and local plans) on the other, of a sample of thirteen countries to:

- understand if the national adaptation policies translate more a global agenda or their vulnerabilities and contexts;
- understand the differences of the objectives between countries and if they are aligned with the national vulnerabilities;
- map the agents that intervene in the process and the place of bottom-up participatory mechanisms.

The originality and practical implications of this research are to identify advantages and limitations among nations to gather critical ideas, which may guide states in the definition and implementation of climate change policies, with the purpose of both serving a global agenda and guide responses which consider their local/regional or national vulnerabilities and specificities.

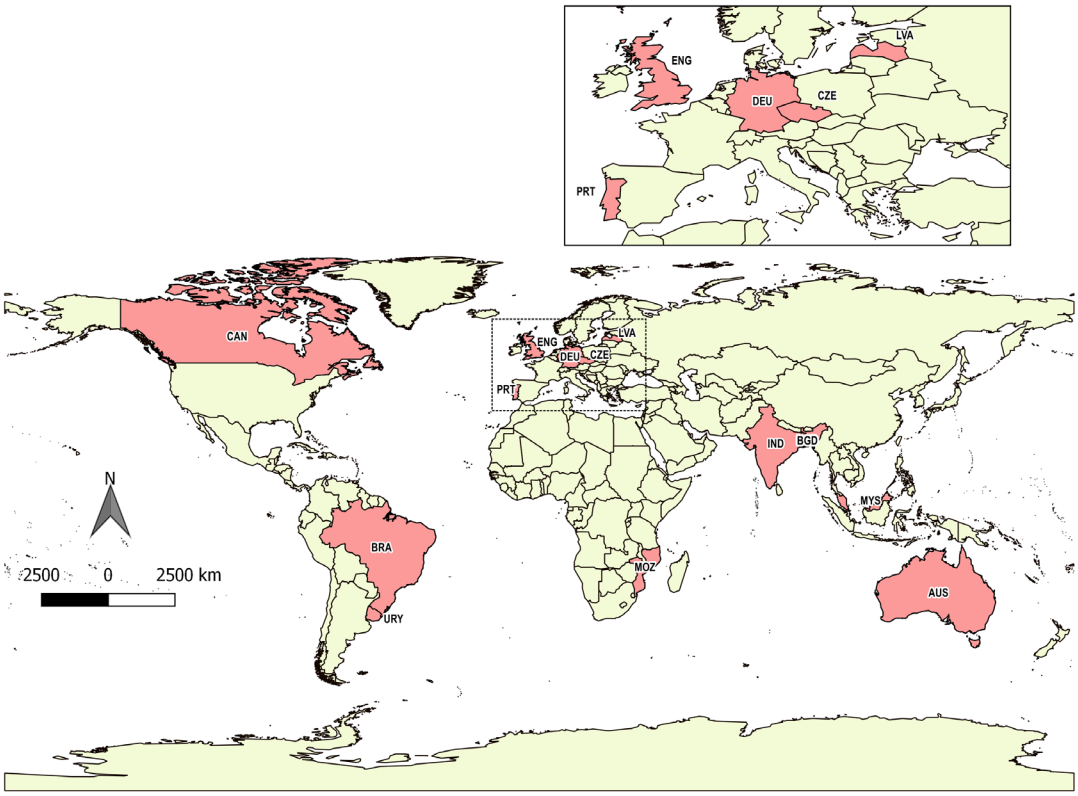
The working hypotheses are 1. NAPs objectives translate the global agenda instead of the national/regional vulnerabilities; 2. The formulation of NAPs tends to include different non-governmental stakeholders mainly led by the Ministries of Environment; 3. NAPs provide mechanisms of participation for non-governmental stakeholders and populations. 4. The formulation of NAPs tends to privilege economic vulnerabilities in developed countries and natural/environmental ones in developing countries and/or with high climate risk.

2 Methodology

2.1 Sampled countries

179 The study undertook a comparative analysis of 13 countries (Fig. 1) selected considering their
180 geographical, socio-economic (from Least Developed Countries-LDC: Bangladesh and
181 Mozambique, to highly developed ones: Australia, Canada, and Germany), cultural and
182 environmental diversity, different status of vulnerability elements (exposure, sensitivity and
183 adaptive capacity), climate-risks, and adaptation strategies, and regionally grouped as follows:
184 Africa (Mozambique); America (Brazil, Canada and Uruguay); Asia (Bangladesh, India and
185 Malaysia); Europe (Czech Republic, England, Germany, Latvia and Portugal); Oceania
186 (Australia). A limitation about regional representativeness is that Africa is underrepresented.
187 The analysis was conducted using statistical indicators, available public materials (e.g. the
188 NAPs), peer-reviewed national and international studies, and from reliable information sources
189 from each country (Appendix A).
190 Statistical indicators from the thirteen countries were gathered from the World Bank Database
191 (2018), the United Nations Human Development Index (HDI) (United Nations Development
192 Program, 2016), the Global Climate-Risk Index (CRI) (Eckstein et al., 2017) and the Notre
193 Dame University Gain Index (ND-Gain) (Notre Dame GAIN, 2016), for the characterization
194 and comparative analysis of each country socioeconomic, vulnerability, climate-risk and
195 adaptive capacity status. The HDI integrates three socioeconomic and human development
196 indicators: (i) the per capita parity purchase power (PPP) and gross domestic product (GDP);
197 (ii) education; and (iii) life expectancy, which have been successfully used for cross-
198 comparison studies of adaptive capacity and development (Leal Filho et al., 2018a). The Global
199 CRI analyses to what extent countries were affected by the impacts of weather-related events
200 from 1997–2016. The states ranking highest are the ones most impacted and should see the
201 CRI as a warning sign that they are at risk of either frequent events or rare, but extraordinary
202 catastrophes, or a combination of both (Eckstein et al., 2017). The ND-Gain Index measures
203 vulnerability (exposure, sensitivity, and adaptive capacity) and readiness (a country's ability
204 to leverage investments and convert them into adaptation actions) when it comes to climate
205 change and climate-related impacts (Notre Dame GAIN, 2016).

Figure 1- Countries involved in the study (AUS – Australia; BGD – Bangladesh; BRA-Brazil; CAN – Canada; CZE - Czech Republic; DEU – Germany; ENG – England; IND – India; MOZ – Mozambique; MYS – Malaysia; PRT – Portugal; URY – Uruguay)



2.2 Selected indicators and categories

A matrix described the comparative analysis of the National Adaptation Plans (NAPs) of the studied countries to identify indicators that allow understanding to which extent climate change formal policy exists and is implemented. NAP "include a mix of policies and measures with the overarching objective of reducing the country's vulnerability", and depending on the circumstances, it can be "comprehensive at a national level, addressing adaptation across sectors, regions and vulnerable populations, or it can be more limited, focusing on just one or two sectors or regions" (Niang-Diop and Bosch, 2005, 186). A set of 10 indicators corresponding to the dimensions of the different adaptation plans provides a framework to source information about them (Table 1), allowing to develop a comparison between various approaches and goals in different countries.

Table 1 – Matrix/Indicators

Indicators	Goals, dimensions, categorisation and responsible for adaptation plans and sectors
National Adaptation Strategy (NAS)	Assess if there is a National Adaption Strategy
National Adaptation Plan (NAP)	Assess if there is a National Adaption Plan
National Adaptation Programme of Action (NAPA)	Assess if there is a National Adaptation Programme of Action
Assessment and/or Evaluation Mechanisms	Assess if there is an Assessment and/or Evaluation Mechanisms
Sectoral Programs	Assess if there are Sectoral Programs The categorisation of the sectoral programs in sectors and main areas
Vulnerable or Key sectors identified in NAP	Classification of the critical sectors identified in the 13 NAP's
Objectives of the NAP	The categorisation of the goals (Adaptation, Mitigation or Governance)
Who is Responsible for elaboration:	NAP Sectoral Programs
Who is Responsible for implementation	NAP Sectoral Programs
Participatory mechanisms	Universities/scientists, NGO, Business, Public in general, Other

Through a content analysis of NAPs, we classify the several sectoral programs, including natural and social systems, as well as risk-management actions (henceforth sector) mentioned in the NAP/NAS, and the critical sectors, that is to say, the most vulnerable ones identified by each country in the 13 studied NAP/NAS upon its main themes/resources into one of nine categories. Acknowledging that adaptation plans should ideally follow an integrated approach, the interrelations between economic activities, natural resources, and infrastructure, as well as the broad definition of sector, and to facilitate the analysis we group the nine categories, into the following three sector-based areas (Table 2):

i) Natural resources (Agriculture and Forestry, Water resources, Coastal Zones, and Marine Resources, Biodiversity and Ecosystems); ii) Human and socioeconomic resources (HSER) (Human health and protection, Built Environment, Infrastructure, and Economic activity); iii) Mixed (includes sectoral programs/critical sectors concerned with integrated natural, human and socio-economic resources, and risk prevention and management actions mainstreamed into the national level).

Table 2 – Sector-based areas

Sector-based areas	Categories	Example
Natural Resources	Agriculture and Forestry	Agriculture (Latvia, Czech Republic, Germany, Portugal, Canada, Brazil, Uruguay, Mozambique) Forests (Latvia, Czech Republic, Germany, Portugal, Canada, Mozambique)
	Water resources, Coastal Zones, and Marine Resources	Coastal zones and sea (Portugal) Marine Ecosystems (Malaysia)
	Biodiversity and Ecosystems	Biodiversity (Portugal, Mozambique) Natural ecosystems (Australia);

Human and socioeconomic resources	Human health and protection consists of a sectoral program/critical sector on human health, quality of life and wellbeing, and security and resilience of (vulnerable) populations; Built Environment, Infrastructure and Economic activity include sectoral programs/critical sectors on urban spaces, infrastructures (energy, transport, and communication) and economic activities, such as tourism and industry.	Human health (Latvia, Malaysia, Germany) Healthy and Resilient Communities (England) Security of people and goods (Portugal) Cities and the built environment (Australia) Industry and energy (Czech Republic) Transport and communications (Portugal) Private Sector (Brazil) Production and Consumption (Uruguay)
Mixed	Sectoral programs/critical sectors that privilege a comprehensive approach to the territory instead of one focused on one kind of sector, such as islands (India), Parks (Canada), Food and Nutritional Security (Brazil), and the risk prevention and management (here considered a critical).	Disaster risk-management (Australia, Brazil, and Uruguay) Adaptation Actions Under State Action Plans On Agriculture, Water, Health, Coastal Regions and Islands (India) Food and Nutritional Security (Brazil)

Each NAP objective was classified into one of three categories, Governance, Adaptation and Mitigation (also considered here because of the reference on NAPs). The Governance objectives address the political, organisational, management and participatory aspects. Mitigation objectives address the causes of climate change, whereas adaptation objectives address the impacts of climate change through an adjustment in natural or human systems in response to the actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC, 2001). Although the focus here is on the adaptation policies to climate change, some NAPs/NASs include mitigation objectives.

In sum, through a quantitative and qualitative broad brush comparative study of 13 countries, we identify the environmental, social and policy components related to formal climate adaptation plans and also an indication of the stage of comprehensiveness, the progression of ecological, social and policy developments (implementation and evaluation). Qualitative and quantitative analysis and comparisons of the data obtained through this study will provide insight regarding formal climate adaptation strategies as a factor determining the success of adaptation plans effectiveness in the 13 studied countries.

Each section of the paper focuses on one of the key results of our analysis of the status of the public climate change policies and includes an overview of the findings as well as the situation for each of our focus thirteen countries.

2.3 Socioeconomic and climate change vulnerability characterisation of the thirteen countries

The thirteen states involved in this study reveal substantial demographic and socioeconomic differences, as well as, heterogeneous climate-risk, vulnerability, and readiness (see table 3 and figure 2). The population distribution range varies from countries that as Latvia and Uruguay (1.9 and 3.4 million, respectively) to India (1,300 million people). Furthermore, India, Canada, Brazil, and Mozambique are countries with a vast geographical area, whereas Bangladesh has a very high population density (1,265 people / km^2).

Table 3 - Comparative country-level population, human development, vulnerability, and climate-risk[1]

Continent	Country	Surface area 10^3 Km^2 (2016)	Population (2016) (Million people)	HDI (2015) (world ranking)	The coefficient of Human Inequality (2015)	Climate Risk Index (1997-2016) (world ranking)
Africa	MOZ	799	28	0.418 (181)	32.9	40.83 (18)
America	BRA	8,5	208	0.754 (79)	25.0	84.67 (90)
	CAN	9,9	36	0.920 (10)	8.7	94.00 (98)
	URY	176	3.4	0.795 (54)	15.4	79.83 (85)
Asia	IND	3,2	1,324	0.624 (131)	26.5	37.17 (12)
	MYS	330	31	0.789 (59)	n.a.	102.83 (113)
	BGD	147	165	0.579 (139)	28.6	26.50 (6)
Europe	CZE	78	10.6	0.878 (28)	5.3	73.17 (72)
	DEU	357	82	0.926 (6)	7.0	43.17 (23)
	GBR	243	65	0.909 (16)	7.8	65.83 (56)
	LVA	64	1.9	0.830 (44)	10.3	102.83 (113)
	PRT	92	10	0.843 (41)	10.1	42.67 (22)
Oceania	AUS	7,7	24	0.939 (2)	8.0	52.33 (34)

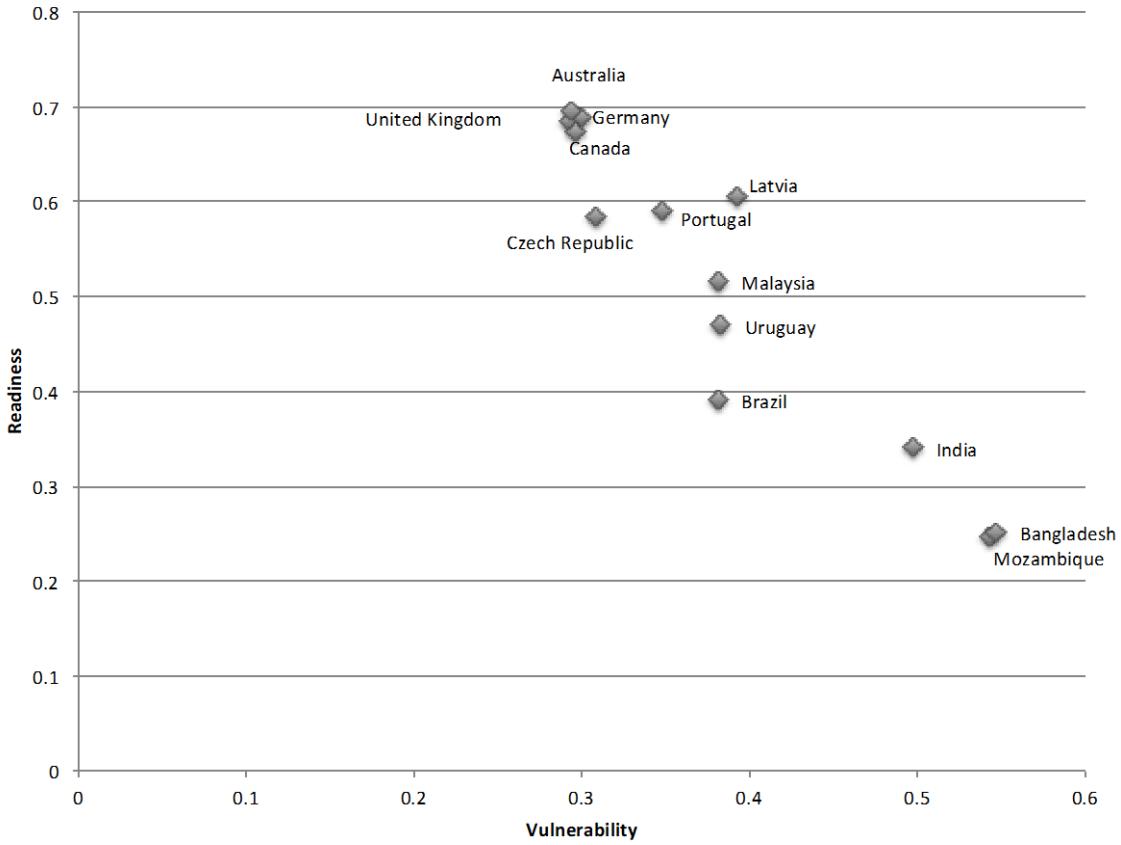
Sources: Surface area and Population - World Bank Database (2018); HDI and Coefficient of Human Inequality - United Nations Development Program (2016); Global Climate Risk Index (CRI) – Eckstein et al. (2017)

Based on the data gathered on the country-level characteristics (see table 3 and figure 2), the essential features of the sampled countries are as follows:

- Bangladesh, India, and Mozambique show below common development indicators, high climate risk - very high in the case of BGD - and vulnerabilities and low degree of readiness to adapt. Brazil shows below average development indicators, high climate risk indicator, and medium vulnerability and readiness to adapt;
- Latvia, Czech Republic, Malaysia, and Uruguay show above average development indicators, low climate risks, and low to medium vulnerability and medium readiness to adapt; Portugal present very similar features, except a medium to high climate risk index;
- Germany, the United Kingdom, Australia, and Canada show well above average development indicators and very low to low vulnerability and a high to very high degree of readiness to adapt, but different climate risk index: high in Germany (23) and Australia (34), moderate in United Kingdom (56) and low in Canada (98);

[1] The United Kingdom combines data clustered from England, Wales, Scotland and Northern Ireland.

283 **Figure 2 –Vulnerability and Readiness (ND-GAIN Index)**



284

285 # 3 Results

286 ## 3.1 Climate Change National Adaptation Plans – one global agenda, multiple
287 national speeds

288 Most of the analysed countries have not only a NAS and/or a NAP, reflecting the international
289 agenda of global climate change adaptation, but also local-level and sectoral plans, as well as,
290 evaluation and/or assessment mechanisms of the NAP, which are crucial to its effective
291 implementation; this disparate diversity of plans, sectors and mechanisms is shown in table 4.
292 Almost all European countries have local-level plans, whereas the majority of the states have
293 sectoral programs, except the Czech Republic and Uruguay: 11 of the 13 countries have
294 sectoral plans, ranging from Bangladesh (16), Brazil (12) and Portugal (10) to Germany (7)
295 and Malaysia (5), with an average of 8.5 sectoral programs.

296

297 **Table 4 - Climate Change National Adaptation Instruments by Country**

Continent	Country	NAS	NAP	Evaluation and/or assessment mechanisms	Sectoral Programs
Africa	MOZ	Yes	Yes	Yes	Yes
America	BRA	Yes	Yes	Yes	Yes
	CAN	Yes	Yes	Yes	Yes
	URY	Yes	Yes	Yes	No
Asia	IND	Yes	Yes	Yes	Yes
	MYS	Yes	Yes	Yes	Yes
	BGD	Yes	Yes	Yes	Yes
Europe	CZE	Yes	Yes	Yes	No
	DEU	Yes	Yes	Yes	Yes
	ENG	Yes	Yes	Yes	Yes
	LVA	Yes	No	Yes	Yes
	PRT	Yes	Yes	Yes	Yes
Oceania	AUS	Yes	No	Yes	Yes

298

299 The overall data shows a slight prevalence of sectoral programs focused on Human and
300 Socioeconomic Resources (HSER) (table 5) (see Appendix B.1). Almost all countries have
301 sectoral plans concerned with HSER, except India, where most programs belong to the
302 category Mixed, opting for an integrated approach to climate change programs (e.g.
303 Agriculture, Water, Health, Coastal Regions and Islands, Knowledge Management and
304 Capacity Building).

305

306 **Table 5 - Sectoral Programs by sector and Country (as of 2017)**

	Africa	America			Asia			Europe					Oceania		Total	
Sector	**MOZ**	**BRA**	**URY***	**CAN**	**BGD**	**IND**	**MYS**	**CZE***	**DEU**	**ENG**	**LVA**	**PRT**	**AUS**	**N**	**%**
Natural resources	**4**	**4**	**4**	**2**	**8**	**2**	**2**	**4**	**4**	**2**	**3**	**4**	**2**	**45**	**40,2**
Agriculture and Forestry	**2**	**1**	**2**	**2**	**2**	**1**	**0**	**1**	**2**	**1**	**2**	**2**	**0**	**18**	**16,1**
Water resources	**1**	**1**	**1**	**0**	**1**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**7**	**6,3**
Coastal Zones and Marine resources	**0**	**1**	**0**	**0**	**2**	**0**	**1**	**1**	**1**	**0**	**1**	**1**	**0**	**8**	**7,1**
Biodiversity and Ecosystems	**1**	**1**	**1**	**0**	**3**	**1**	**0**	**1**	**1**	**1**	**0**	**1**	**1**	**12**	**10,7**
Human and socioeconomic resources	**3**	**6**	**5**	**6**	**4**	**0**	**2**	**4**	**3**	**4**	**2**	**5**	**3**	**47**	**42,0**
Human health and protection	**2**	**2**	**1**	**0**	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**15**	**13,4**
Built Environment, Infrastructure and Economic activity	**1**	**4**	**4**	**6**	**3**	**0**	**1**	**3**	**2**	**3**	**1**	**3**	**1**	**32**	**28,6**
Integrated or Mixed	**2**	**2**	**1**	**1**	**4**	**4**	**1**	**1**	**0**	**1**	**0**	**1**	**2**	**20**	**17,9**
Total	**9**	**12**	**10**	**9**	**16**	**6**	**5**	**9**	**7**	**7**	**5**	**10**	**7**	**112**	**100**

Mean of Sectoral Programs by Country = 8.5(without URY and CZE)

*Main strategic sectors identified in NAP

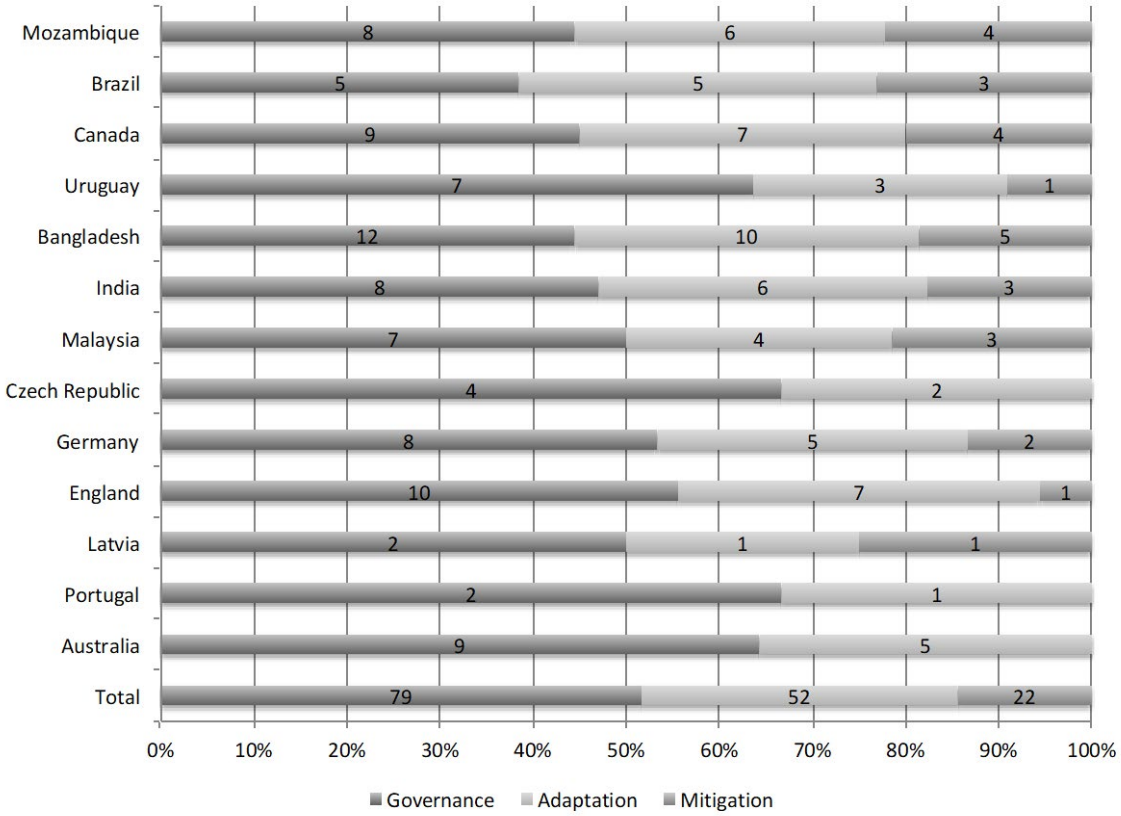
307

Table 5 presents the Sectoral Programs by category and country, corroborating the slight prevalence of the HSER main area (42% of the sectoral programs). The built environment, Infrastructure, and Economic Activity is the category with more sectoral plans (28,6%), followed by Agriculture and Forestry (16,9%) and Human Health and protection (13,4%). Besides, if Agriculture and Forestry were included within HSER, this area would reach 59%. Germany, Portugal, England, Canada, Bangladesh, and Brazil even have more than one sectoral program focused on "Built environment, Infrastructure, and Economic Activity". Note that this category is more significant in the European countries, Brazil and Canada, countries that have above average development indicators. On the contrary, the states with development indicators below average, such as Bangladesh, India and Mozambique privilege sectoral programs focused on Natural Resources. In the Czech Republic and Uruguay, there are no sectoral programs; however, the main strategic sectors identified in NAP coincide with the sectoral plans defined by other countries: Built Environment Infrastructure and Economic activity and Agriculture and Forestry.

3.2 Climate Change National Adaptation Plans–standardisation of the objectives

National Adaptation Plans in these 13 countries reflects, in principles, the international agenda of global climate change adaptation efforts. Figure 3 presents the main goals of the NAP of each state organised into three areas (see Appendix B.3): governance, adaptation, and mitigation (because mitigation is mentioned in most NAPs).

Figure 3 - NAP Objectives. The results were obtained through the categorisation of the objectives mentioned in each NAP.



Governance is a critical part of all National strategies. The establishment of integrated policies, suitable institutional arrangements and procedures, proper intergovernmental coordination and communication about Climate Change, and the involvement of all stakeholders guide the NAP objectives in almost every country. Governance objectives reveal the need to ensure that NAP has the (local, regional and national) institutional and funding support that is needed to implement plans.

The adaptation objectives are similar in every country. All countries include the maintenance and improvement of the adaptability of natural/social/infrastructure or/and economic systems, reducing vulnerability, risks and increase responsiveness and assist/protect the vulnerable populations. Although the focus is on the adaptation policies to climate change, most countries (Australia, Bangladesh, Brazil, Canada, England, Germany, India, Latvia, Malaysia, Mozambique, and Uruguay) also include some mitigation objectives in their NAS.

3.3 Climate Change Sectoral Programs: Homogeneity of adaptation plans vs heterogeneity of contexts and vulnerabilities.

As referred above, the overall analysis shows absolute uniformity in the approach to climate change in the NAP, which does not reflect the different characteristics and specificities observed in each country. The development of Sectoral Programs can partially solve these

adding social, economic, cultural, political national features to the agendas and adding context vulnerabilities and risks. That is the reason why we explored whether the Programs in each country indicate any efforts to undertake an aligned policy with the vulnerable/critical sectors identified in the NAP.

All thirteen studied countries report critical sectors based on their critical vulnerabilities mentioned in the NAP (table 6) (see also Appendix B.2) ordered as follows: Built Environment, Infrastructure and Economic activity followed by Agriculture and Forestry, and Biodiversity.

356 **Table 6 - Critical sectors in the NAP**

Sector	**Africa**	**America**			**Asia**			**Europe**					**Oceania**	Total	357
	MOZ	BRA	CA	URY	IN	MYS	BGD	CZE	LVA	DEU	ENG	PRT	AUS	**N**	**%**
Natural resources	9	6	7	7	7	8	8	5	3	6	9	4	8	87	44,2
Agriculture and Forestry	3	2	3	2	3	2	3	2	2	2	3	2	2	31	15,7
Water resources	1	1	1	1	1	1	1	1	0	1	1	0	1	11	5,5
Coastal Zones and Marine resources	2	1	1	1	1	2	2	0	1	1	2	1	2	17	8,6
Biodiversity and Ecosystems	3	2	2	3	2	3	2	2	0	2	3	1	3	28	14,2
Human and socioeconomic resources	11	7	9	7	9	2	6	7	2	5	11	5	3	84	42,6
Human health and protection	3	2	2	2	2	0	2	2	0	2	3	1	1	22	11.1
Built Environment, Infrastructure, and Economic activity	8	5	7	5	7	2	4	5	2	3	8	4	2	62	31.4
Mixed	3	0	3	2	3	3	2	1	1	2	3	0	3	26	13,1
Risk prevention and management	3	0	3	2	3	3	2	1	1	2	3	0	3	26	13,1
Total	**23**	**13**	**19**	**16**	**19**	**13**	**16**	**13**	**6**	**13**	**23**	**9**	**14**	197	100

Countries mean = 15,2

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Table 7 presents the comparison between critical sectors in the NAPs and the programs in each country, analysed above in tables 5 and 6. Based on the data gathered, the most important features are as follows:

- Bangladesh, Portugal, Australia, and Mozambique Sectoral Programs align with the vulnerable sectors identified in the NAP.
- In England (3), Germany (2), Malaysia (2), India (1), Latvia (1), and Canada (2) there is a gap between the vulnerable sectors identified in the NAP and the Sectoral Programs.
- England, Malaysia, Latvia, and Canada identified Risk Prevention and Management as a key or vulnerable sector and did not foresee any program, on contrary Brazil has a sectoral plan towards Risk Prevention and Management, and it does not consider this a critical sector.
- Similarly, Canada identified Human Health and protection as one of the critical sectors and did not foresee any program, while Malaysia and Latvia have a sectoral plan and do not consider this a critical sector.

Table 7 – Comparison of between Critical Sectors in the NAPs and Sectoral Programs

		Critical sectors/Sectoral Program						
		Agriculture and Forestry	Water resources	Coastal Zones and Marine resources	Biodiversity and Ecosystems	Human health and protection	Built Environment, Infrastructure and Economic activity	Risk prevention and management
Africa	MOZ	Yes/Yes	Yes/Yes	Yes/Yes (M)	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
America	BRA	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	No/Yes
	CAN	Yes/Yes	Yes/Yes (M)	Yes/Yes (M)	Yes/Yes (M)	Yes/No	Yes/Yes	Yes/No
Asia	IND	Yes/Yes (M)	Yes/Yes (M)	Yes/Yes (M)	Yes/Yes	Yes/Yes (M)	Yes/No	Yes/Yes
	MYS	Yes/Yes (M)	Yes/Yes	Yes/Yes	Yes/**No**	No/Yes	Yes/Yes	Yes/No
	BGD	Yes/Yes	Yes/Yes (M)	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
Europe	DEU	Yes/Yes	Yes/No	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/No
	ENG	Yes/Yes	Yes/No	Yes/No	Yes/Yes	Yes/Yes	Yes/Yes	Yes/No
	LAV	Yes/Yes	No/No	Yes/Yes	No/No	No/Yes	Yes/Yes	Yes/No
	PRT	Yes/Yes	No/No	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	No/No
Oceania	AUS	Yes/Yes (M)	Yes/Yes	Yes/Yes (M)	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes

Legend: M – Integrated or Mixed

Table 7 also shows that in 11 (of the 91 total possible combinations) cases the vulnerable sectors identified have not a correspondent program. On the contrary, the number of the sectoral plan that does not reflect vulnerable areas is less frequent but still exists in three cases (Latvia, Malaysia, and Brazil).

3.4 Climate Change National Adaptation Plans Definition and Implementation - numerous areas of intervention, a single ministry

A critical part of the climate change National Adaptation Plans success consists in the establishment of suitable institutional arrangements and the involvement of all stakeholders. Climate action traditionally falls under the primary mandate of environment ministries, as is the case with most of the selected countries: Australia, Bangladesh, Malaysia, India, Canada, Brazil, Latvia, Czech Republic, and Mozambique. NAP outlining in Germany, Portugal, Uruguay, and England, on the contrary, extends beyond the mandate of a single ministry and involves several institutional actors (i.e. sectoral line ministries, government agencies, subnational authorities). In Germany, Portugal, and Uruguay the definition is of inter-ministerial responsibility (although the Ministry of the Environment led the process) and in England a new entity has been specially created to advice government on building a low-carbon economy and preparing for climate change (and create the NAP), the Climate Change Committee, an Independent Statuary Committee. Countries have in general a similar approach to the definition process of NAP, and the Sectoral Plans, India, Canada, and Brazil stand out for adopting inter-ministerial responsibility in the Sectoral Programs.

Table 8 shows that Ministries of Environment is, as referred, the driving force behind the process of NAP outlining; however, the NAP implementation usually involves other institutional actors (i.e. sectoral line ministries, government agencies, the private sector, NGOs). Only the Ministries of Environment of Latvia and Malaysia are responsible both for the definition and implementation of NAP. In Australia, the application of the NAP depends at which scale of particular government actions are proposed: all national activities are handled by the Federal (national) government, but if steps need to be implemented at other scales, as states, then implementation falls to state governments and agencies. In England, some of the policies and proposals implementation are the sole responsibility of the national government, but local government, industry, communities and civil society play an essential role to in some areas of joint responsibility that need shared solutions.

Table 8–NAP definition and implementation

		NAP definition		
		Ministry of Environment	**Inter-ministerial**	**Other stakeholders**
NAP implementation	**Ministry of Environment**	Bangladesh* Latvia Malaysia Australia		England
	Inter-ministerial	Czech Republic India Canada Brazil	Germany Uruguay Portugal	
	Other stakeholders	Mozambique		

*Ministry of Environment, Forest and Climate Change in Bangladesh

In what concerns the participatory mechanisms, the majority of NAP foresees some participation of the experts, NGO, Business (associations or not) and General Public in the definition and implementation process (Table 9). However, Latvia, the Czech Republic, and Canada did not include the involvement of some stakeholders in the implementation, especially of the general public.

Table 9 - Stakeholders involvement in NAP definition and implementation by country

Continent	Country	Experts	NGO	Business	General Public
Africa	Mozambique	⑤ ●	⑤ ●	⑤ ●	⑤ ●
America	Brazil	⑤ ●	⑤ ●	⑤ ●	⑤ ●
	Canada	⑤ ●	⑤ ●	⑤ ●	⑤
	Uruguay	⑤ ●	⑤ ●	⑤ ●	⑤ ●
Asia	India	⑤ ●	⑤ ●	⑤ ●	⑤ ●
	Malaysia	⑤ ●	⑤ ●	⑤ ●	⑤ ●
	Bangladesh	⑤ ●	⑤ ●	⑤ ●	⑤ ●
Europe	Czech Republic	⑤ ●	⑤	⑤ ●	
	Germany	⑤ ●	⑤ ●	⑤ ●	⑤ ●
	England	⑤ ●	⑤ ●	⑤ ●	⑤ ●
	Latvia	⑤ ●	⑤ ●	⑤ ●	
	Portugal	⑤ ●	⑤ ●	⑤ ●	⑤ ●
Oceania	Australia	⑤ ●	⑤ ●	⑤ ●	⑤ ●

Legend: ■ **participation in NAP definition** ● **participation in NAP implementation**

The mechanisms of participation are similar among countries despite their different socio-cultural characteristics. Our results show a proactive movement towards the involvement of

the various stakeholders, in the definition and (foreseen) implementation. Most of the countries establish different participatory mechanisms for each stakeholder, as follows: experts with scientific consultation, and advisory and participation in conferences; NGO – participation in focus groups and meetings; Business/Associations – participation in dialogues; broad public participation through online consultation and public hearings. It seems that a close relationship with the experts is privileged, while the involvement of NGO and Business/Associations is required through direct dialogues and the involvement of the citizens is more distant and relies on their will to participate. On the contrary, Australia, Brazil, and Mozambique establish for all stakeholders similar participatory mechanisms: discussion and participation through public hearings. The mechanisms of engagement are identical among countries despite their different socio-cultural characteristics.

4 Discussion

This article examines the state of climate change agenda and policies in 13 highly diverse countries in regards to their geography, socioeconomic development, vulnerability, adaptation, climate-risks, and climate management policies, allowing for a worthful cross-comparison. For instance, the CRI world rank varies from countries with low climate risk (e.g. Latvia, 113th), high risk (India, 12th), to very high risk (Bangladesh, 6th), whereas the socio-economic development ranges from the least developed countries (Bangladesh, Mozambique) to top world countries (Australia, Germany, and Canada).

Firstly, most of the selected countries have begun to show evidence of overall adaptation strategies to be delivered by plans such as NAP/NAS, Regional and/or Sectoral Plans. However, an exclusive focus on national adaptation policy obscures the complexity of the emergence of adaptation across multiple scales. National policy development does not always result in local implementation or policy (Keskitalo et al., 2013).

The growing adoption and diffusion of climate change adaptation policies can be the result of several drivers (Massey et al., 2014):

- Internal drivers: Extreme weather events; increased public awareness; recognising the benefits of policy; Domestic political pressure; scientific research.
- External drivers: Efforts by an international organisation; Efforts by European Union; Financial support from foreign funds; Pressure from NGOs; Motivated by progress in other countries.

Lesnikowski et al. (2013) classify the states as "leaders" and "laggards" (top-bottom 10% respectively) based on their Adaptation Initiative Index (AII) score (adaptation initiatives and recommendations) reported through the national communications to the UNFCCC. These authors found that most adaptation actions (63%) are being implemented through mainstreaming into existing frameworks, policies, institutions, and programs, and that impact/vulnerability assessment prevails. Australia, Canada, and Uruguay are among the "leaders". However, several authors (e.g. Villamizar et al., 2017; Leal Filho et al., 2018b) argue that the AII is, due to the lack of the assessment of implementations actions, more useful to define the level of planning behind (potential) preparedness of the countries than their actual capacity to reduce vulnerabilities. Despite that the assessment of implemented adaptation measures and policies should be prioritised, our analysis focuses on strategies rather than on implementation. In this regard, some of our informants refer, on the one hand, to the concrete impossibility of implementing measures and policies in the political and socio-economic context of countries (e.g. Mozambique), and, on the other hand, to the disbelief that the process of implementation is possible. However, in the LDC highly vulnerable Bangladesh, adaptation implementation is improving over the last decade, particularly in coastal areas (Leal Filho et al., 2018b).

Secondly, there are still steps to be made in the sectoral adaptation actions and regional plans, as well as in the levels of response. Through sectoral programs, countries may adopt specific and directed policies towards their vulnerabilities and needs. However, the Czech Republic and Uruguay do not have such plans (Uruguay will have a coastal NAP by the end of 2019, www.mvotma.gub.uy/napcostas) and except for Bangladesh, Portugal, Australia, and Mozambique, all other countries with sectoral programs present some gaps between the critical sectors identified in the NAP and the sectoral plans defined. Nonetheless, further assessments are needed to determine which climate scenarios and statistics are being used in planning, as a means to assess progress on adaptation.

In respect of regional plans, most European countries only have them at some local levels. However, the EU supports the engagement of cities in climate policy with such initiatives as the Mayors Adapt (Covenant of Mayors, 2018), and Smart Cities Initiative (European Commission, 2018b). An analysis of the Local Climate Plans of 885 Urban Audit cities of EU-28 showed that approximately 66% of towns have a mitigation plan, 26% adaptation plan, and only 17% joint plan (Reckien et al., 2018). The results of the research surveyed 200 European cities show that many cities are proactive on climate change and have a substantial commitment to mitigation (64%) and adaptation (23%) (Heidrich et al., 2016). Countries from other

continents tend to have local-level plans (except Australia), which can be traced back to specific national vulnerabilities and/or existence - or lack of - international funding from the UN, World Bank that promotes specific programs in developing countries (such as Climate Change Technical Assistance Project for Mozambique of the World Bank (2012)).

Thirdly, the analysis shows that regardless of the socioeconomic, vulnerability, adaptation, and climate-risk differences, Built Environment, Infrastructure, and Economic Activity is central in the NAPs programs and critical sectors identified, which may reflect the neglecting of other areas related to the Natural Resources and Health and Human Resources. Nonetheless, the category of Natural Resources is still significant among the less developed countries.

Fourthly, most of the countries include mitigation objectives in their NAPs (except Portugal, Australia, and the Czech Republic); yet, the Australian NAS mentions about mitigation. In the past, both mitigation and adaptation have evolved along different pathways. However, addressing climate change challenges through only one lens (either mitigation or adaptation) can lead to trade-offs, and one could undermine the other (Klein et al., 2007). Mitigation and adaptation are two different strategies for addressing climate change that complement each other. There may be great potential in creating synergies between mitigation and adaptation and implementing climate policy options more cost-effectively. So it is understandable that one of the objectives of Latvia, Malaysia, Bangladesh, India, Canada, Brazil and Mozambique NAP's is the "integration with mitigation policy".

Actually, it is essential to note that the climate change policies of the EU, which plays a leading role internationally (Bäckstrand & Elgström, 2013; Rayner & Jordan, 2013), have been mostly focused on the mitigation of climate change through a reduction of greenhouse gas emissions (European Environment Agency, 2013). Only with increasing evidence of adverse climate impacts, has the topic 'adaptation' appeared on the political agenda (Biesbroek et al., 2010). In Latin American countries climate management focuses on coping with extreme events and disaster risk management, particularly after the increased climate variability and disasters observed since 1998 (IPCC, 2012; Magrin et al., 2014; Villamizar et al., 2017). However, the development of NAPs and sectoral programs focus on adaptation and do not ignore mitigation; on the contrary, they tend to integrate it in a more balanced approach.

Finally, the overall analysis let us find that the NAPs definition/outline responsibility is concentrated in a single ministry, while the foreseen implementation responsibility is shared governmentally. Climate action traditionally falls under the primary mandate of environment ministries (Rizzo and Maro, 2018); furthermore, the formulation of NAPs is generally less an inclusive governance approach than optimally desired. For instance, adaptations reported from

520 African and low-income countries are primarily being driven by national governments, NGOs,
521 and international institutions, with minimal involvement of lower levels of government or
522 collaboration across nations (Ford et al., 2015). Thus, National governments are central actors
523 in climate change policies and are well positioned to play a crucial role in national adaptation
524 planning through NAPs. Although developed countries usually have a high adaptive capacity
525 potential due to their resources and human capital (see table 2), these factors do not necessarily
526 translate into adaptation itself (readiness). In practice, national governments are often
527 constrained by existing institutional arrangements, such as conflicting mandates or
528 fragmentation, or low political or public prioritisation of climate change, which may reduce
529 actual readiness. These findings are in agreement with the tension between top-down policy
530 development and bottom-up implementation stated by Termeer et al. (2012) in Europe.
531 The analysis of NAPs shows two different logics of adaptation: while in the studied developed
532 countries, the focus is tendentially on the economic risks and opportunities, in the developing
533 countries the centre is more on the natural resources and conservation.
534 Moreover, as stated above, there remains a potential gap between planned adaptation, and it is
535 implemented in practice. Although the NAP is a central government document, its ultimate
536 objective is to enable adaptation practices at multiple levels of governance through time and
537 space, but local and regional representatives are most often neglected (Biesbroek et al., 2010).
538 Furthermore, the complexity and multi-level nature of climate change require governance
539 systems able to manage and resolve conflicts of interests across multiple scales and among
540 diverse policy actors. Within the Global South, this is the more important, as priorities are
541 likely to be influenced by powerful international interests (Di Gregorio et al., 2019).
542 According to the analysis, countries tend to involve different stakeholders, in the definition and
543 (foreseen) implementation of NAPs because that way they can be implemented more
544 efficiently, and the responses to climate challenges can better meet the local needs. The usual
545 procedure is to establish different participatory mechanisms for each stakeholder: placing
546 experts at the centre of the decision as consultants and limiting the broad public participation
547 to an online consultation and public hearings. Besides that Latvia, Czech Republic, India, and
548 Canada even exclude the involvement of some stakeholders in the implementation of NAPs,
549 specifically the general public. Moreover, Malaysia foresees the participation of other
550 stakeholders only in the definition of NAP.
551 A drawback of this study is that from the 13 studied countries, seven are from Europe, Australia
552 and Canada; hence, some of the findings are not generalisable, e.g. the importance given to
553 natural resources and biodiversity is very likely underestimated, particularly for Africa.

Conclusions

The main implications of the study are as follows:

a) NAPs objectives translate more a global agenda and less the national/regional vulnerabilities (Hypothesis 1), particularly in developing countries.

b) The examined NAPs/NASs usually refer to related critical sectors and objectives, which justifies and expresses the gap between these and the vulnerable areas. The symbolic imposition of a unique one-size-fits-all model at the global level, the less than optimal level of participation of stakeholders at the national level (Hypotheses 2 and 3), and the socio-economic conditions of each country, undermine the adequacy of policies to the local reality and compromise the implementation of sectoral plans to face the country´s climate problems.

Our analysis also illustrates both the tensions and the gaps between climate policies on the one hand, and their adequacy and implementation on the other, an issue which needs further attention and research. It should be stated that despite the wide range of countries studied, it is not appropriate to generalise the study. This is also a limitation of the paper.

Despite the above constraints, the paper has allowed the identification of two different logics of adaptation reflected on the NAPs. One option, typical of developed countries, concentrates on economic risks and opportunities. Another option, usually in developing countries, concentrates on the natural resources and conservation, which supports hypotheses 4 and 5. This finding also needs further research to understand the role played by external aid and financing in promoting a country´s efforts towards climate change adaptation.

The development of NAPs is mainly state-centred in most of the 13 studied countries.

The participatory mechanisms for each stakeholder group should be put in place so that public participation is not only restricted to an online consultation and public hearings (more in the definition than in the implementation of plans).

The examined plans illustrate the complexities of climate change adaptation policies and national agendas that need further research and reflection from the scientific community regarding the interdependencies between the global and national scales, participatory and local grounded governance, and the integration of top-down and bottom-up planning and implementation.

Abbreviations and Acronyms

AII - Adaptation Initiative Index

AUS – Australia

BGD - Bangladesh

BRA - Brazil

CAN – Canada

COP – Conference of the Parties

CRI - Global Climate-Risk Index

CZE – Czech Republic

DEU - Deutschland

EEA - European Environmental Agency

ENG - England

EU – European Union

GBR – United Kingdom

HDI - United Nations Human Development Index

HSER - Human and socioeconomic resources

IND - India

LVA - Latvia

MOZ – Mozambique

MYS - Malaysia

NAP – National Adaptation Plan

NAS – National Adaptation Strategy

ND-Gain - Notre Dame University Gain Index

PRT - Portugal

UNFCCC - United Nations Framework Convention on Climate Change

URY – Uruguay

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