



**REGIONSADAPT**

# 2017 Report

Regions accelerating climate change adaptation

An initiative by:



Network of Regional Governments  
for Sustainable Development





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# Foreword



**Maria Cecilia Alvarado**  
Vice-Prefect Provincial Government of Azuay, Ecuador and Co-Chair for the South of nrg4SD

The Province of Azuay in Ecuador finds an exigency and a stimulus in the **RegionsAdapt** initiative. Exigency, because by assuming the commitment we knew it was time to implement the speech, to focus on specific projects, while looking at how the environmental approach marks our actions as an intermediate government, and to set measurable and verifiable goals. Stimulus, because we know that we are not alone, that we are part of a NETWORK, that our effort and our concerns are shared and that the work we do with our population is valued and appreciated, from the most local, in the face of a global problem. Our main achievement has been to have a plan turned into public policy through Provincial Ordinance, which we call the MAR Strategy

(Mitigation, Adaptation and Reversion). The MAR Strategy: 1. Emerges from the environmental to influence the entire provincial development model; 2. Organizes, articulates and gives integrality to all our actions as an intermediate government, establishing our work priorities in the face of Climate Change, based on our competences and our territorial and social reality; 3. It is our tool for planning, for dialogue, for articulation with the other levels of governments and with organized citizenship. 4. It establishes concrete actions and mechanisms that allow us to territorialize the Sustainable Development Goals. We reached the year 2018 with concrete institutional improvements. Projects stop being isolated initiatives to articulate and look at the impact as a whole. In spite of the economic difficulties, we reached the compliance of goals established for the year 2017, and we project ourselves with enthusiasm for this New Year. Our challenge: to achieve more incidence, understanding and respect to our development model. At the national government level, we aim to

create consciousness of the responsibility and the possibility offered by the work of an intermediate government to carry out a more sustainable development model. In our case, to continue struggling for the protection of water sources and the limitation of metal mining activity in these areas. At the local government level, once we have the accreditation as Provincial Environmental Authority, we aim to improve procedures and practices for environmental control throughout the territory; to carry out a follow-up and articulation work with the municipalities and to implement actions of the MAR Strategy, mainly in the solid waste management. At the international level, we project ourselves to take advantage of the **RegionsAdapt** and nrg4SD's wide platform, in order to make our efforts visible; to learn from our peers and to continue on insisting on the preponderant role that Regional Governments have in achieving a vision of territory that understands the interdependence of the urban with the rural.

## Seven hundred and thirty days involved in the **RegionsAdapt** initiative



**Marta Subirà**  
Secretary for the Environment and Sustainability, Government of Catalonia

When Catalonia and Rio de Janeiro suggested the **RegionsAdapt** initiative just two years ago, we did so based on the conviction that it was time that the voice of subnationals had a place at the top table of global climate policies. This is particularly true in the field of adaptation to the impacts of climate change, where the powers of non-state administrations are crucial in reducing the vulnerability of territories, and of the societies that live in them. **RegionsAdapt** is clearly moving in the right direction: based on cooperation and exchange information, we have built a useful partner-

ship that offers knowledge and action to make adaptation effective. This is reflected by the fact that as of today, **RegionsAdapt** includes subnational governments that represent a population of almost 300 million people on all the continents of our planet. Exchanging good practices, sharing ideas through webinars, the opportunity to participate in co-financed projects, developing a guide for adaptation and including our actions in the NAZCA database are tools that we have been working on over the past two years. As with many other sustainability policies, our nation is ahead of other nations in the world, and since 2012, it has adopted the Catalan Strategy for Adapting to Climate Change, for the 2013–2020 horizon (ESCACC); promoting and belonging to **RegionsAdapt** has been an accelerating factor. In February 2017, it enabled our Government to approve the timely review of this strategic instrument and as a result, the evaluation of the measures that

have been implemented all over our territory since 2012. Furthermore, the session of the Parliament of Catalonia of 27 July 2017 approved Law 16/2017, on climate change, with an absolute majority of the deputies voting in favour—a pioneering and advanced law in southern Europe. However, we must continue moving forward together in the framework of **RegionsAdapt** in order to provide a robust metric for adaptation. We must be able to quantify not only the effectiveness of the actions, but also the cost of not adapting. Although studies of global adaptation indicators are already being carried out, it is necessary to demonstrate to society in an empirical way and for each territory that the cost of not adapting is far higher than that of adapting. Catalonia believes that **RegionsAdapt** can help meet these challenges, which is why we are inviting other governments to meet the objectives of the second phase of the initiative that we share.

# Members

Table 1. *RegionsAdapt* members who reported through CDP's platform in 2017

Regional Government (Country)	Head of Government	Land area (km <sup>2</sup> )	Population
Alberta (Canada)	Premier Rachel Notley	661,848	4,252,900
Australian Capital Territory (Australia)	Chief Minister Andrew Barr	2,358	400,000
Azuay (Ecuador)	Prefect Paúl Carrasco Carpio	82,329	712,127
Basque Country (Spain)	President Iñigo Urkullu	7,235	2,171,886
British Columbia (Canada)	Premier John Horgan	944,735	4,773,345
Brittany (France)	President Loïg Chesnais-Girard	27,208	3,310,341
California (United States)	Governor Edmund G. Brown Jr.	423,470	39,200,000
Catalonia (Spain)	Secretary Marta Subirà	32,108	7,522,596
Ceará (Brazil)	Governor Camilo Santana	148,826	8,843,000
Cross River State (Nigeria)	Governor Benedict Ayade	21,461	2,892,988
Esmeraldas (Ecuador)	Prefect Lucía de Lourdes Sosa Robinzon	15,825	491,168
Fatick (Senegal)	President Omar Sène	2,646	361,710
Gossas (Senegal)	President Adama Diallo	2,500	105,000
Jalisco (Mexico)	Governor Jorge Aristóteles Sandoval Díaz	80,137	8,055,985
Kaffrine (Senegal)	President Adama Diouf	2,716	223,296
KwaZulu-Natal (South Africa)	Premier T. W. Mchunu	94,361	11,000,000
Lombardy (Italy)	President Roberto Maroni	23,864	10,008,349
Manabí (Ecuador)	Prefect Mariano Zambrano Segovia	18,940	1,370
Minas Gerais (Brazil)	Governor Fernando Damata Pimentel	586,520	20,734,097
Misiones (Argentina)	Governor Hugo Mario Passalacqua	29,801	1,197,823
Morona Santiago (Ecuador)	Prefect Felipe Marcelino Chumpi Jimpikit	25,691	148,000
Pichincha (Ecuador)	Prefect Gustavo Baroja	9,467	2,576,287
Prince Edward Island (Canada)	Premier Wade MacLauchlan	5,656	148,649
Québec (Canada)	Premier Philippe Couillard	1,667,712	8,326,089
Rabat-Salé-Kénitra (Morocco)	President Abdessamad Sekkal	18,385	4,580,866
Reunion Island (France)	President Didier Robert	2,504	850,996
Rio de Janeiro (Brazil)	Governor Luiz Fernando de Souza	43,778	16,550,000
Rio Grande do Sul (Brazil)	Governor José Ivo Sartori	281,738	11,286,500
Saint-Louis (Senegal)	President Mamadou Moustapha Mbaye	19,241	870,629
Santa Elena (Ecuador)	Prefect Patricio Cisneros	3,695	350,624
São Paulo (Brazil)	Governor Geraldo Alckmin	248,220	44,035,304
South Australia (Australia)	Premier Jay Weatherill	983,482	1,708,135
Tocantins (Brazil)	Governor Marcelo Miranda	277,721	1,383,445
Tombouctou (Mali)	Regional Councilor Mohamed Ibrahim	497,926	852,000
Wales (Wales)	First Minister Carwyn Jones	20,761	3,099,086
<b>Total</b>		<b>7,314,865</b>	<b>223,024,591</b>

# Introduction

When **RegionsAdapt** was launched in December 2015, at COP21, its founding members shared a general feeling that bolder action was needed to shed light on the contributions of regional governments to climate change adaptation. Hence, the creation of this initiative aimed at balancing mitigation and adaptation within the scope of actions undertaken by regional governments on the international stage, as well as stressing the importance of these actors within the global adaptation agenda. Filling these gaps would benefit not only regional governments, but also the climate change regime as a whole, taking into account the crucial importance this specific level of jurisdiction has for adaptation.

The contributions of regional governments to adapting society to climate change can occur either directly or indirectly. Examples of direct contributions are manifold, ranging from addressing water scarcity to adopting ecosystem-based solutions or dealing with extreme weather events. Indirectly, regional governments also contribute to adapting communities to climate change by backing the actions undertaken at other levels of jurisdiction. They can support municipalities, facilitate the implementation of global decisions at the local level through vertical integration, and even offer inspiring and innovative solutions to national governments. Such regional governments' strategic role is especially meaningful in contexts in which they counterbalance setbacks arising from decisions adopted at the national level.

Notwithstanding all the evidence confirming the importance of regional governments to climate adaptation, these actors are not always as sufficiently included in this agenda as they should be. In fact, despite the legal responsibilities, the policy tools and the financial mechanisms that these actors have in a wide array of areas that are decisive for adaptation, the regional governments' role in adapting communities and territories to climate change remains largely underestimated – both in theory and practice.

This situation generates multiple implications that ultimately undermine adaptation goals in general. For instance, many challenges faced at the regional level could be better addressed if information were more effectively exchanged between regions dealing with similar issues. However, the relative lack of awareness about the adaptation actions of these jurisdictions impedes a more robust knowledge sharing process that could eventually save resources and enhance solutions in multiple locations. Likewise, if regional governments were more included in nationwide climate planning, the implementation of National Adaptation Plans would certainly benefit from stronger vertical integration. Moreover, because their role in adaptation remains undervalued most of the time, the regional governments' access to funding sources in this area is frequently inadequate, which tends to entangle them in a vicious cycle.

In the end, the paradox between the essentiality of regional governments to climate adaptation and the insufficient recognition of these actors in this field results in a situation in which the adaptation agenda turns out being the most jeopardized. Conversely, supporting regional governments' efforts leads to the likelihood of favoring adaptation at other levels of jurisdiction (e.g. local or national) and in other sectors (e.g. private sector and academia). **RegionsAdapt** was created to explore this quite untapped potential, as the first global initiative backing regional governments in climate adaptation.

It is true that, thanks to an engaged group of members and a dedicated Secretariat, **RegionsAdapt** has been able to deliver quite remarkable achievements in its first two years of existence. Six working groups were created around key priority areas, in which the technical staff of regional governments from all continents could exchange information and experiences through 25 online meetings. Nine webinars were also organized to discuss cross-cutting thematic based on the presentation of invited external experts. In the meantime, the initiative was included in several global coalitions as well, such as the UNFCCC Marrakech Partnership for Global Climate Action, the UN Sustainable Development Knowledge Platform, and the Climate Initiatives Platform of the UNEP DTU Partnership Database.

Adding to these accomplishments, now we share with you our second Data Report. This document is comprised of two main sections. The first one outlines the essential information collected through CDP's states and regions platform in the context of **RegionsAdapt**'s most recent reporting process. In 2017, 35 regional governments – whose combined population amounts to more than 223 million inhabitants – successfully disclosed information on their main climate risks and related actions. This figure represents a 30% increase in relation to that of 2016 and includes 19 regional governments from the Americas (14 of which are Latin American), 9 from Africa, 5 from Europe, and 2 from Asia and Oceania.

The second section of the present report encompasses an assessment review of the initiative's first two years and briefly portrays its envisaged future. This two-year milestone represents the completion of the deadline that founding members had established to accomplish their three commitments and the conclusion of **RegionsAdapt**'s first phase for those that successfully fulfilled all three of them. As a result, the initiative's new commitments are also outlined in this section.

While such vanguardism offers a great amount of visibility, it also entails considerable challenges. In this sense, we hope that this report may also draw the attention of the international community to the added value of the **RegionsAdapt** initiative and boost opportunities to craft new partnerships.

# Regions take action in adapting to climate change

The year 2017 delivered a series of dreadful extreme weather events worldwide. Floods affected millions of households in Southeast Asia, hurricanes in the Caribbean and the US claimed a number of human lives and injured people alongside devastating infrastructure damage, and droughts in Africa caused famines and alarming water shortages. The risk of climate-related disasters has increased due to higher greenhouse gas concentrations and will further increase in frequency and intensity in the future.<sup>1,2</sup> The Intergovernmental Panel on Climate Change (IPCC) affirms this in its latest report: “Climate-change-related risks from extreme events, such as heat waves, extreme precipitation, and coastal flooding, are already moderate (high confidence) and high with 1°C additional warming (medium confidence). Risks associated with some types of extreme events (e.g., extreme heat) increase further at higher temperatures (high confidence).”<sup>3</sup> In addition to these extreme weather events, sea level rise poses a significant risk not only to Small Island States but also to coastal areas around the world. The IPCC estimates that the global sea level rise will be between 26 and 98 cm by 2100, with widespread effects on populations, infrastructure and ecosystems due to coastal and riverbank erosion, flooding and storm surges.<sup>4</sup> As the UN Secretary General stated during a speech in May, “Climate change is a direct threat in itself and a multiplier of many other threats – from poverty to displacement to conflict. The effects of climate change are already being felt around the world. They are dangerous and accelerating.”<sup>5</sup>

In order to limit the impacts of climate change, accelerated mitigation action is needed. But the latest edition of UNDP’s Emissions Gap Report shows that current efforts are not sufficient: “The 2°C emissions gap for the full implementation of both the conditional and unconditional NDCs for 2030 is 11 to 13.5 GtCO<sub>2</sub>e. The gap in the case of the 1.5°C target is 16 to 19 GtCO<sub>2</sub>e.”<sup>6</sup> Enhanced mitigation ambition is urgently needed, and central for limiting adaptation costs. But these numbers indicate that the NDCs, as they currently are, only cover one third of the emissions

reduction needed, reinforcing the need for adaptation action. The Paris Agreement recognizes this importance of adaptation through several provisions, one of them being the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change (Article 7). Even though the Agreement establishes a global goal, it also recognizes the “multifaceted local, subnational, national, regional and international dimensions.”<sup>7</sup> Indeed, adaptation strategies need to take into account the territories where tackling adaptation challenges is required, since it is a location-specific task and there are no one-size-fits-all solutions. Here, regional governments play a crucial role due to their specific responsibilities in areas of climate adaptation, such as energy, environment, economic development, agriculture, and others, as well as their unique position between the national and local levels.

Focusing on these jurisdictions, this chapter will shed light on the different climate impacts that regional governments are facing, and on their numerous adaptation actions being taken in order to anticipate physical risks resulting from the impacts of climate change.

1. Energy&Climate Intelligence Unit, 2017: Tracking the fingerprints of climate change, two years after the Paris summit.

2. UN Security Council 2017: Concept note of Arria Formula meeting: Preparing for security implications of rising temperatures on 15 December 2017.

3. IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp.

4. Ibid.

5. UN Security Council Op. cit.

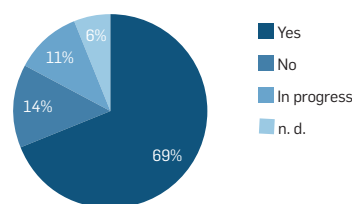
6. UNEP, 2017: The Emissions Gap Report 2017. United Nations Environment Programme (UNEP), Nairobi, Kenya.

7. UNEP, 2017: The Adaptation Gap Report 2017. United Nations Environment Programme (UNEP), Nairobi, Kenya.

## Impacts of climate change and associated adaptation actions

In total, 35 regional governments reported through the “risks and adaptation” section of CDP’s states and regions platform, and all of them face significant physical risks due to the impacts of climate change within their territories. More than two-thirds of these governments have already undertaken a climate change risk or vulnerability assessment in order to determine how they are or will be affected by climate change (see Figure 1), and as a first step to identify their needs. Compared to last year’s data, this share increased significantly.

Figure 1. Climate change risk or vulnerability assessments undertaken



Climate change impacts are assessed according to their level of risk and their anticipated timescale (in years). The level of risk is described by estimating the potential impact from the anticipated effect of climate change, along with the likelihood of that effect occurring. On CDP's platform, four options are available using this metric: (i) Extremely serious; (ii) Serious; (iii) Less serious; and (iv) Other. Similarly, there are four options to describe the expected timescales:

- Current: the region is already experiencing the identified effect of climate change;
- Short-term: the region will experience the identified effect of climate change by 2025;
- Medium-term: the region will experience the identified effect of climate change between 2026 and 2050; and
- Long-term: the region will experience the identified effect of climate change after 2051.

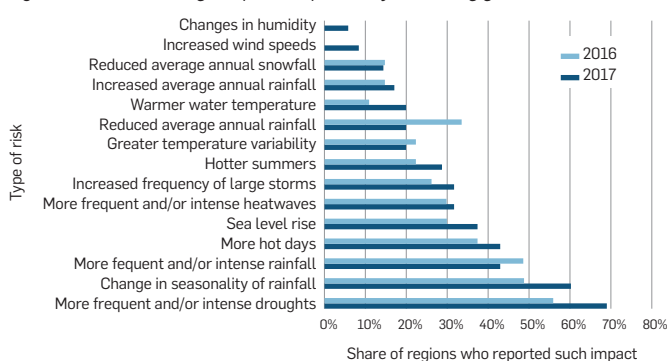
Additionally, we included the expression "not defined" (n.d.) when governments did not make any specifications on the respective metric. The 35 participating governments that said climate change presents significant physical risks to their regions, in total, reported 208 such risks resulting from climate change impacts – separated into 19 categories (For convenience we summarized some of these impacts in one category each, further along in this report).

These categories were the following:

- Change in seasonality of rainfall
- Changes in humidity
- Greater temperature variability
- Hotter summers
- Increased average annual rainfall
- Increased frequency of large storms
- Increased wind speeds
- More frequent droughts
- More frequent heatwaves
- More frequent rainfall
- More hot days
- More intense droughts
- More intense heatwaves
- More intense rainfall
- Reduced average annual rainfall
- Reduced average annual snowfall
- Sea level rise
- Warmer water temperature
- Other

In accordance with last year's results, the main concern for the disclosing governments in 2017 is more frequent and/or intense droughts (60%), followed by change in seasonality of rainfall (60%), as well as more frequent and/or intense rainfall and more hot days (each 43%). Sea level rise was reported by 37% of the regions as a climate change impact that they face or will face in the future. Nearly one third of the regions reported more frequent and/or intense heatwaves, as well as

Figure 2. Climate change impacts reported by disclosing governments



an increased frequency of large storms within their territories. Hotter summers also pose a significant threat to the disclosing regions, with 29% reporting such risk. In addition, greater temperature variability, reduced average annual rainfall and warmer water temperature are among the risks most commonly reported in 2017.

Similar to 2016, in 2017 the disclosing governments could not evaluate the seriousness of a number of climate change impacts (16%). For those risks where they could, most risks reported are considered as either serious (50%) or extremely serious (21%). The number of climate change impacts that are considered as less serious rose to 12% of the disclosing regions, which could be also due to the total number of regions and the slightly different composition of regions that disclosed in 2017.

In 2017, nearly one third of the climate change impacts are anticipated to occur in the medium term, that is to say between 2026 and 2050, whereas this number was smaller the year before. Nevertheless, climate change still constitutes a relatively immediate threat, with 19% of the regions reporting that they currently face climate change impacts, and 23% of them will face impacts by 2025.

Figure 3. Seriousness of reported climate change impacts

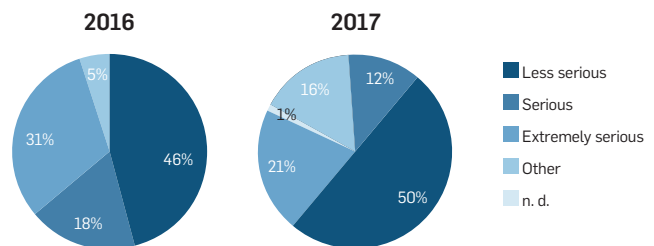
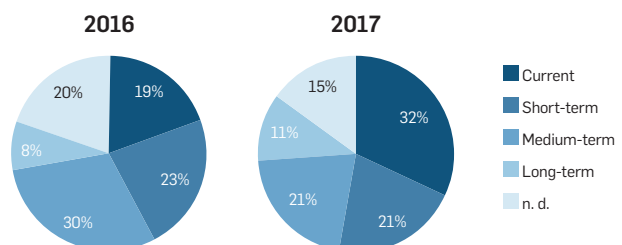
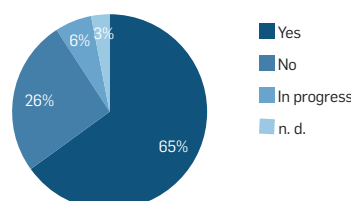


Figure 4. Anticipated timescale of reported climate change impacts



Given the fact that all of the disclosing regional governments reported that current and/or anticipated impacts of climate change present significant physical risks to their regions, it is evident that adaptation strategies and actions are inevitable. Most of the regional governments that reported identified this need and already developed an adaptation plan, or are in the process of developing one (see figure 5).

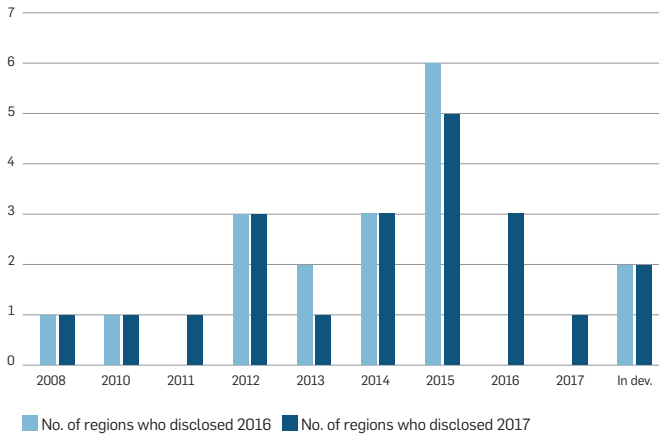
Figure 5. Existence of adaptation plans within the disclosing regions





The overall share of regional governments here did not change compared to last year's report. Further, it has been found that either the regions developed new adaptation plans or worked on their already existing ones, which was observable with the ongoing publications of adaptation plans (see figure 6).

Figure 6. Publication year of adaptation plans - compared to 2016 and 2017



Nevertheless, not all regions have adaptation plans to anticipate the impacts of climate change and their associated risks. The reasons for not having a plan are various. Some of the regions believe that adaptation should be integrated into all planning documents and, therefore, no specific document is needed, so they support a rather holistic approach to the topic. Further reasons mainly include a lack of human and financial resources, as well as capacities. In addition, inadequate institutional structures or the absence of political will and leadership constitute additional obstacles to the effective development of adaptation plans. International initiatives, such as **RegionsAdapt**, can support regional governments to overcome such obstacles in order to effectively mitigate the risks arising from climate change impacts. Despite the nonexistence of adaptation plans in some regional administrations, almost all the regions that disclosed do carry out adaptation actions. With 200 reported adaptation actions, regional governments are committed to protecting their territories and populations from the physical risks arising from the impacts of climate change. Figure 7 shows that more than two-thirds of the climate change impacts reported by the disclosing governments are covered by adaptation actions.

Figure 7. Coverage of adaptation actions

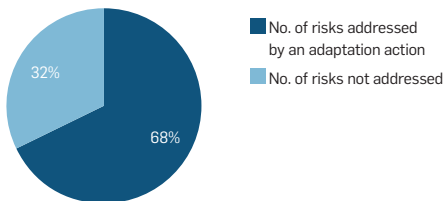
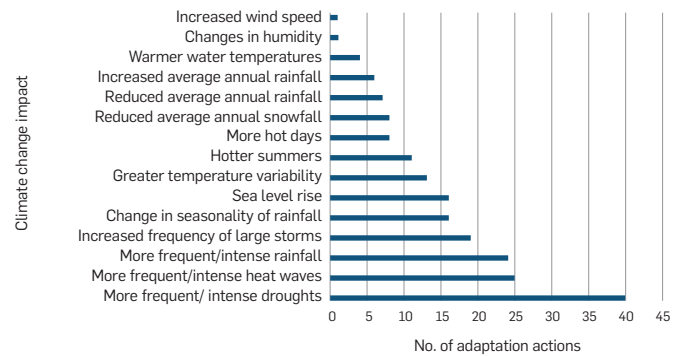


Figure 8 indicates that the number of adaptation actions addressing a certain climate change impact correlates with the type of risks most commonly reported by the disclosing governments. Whereas for other impacts, a higher number of adaptation actions addressing them could be associated with the drastic risks they involve.

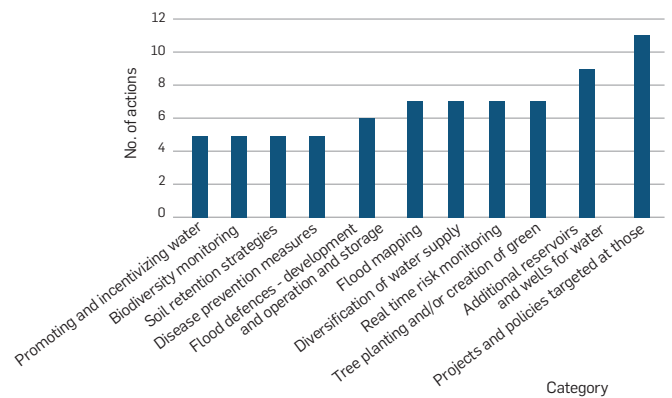
It should be added that in some cases there have been various adaptation actions developed that address the same climate change impacts, while, on the other hand, there are adaptation actions that address different climate change impacts (and have therefore been counted for each risk separately).

Figure 8. Most commonly-addressed climate impacts



Within the reporting platform, disclosing governments could choose from a number of categories of adaptation actions and further define the exact actions they are undertaking. Figure 9 shows the most commonly reported categories of adaptation actions in 2017. However, there is a huge number of adaptation actions (81) that fall into none of these categories, showing that there are no one-size-fits-all solutions in climate change adaptation.

Figure 9. Types of adaptation actions undertaken the most



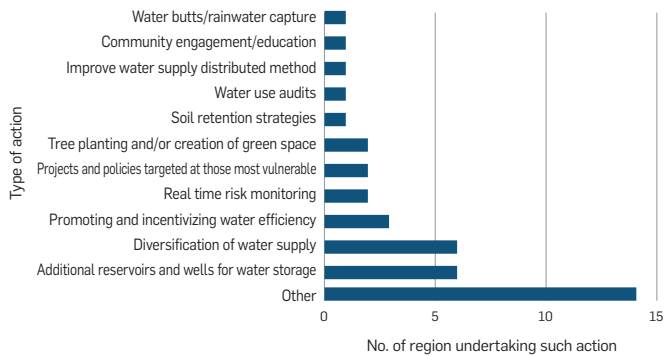
The next section of this report will take a closer look at the adaptation actions that regional governments are undertaking in order to anticipate the risks resulting from climate change impacts, reduce vulnerabilities and increase resilience within their territories.

# Droughts: More frequent and more intense

**D**roughts are the climate change impact most often mentioned by the regional governments that disclosed their data through CDP's platform. While more than half of them either face more frequent or more intense droughts as a result of climate change, ten regions have to deal with both – more frequent and more intense droughts. Droughts are considered as either a serious or an extremely serious threat that, for the majority of the regions, will occur in the medium term. Droughts affect mainly water resources in these territories, resulting in reduced water availability and leading to risks to the lives of humans and animals, decreased agricultural production, economic losses, threats to ecosystems and their services, as well as further associated physical risks.

Regional governments not only reported the various risks resulting from droughts as an impact from climate change, they also described 40 different adaptation actions they are undertaking. Some of them will be described in the following lines. While almost one third of the adaptation actions reported do not fall in any category provided by CDP's platform, the most mentioned categories are ensuring additional reservoirs and wells for water storage and the diversification of water supply.

Figure 10. Adaptation actions to droughts



The State of **Ceará** in Brazil, for example, builds dams and conduits to store water and transfer it to drier regions within its territory. The same logic is followed by the **Australian Capital Territory** in Australia, which recently completed two major construction projects. The Cotter Dam, which was completed in 2013, has increased the capacity of the Cotter Reservoir significantly, thereby increasing the water storage capacity of the region by 35%. The other project, the Murrumbidgee to Goongong Water Transfer Pipeline, completed in 2012, allows the transfer of up to 100 megaliters of water per day from the

Table 2. Regions affected by more frequent and/or intense droughts (Regions in *italic face* both, more frequent and more intense droughts)

Region	Impact seriousness	Anticipated timescale
<b>Alberta</b>	serious	long-term
<b>Capital Territory</b>	serious	medium-term
<b>Azuay</b>	extremely serious	medium-term
<b>Basque Country</b>	serious	medium-term
<b>British Columbia</b>	serious	medium-term
• more intense droughts	n.d.	n.d.
• more frequent droughts	n.d.	n.d.
<b>Brittany</b>	serious	short-term
<b>California</b>	extremely serious	current
<b>Catalonia</b>	extremely serious	short-term
• more intense droughts	n.d.	n.d.
• more frequent droughts	n.d.	n.d.
<b>Ceará</b>	extremely serious	current
<b>Fatick</b>	serious	medium-term
<b>Gossas</b>	serious	short-term
<b>KwaZulu-Natal</b>	n.d.	n.d.
<b>Minas Gerais</b>	extremely serious	medium-term
<b>Québec</b>	less serious	medium-term
<b>Rabat-Salé-Kenitra</b>	serious	current
<b>Reunion Island</b>	n.d.	n.d.
<b>Rio de Janeiro</b>	extremely serious	medium-term
<b>Rio Grande do Sul</b>	serious	current
<b>Santa Elena</b>	extremely serious	long-term
<b>São Paulo</b>	serious	short-term
• more intense droughts	n.d.	n.d.
• more frequent droughts	n.d.	n.d.
<b>South Australia</b>	extremely serious	medium-term
<b>Tocantins</b>	extremely serious	short-term
<b>Wales</b>	serious	medium-term

Murrumbidgee River to the Goongong Reservoir. The government of **Santa Elena** in Ecuador is also assessing the construction of different reservoirs in order to transfer water from the Guayas river basin and cover the existing water deficit. The State of **Rio Grande do Sul** in Brazil is pursuing a different approach within the same category. The government here implemented a policy of incentives for farmers to adopt water storage practices on their properties, in addition to exempting water permits for small and medium-size reservoirs. Other regions are diversifying their water supply, such as **Gossas** in Senegal.



Image 1. Mampituba river in Rio Grande do Sul during drought season in 2017. AMANDA FADEL, SEMA

Here, the government wants to adapt agriculture to climate change in addition to other measures, such as the use of solar energy to have water for farmers and the promotion of bio-agriculture. In **Catalonia** in Spain, the River Basin District Management Plan of the Catalan Water Agency indicates that in periods of emergency drought, part of the regenerated water (2 m<sup>3</sup>/s) from the third system of the Llobregat river treatment plant will be sent 8 km upstream to the river Molins de Rei to guarantee the river flow. **KwaZulu-Natal** in South Africa is diversifying its water supply by assessing the feasibility of waste water reuse and seawater desalination. Desalination systems are also one of the adaptation measures in the State of **Minas Gerais** in Brazil. They are implemented in order to ensure the sustainable use of surface water and groundwater in rural communities. **South Australia** is also diversifying its water supplies and storage, including through the use of desalinated water, recycled water and stormwater capture and reuse to augment supplies.

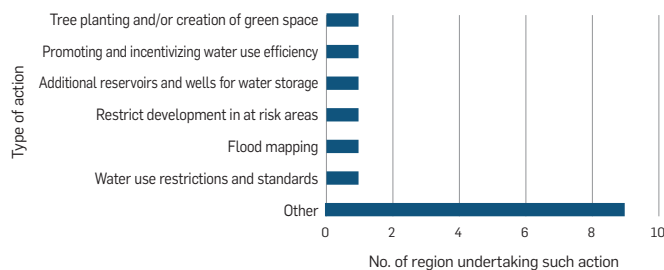
Promoting and incentivizing water use efficiency is another category of adaptation measures that actively integrates the local population into the regions' adaptation efforts. The State of **California** in the U.S., for example, developed energy efficiency and water standards that require water appliances to consume less water, thereby using less energy while performing the same function. In addition to that, the California Department of Food and Agriculture's State Water Efficiency

and Enhancement Program offers financial assistance for the implementation of irrigation systems that reduce greenhouse gases and use water more efficiently on Californian agricultural operations. The Province of **Québec** in Canada is sensitizing its population through a public awareness campaign that promotes water use efficiency. **British Columbia** in Canada brought into force the Water Sustainability Act that protects aquatic ecosystems and allows water for essential household use during times of water scarcity. It further authorizes regulation at such times of stream water and groundwater diversion and use. Furthermore, this regional government developed the Drought Response Plan that guides action of federal, provincial and local government agencies during drought events. In **Rio de Janeiro** in Brazil, the government implemented the Sustainable Rural Development Project (RRP- Rio Rural Project), which aims to increase the adoption of integrated and sustainable farming systems in 270 micro-watersheds of the state covering 59 municipalities. Among other objectives, the project intends to promote and contribute to sustainable development, reducing drought in 50 watersheds, which includes 1,440 ha of riparian forests and springs protected or restored, and 1,280 ha of reforested areas. Another state in Brazil, **Tocantins**, carries out the so-called Barraginhas Project, which aims to capture rainwater and promote its infiltration into the soil, in order to perpetuate the state's water bodies.

## Change in seasonality of rainfall

Change in seasonality of rainfall poses a number of risks to the disclosing regions. The agricultural sector particularly suffers from this climate change impact as water availability, in addition to sowing and harvesting activities, are strongly affected if seasons change. In other regions, like **Alberta** and **British Columbia**, a shift from snow to rainfall in winter can affect water availability later in the year. Also, other regions reported risks to their water availability due to problems with groundwater recharge or dam regulation. Regional infrastructure and energy supply are also at risk due to a change in seasonality of rainfall. Three quarters of the regions that reported facing this climate change impact stated that they are or will be seriously affected by it, making adaptation tremendously necessary. A total of 15 adaptation actions were reported, the majority of them not falling into one of the provided categories.

Figure 11. Adaptation actions to change in seasonality of rainfall



In order to anticipate the risks resulting from a change in seasonality of rainfall, the province of **Pichincha** installed additional reservoirs and wells for water storage and **Morona Santiago**, also in Ecuador, carries out a mix of different adaptation actions. The government monitors climate and water through weather and hydrological stations, implements agricultural drainage and reforestation actions, and has also created a number of environmental regulations. A broad

Table 3. Regions affected by change in seasonality of rainfall

Region	Impact seriousness	Anticipated timescale
<b>Alberta</b>	serious	long-term
<b>Australian Capital Territory</b>	serious	medium-term
<b>Azuay</b>	serious	current
<b>Basque Country</b>	serious	short-term
<b>British Columbia</b>	less serious	medium-term
<b>Brittany</b>	less serious	long-term
<b>Catalonia</b>	serious	current
<b>Fatick</b>	less serious	long-term
<b>Jalisco</b>	serious	long-term
<b>KwaZulu-Natal</b>	extremely serious	long-term
<b>Lombardy</b>	serious	short-term
<b>Minas Gerais</b>	extremely serious	medium-term
<b>Morona Santiago</b>	serious	short-term
<b>Pichincha</b>	serious	current
<b>Prince Edward Island</b>	serious	medium-term
<b>Québec</b>	serious	current
<b>Rabat-Salé-Kénitra</b>	serious	current
<b>Rio de Janeiro</b>	extremely serious	current
<b>Santa Elena</b>	serious	medium-term
<b>South Australia</b>	extremely serious	medium-term
<b>Wales</b>	serious	current

approach is also applied by the region of **Lombardy** in Italy. The government re-evaluates its hydro-geological hazard mitigation plan by explicitly considering future climate variability. Further, the region implements adequate policies and protection systems in response to the expected increase in flood risk. The province of **Azuay** in Ecuador also tries to reduce the flood risk resulting from a change in seasonality of rainfall with the execution of maps showing the vegetation



cover of its territory. The **Basque Country** in Spain applies various measures in order to anticipate the risks resulting from a change in seasonality of rainfall. It incorporates water stress estimations in hydrological plans, facilitates the creation of green space with grants for climate actions in municipalities and plans for special areas for conservation. In addition, the government promotes water efficiency through the renovation of the water supply infrastructure, the grouping of water supply agents, as well as the review of taxes and awareness-raising measures. The government of **KwaZulu-Natal** anticipates possible risks through restricting development in areas at risk. The Municipal System Act and Disaster Management Act requires disaster management practitioners to identify areas of risk, which involves monitoring where and what investment or developments are under planning and ensuring that they are not build on flood plains. In **South Australia**, governments, research institutions and the primary industries sector are working to change irrigation and farm management practices and crop types, as well as diversify its industry in preparation for reduced water availability. Further, reduced water allocation, water trade, and water use restrictions are used to manage limited water supplies in the region. **British Columbia** applies a more holistic approach in adapting to climate change by incorporating climate change into long-term planning documents and climate change assessments for key economic sectors to identify climate-related risks and actions that can help these sectors prepare for climate change. The **Australian Capital Territory** has changed its water management approach to using permanent water conservation measures. These measures ensure that, even though the government no longer applies water restrictions, a sensible and conservative approach is applied to water use. Since these new water conservation measures have been put in place, overall water consumption dropped significantly, representing a 39% savings in per capita demand. Additionally,



Image 2. Agriculture will be highly affected by the change in seasonality of rainfall, Agriculture at River Muga, Catalonia. GOVERNMENT OF CATALONIA

during the 1996 to 2009 Millennium Drought, the **Australian Capital Territory** government implemented a number of potable water substitution schemes such as stormwater harvesting for irrigation of urban green space. **Québec** anticipates the risks resulting from changes in seasonality of rainfall by consolidating its water monitoring network and producing a hydroclimatic atlas evaluating the impact of climate change on river flood and low-flow periods. Moreover, the government is aiming to acquire knowledge on vulnerabilities of hydroelectricity production and reservoirs management adaptation to these new climate conditions.

## More extreme rainfall events

**M**ore frequent and more intense rainfall events are mostly associated with flooding, posing significant risks to human life, buildings and infrastructure, as well as problems in the agricultural sector – such as crop and livestock productivity. Fifteen of the disclosing governments stated that their regions are or will be affected by either more frequent or intense rainfall, or both, with most of them estimating these climate change impacts as serious. Most of the regions are already taking action in adapting to these extreme rainfall events. Twenty-one different adaptation actions have been identified here.

Figure 12. Adaptation actions to extreme rainfall events

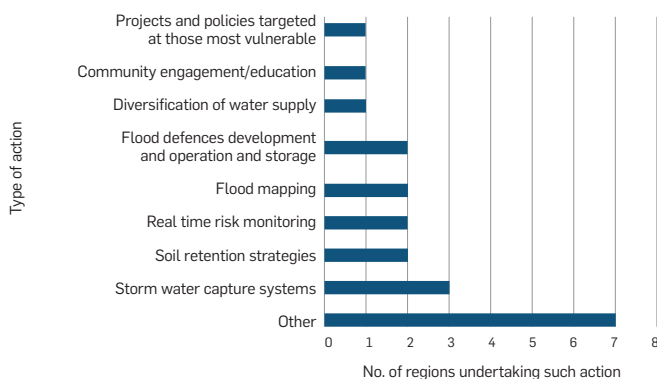


Table 4. Regions affected by more extreme rainfall events (Regions in italic face both, more frequent and more intense rainfall)

Region	Impact seriousness	Anticipated timescale
<b>Alberta</b>	serious	long-term
<b>Basque Country</b>	serious	medium-term
<b>British Columbia</b>	serious	current
<b>Catalonia</b>	serious	short-term
<b>Fatick</b>		
• more frequent rainfall	less serious	short-term
• more intense rainfall	other	current
<b>Jalisco</b>	serious	short-term
<b>KwaZulu-Natal</b>		
• more frequent rainfall	serious	medium-term
• more intense rainfall	extremely serious	long-term
<b>Lombardy</b>	serious	short-term
<b>Minas Gerais</b>	serious	medium-term
<b>Prince Edward Island</b>	serious	medium-term
<b>Québec</b>		
• more frequent rainfall	serious	current
• more intense rainfall	extremely serious	current
<b>Rio de Janeiro</b>	n.d.	n.d.
<b>Rio Grande do Sul</b>	serious	medium-term
<b>South Australia</b>	serious	medium-term
<b>Wales</b>	serious	current

The **Basque Country** invests in rural areas and conserves forest for soil retention in its territory, while **Minas Gerais** applies real-time risk monitoring in order to reduce the state's vulnerability to extreme rainfall events. **Catalonia** installed anti-flooding systems in its territory. A network of metropolitan collectors and municipal networks are the main infrastructure in cities within the region to drain off rainwater, regulate flow and reduce the risk of flooding associated with torrential rainfall. The unified anti-flooding system of tanks built in some cities in the Barcelona Metropolitan Area is a measure to reduce the risk of flooding and guarantee the quality of bathing water, as well as regulating flow into water treatment plants. **Wales** carries out a number of adaptation actions. Among others, the Flood Awareness Wales program continues to raise awareness of flood risk and how to prepare for flooding. In addition, the Natural Resources Wales, Lead Local Flood Authorities, Internal Drainage Boards and Water and Sewerage companies are managing flood and coastal erosion risks. In the winter storms of 2013/14, it is estimated that approximately 75,000 properties and 34,000 ha of agricultural land was protected from flooding. This meant damages estimated at nearly £3bn (around 3.6bn €) were avoided. Moreover, more than 340 coastal and river flood defense schemes have been carried out, reducing flood risk to approximately 6,700 properties. Land management actions, such as restoring vegetation to river banks, improving connectivity between habitats and managing upland wetland areas that will help to reduce nutrient loss, increase water retention, reduce surface water flows and improve natural coastal defenses, are further actions the government of **Wales** is taking. The province of **Prince Edward Island** in Canada is opposing the risks to its infrastructure that result from more extreme rainfall events through its requirement that new infrastructure, like bridges and culverts, is designed with climate change considerations, thus resulting in more resilient infrastructure within the province. In **South Australia**, the government developed state emergency management frameworks for prevention, preparedness, response and recovery from flooding events. Further, the region uses early warning systems and invests in water-sensitive urban design, stormwater infrastructure, as well as green infrastructure to

manage the impact of excess water in the landscape. The state of **Rio de Janeiro** in Brazil carries out a number of adaptation actions of different categories. In addition to the flood mapping that the state is carrying out, which entails the data of historical floods, population reports of previous events and previous studies, as well as the associated risk identification and analysis, the government is engaging the local community through flash flood alerts that are sent to the population through SMS. In addition, Emergency Teams (free translation from "Defesa Civil") are associated to publicity actions, especially using social networks and the State Environment Institute's website. The risk management efforts of the government are based on five pillars: diagnosis, preparation, prevention, adverse events management and recovery. In **Rio Grande do Sul**, the government tries to anticipate the risks resulting from more extreme rainfall events through the so-called Situation Room, for the monitoring, prevention and mapping of extreme hydrological events. This project is one of the central points of the state's Extreme Events Management Program and aims to combine data from hydro-meteorological gauges and radar volumes with hydro-meteorological modeling in the same platform. The Situation Room issues forecasts for the Emergency Team ("Defesa Civil") to inform of potential risks due to extreme weather conditions and river levels. Different strategies are also carried out by **Québec**. The development of new material and land use planning for better soil retention is complemented by research and pilot projects of stormwater capture in urban areas, such as retention basins. In addition, integrating increased likelihood of flooding in the new flood mapping of rivers and projects in natural disaster risk prevention, including increasing resilience of infrastructure and buildings to landslide risks, are measures targeted to reduce the vulnerability within the province's territory. **British Columbia** wants to enhance preparedness ahead of major storms through weather forecasting and warning dissemination. Furthermore, the government is working with professional associations to build capacity and provide guidance, and it provides engineering design processes in order to promote climate-resilient infrastructure such as highway bridges and culverts.



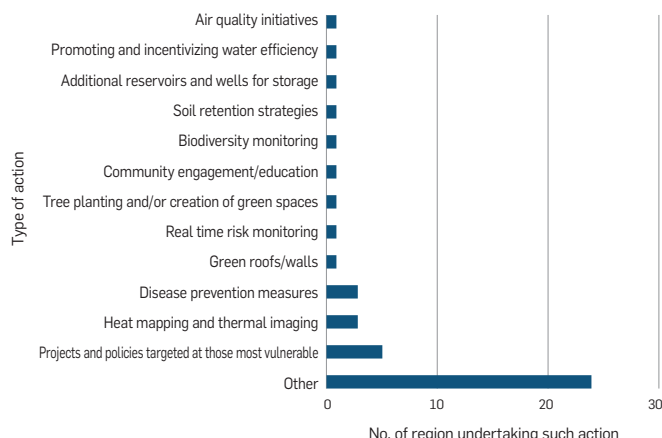
Image 3. *British Columbia is changing its road engineering design processes to promote climate resilient infrastructure.*  
GOVERNMENT OF BRITISH COLUMBIA



# Heat extremes: More hot days, hotter summers and heatwaves

More hot days, hotter summers, as well as more frequent and more intense heatwaves pose various risks to the disclosing regions. One huge concern is the impact on public health, as especially vulnerable populations, like children and the elderly, suffer most under heat extremes – thus also raising healthcare costs. Declining air quality, especially in urban areas, and increases in allergenic plant pollen contribute to increased respiratory illness. In addition to the impacts on human health, heat extremes exaggerate the risks and the intensity of wildfire events. Water availability and supply, as well as agriculture are also highly affected by increasing heat. While during cool seasons the energy demand for heating will be reduced, the energy demand for cooling in summer might increase. Due to the intensity with which increased heat affects not only the environment but also human health, regional governments are undertaking a high number of adaptation actions in order to reduce vulnerabilities.

Figure 13. Adaptation actions to warmer conditions



In **South Australia**, various adaptation measures are occurring across local and state governments, and by regional stakeholders or research institutions. Among them are community education and engagement around managing personal health impacts related to heat, as well as heat and green mapping to understand and prioritize treatments – including the role of green infrastructure. Local and state governments are also working to plan for bushfire risk and response efforts, and restrictions on activities that can be undertaken on total fire ban days are being implemented. In addition to the public sector, business organizations are changing requirements for working in extreme heat conditions. In **Lombardy**, the government is reinforcing healthcare services and increasing efforts and resources in prevention and control that explicitly take climate change projections into consideration. The region is also intensifying efforts in reducing the ‘heat urban island’ effect in metropolitan areas (e.g. expand green spaces and urban parks, bio-climatization in new buildings, etc.). Moreover, the government is promoting hygiene habit campaigns, food safety, healthy lifestyle choices, and it’s trying to ensure adequate energetic supplies for air conditioning during periods of high demand. The Catalan Action Plan to Prevent the Effects of Heat Waves on Health (POCS) establishes a series of measures and recommendations for the most vulnerable members of the public to prevent the impact of heat waves, and the Climate Change Adaptation Plan of the metropolitan area of Barcelona indicates adaptation measures for employers who can suffer from heat waves.

Table 5. Regions affected by warmer conditions (Regions in italic face both, more frequent and more intense heatwaves)

Region	Impact seriousness	Anticipated timescale
<b>Australian Capital Territory</b> • Heatwaves	serious	short-term
<b>Basque Country</b> • More frequent heatwaves • More intense heatwaves	serious n.d.	medium-term n.d.
<b>British Columbia</b> • More hot days • Hotter summers • More frequent heatwaves • More intense heatwaves	less serious serious serious n.d.	medium-term short-term medium-term n.d.
<b>Brittany</b> • Hotter summers • Heatwaves	n.d. serious	n.d. long-term
<b>California</b> • More hot days • Hotter summers • Heatwaves	extremely serious extremely serious serious	current current medium-term
<b>Catalonia</b> • More hot days • Hotter summers • Heatwaves	serious n.d. serious	current n.d. short-term
<b>Ceará</b> • More hot days	extremely serious	current
<b>Fatick</b> • More hot days • Hotter summers • Heatwaves	extremely serious serious less serious	current current short-term
<b>Jalisco</b> • More hot days	serious	medium-term
<b>KwaZulu-Natal</b> • More hot days	serious	medium-term
<b>Lombardy</b> • More hot days • Hotter summers • Heatwaves	extremely serious extremely serious serious	short-term short-term short-term
<b>Manabí</b> • More hot days	serious	current
<b>Minas Gerais</b> • Hotter summers • More hot days	serious serious	medium-term long-term
<b>Québec</b> • More hot days • Hotter summers • More frequent heatwaves • More intense heatwaves	less serious less serious n.d. serious	current current n.d. short-term
<b>Rabat-Salé-Kénitra</b> • More hot days • Hotter summers • Heatwaves	extremely serious serious serious	current current current
<b>Rio Grande do Sul</b> • More hot days	serious	current
<b>South Australia</b> • Heatwaves	extremely serious	short-term
<b>Tocantins</b> • More hot days	serious	medium-term
<b>Wales</b> • More hot days	extremely serious	long-term



Image 4. Increased summer temperatures, including the frequency and intensity of heat waves, may increase rates of evapotranspiration – water loss from plants, soils, and surface water. GOVERNMENT OF BRITISH COLUMBIA

Further, the MEDACC-Life project in **Catalonia** has developed a system for crop irrigation optimization (Giroreg), which takes into account weather forecasts, evapotranspiration data, and field measurements to estimate weekly irrigation needs in corn crops. These irrigation needs are sent to farmers, who can benefit from water and energy savings. In addition, the Catalan Office for Climate Change will open a call for grants for municipalities to develop actions to reduce the loss of water in the urban network and actions to reduce the effect of heat urban island for vulnerable people. In the **Basque Country**, pilot projects are executed in different categories of adaptation actions. Alongside heat mapping and thermal imaging projects, the government developed projects to protect its population from heat waves through natural solutions in urban planning, such as parks and roof plazas. Future heat waves' implications in health are being analyzed in order to develop better alert and emergency protocols for the region. **Brittany** in France is providing additional reservoirs and wells for water storage and is working closely with the agricultural sector, as well as facilitating adaptation through localized actions facilitated by its climate air energy regional plan. The government of the **Australian Capital Territory** addresses the risks of heat to human health through the expansion of current health policies and programs that target services to the most vulnerable, and the government of **Québec** wants to prevent zoonotic diseases through the creation of a multidisciplinary observatory for evaluation, monitoring and prevention. Here, the government also assesses vulnerabilities of key species indicators of ecosystem health and monitors invasive species. In addition, an air quality initiative has been elaborated and implemented, and the government is monitoring

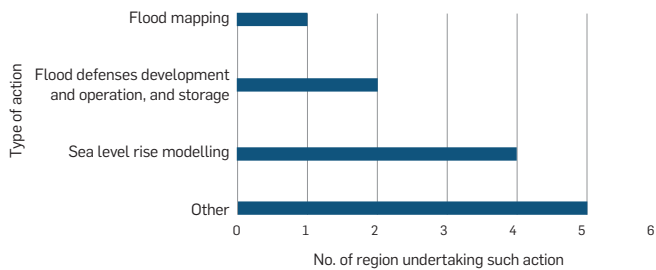
air contaminants. Other measures include a pollen reduction strategy, crop pest monitoring and the mapping and monitoring of permafrost, as well as actions addressing urban heat islands, such as tree planting, the construction of shaded areas, as well as the use of reflective material and the preservation of existing cool zones. In 2015, the state of **Rio Grande do Sul** approved a soil and water conservation policy to reduce the impacts of droughts and floods on a rural property level, and in **British Columbia** a new heat wave alerting system has been developed to alert the public and trigger municipal heat response plans. These plans include education messages to the public and vulnerable populations, advice about cooling centers and water stations, or considerations for outdoor events including water availability and schedule changes. The state government in **California** is providing resources, conducting research, and designing programs for climate conditions appropriate for individual communities through its Fourth Climate Change Assessment. The government is further preparing the states and its most vulnerable populations for extreme heat scenarios through a state-wide coordination by the California Public Health Department via the CalBRACE Program. CalBRACE enhances the California Department of Public Health's capability to plan for and reduce health risks associated with climate change through coordinating climate vulnerability assessments for all counties. Furthermore, the California Natural Resources Agency offers an Urban Greening Grant Program and the Governor's Office of Emergency Services developed a Heat Contingency Plan to help guide government and non-governmental organizations in managing heat-related emergencies.



# Sea level rise

According to the Intergovernmental Panel on Climate Change, the global mean sea level rise will be between 26cm and 98cm by 2100, associated with a number of risks like coastal and riverbank erosion, as well as floods in conjunction with storm surges.<sup>8</sup> Coastal communities, as well as buildings and infrastructure close to the coast, are at risk due to rising sea level, and coastal farming communities are threatened by salt water intrusion entering irrigation systems and accumulating in soils. Half of the regions that reported risks resulting from sea level rise already face those risks at the moment, and half of them also rated this impact from climate change as either serious or extremely serious. The severity of this impact has caused the majority of the disclosing regions to develop and implement adaptation actions to anticipate associated risks.

Figure 14. Adaptation actions to sea level rise



In order to protect island villages, the region of **Fatick** is developing protection dikes and **Prince Edward Island** is addressing flood risk concerns resulting from sea level rise through flood mapping in many locations as well as land use planning policies. **British Columbia** also developed actions against the flood risk from sea level rise. Here, new engineering and planning guidance on sea dike design and coastal development will help enable local governments and qualified professionals to protect people, buildings and infrastructure from sea level rise. The government of **Catalonia** created a new wetland at a restored area near the coastline. The regional models show that the flood level has decreased by 25cm and the water has entered 250m less than the original line. The project not only aims to adapt to sea level rise, but also to recover the natural sand dynamics as an adaptation action to coastal climate impacts – which has been achieved. Also, a water barrier against sea intrusion into the Llobregat aquifer is a structural measure that was developed by the Catalan Water Agency. Another project carried out

Table 6. Regions affected by sea level rise

Region	Impact seriousness	Anticipated timescale
Basque Country	serious	short-term
British Columbia	serious	long-term
Brittany	extremely serious	short-term
California	extremely serious	medium-term
Catalonia	less serious	current
Ceará	serious	current
Fatick	extremely serious	current
KwaZulu-Natal	extremely serious	short-term
Prince Edward Island	serious	medium-term
Québec	serious	current
Rabat-Salé-Kénitra	serious	current
Reunion Island	n.d.	n.d.
South Australia	extremely serious	current

in **Catalonia**, the LIFE EBRO-ADMICLIM project, proposes pilot actions of mitigation and adaptation to climate change in the Ebro Delta - an area vulnerable to sea level rise and subsidence. During 2017, the second phase of sediment injection in the Ebro River has been carried out to find solutions to prevent the regression and subsidence of the Ebro delta within the framework of the project. In **South Australia**, development plans are used to manage development in areas at risk, and detailed adaptation strategies have been identified for some coastal areas. In addition, structural and infrastructure protections have been developed for some areas. Monitoring and mapping are being undertaken to better understand risks. Sea level rise modeling is used in the **Basque Country**, where the government uses GIS mapping of the coast with 2100 level increase estimations. In **KwaZulu-Natal**, sea level rise modeling is also used for adaptation purposes. An assessment of relative coastal vulnerability for the **KwaZulu-Natal** coast is in place, a tool used to identify risk areas, at-risk infrastructure and communities most adversely affected by sea level rise. In addition, a coastal set-back line has been defined, which prohibits or restricts the building, erection, alteration or extension of structures that are wholly or partly seaward of the set-back line. It also protects coastal public property, private property and public safety, it protects the Coastal Protection Zone, and it preserves the aesthetic value of the coastal zone. Sea level rise modeling is also used in **California**, where it will help to

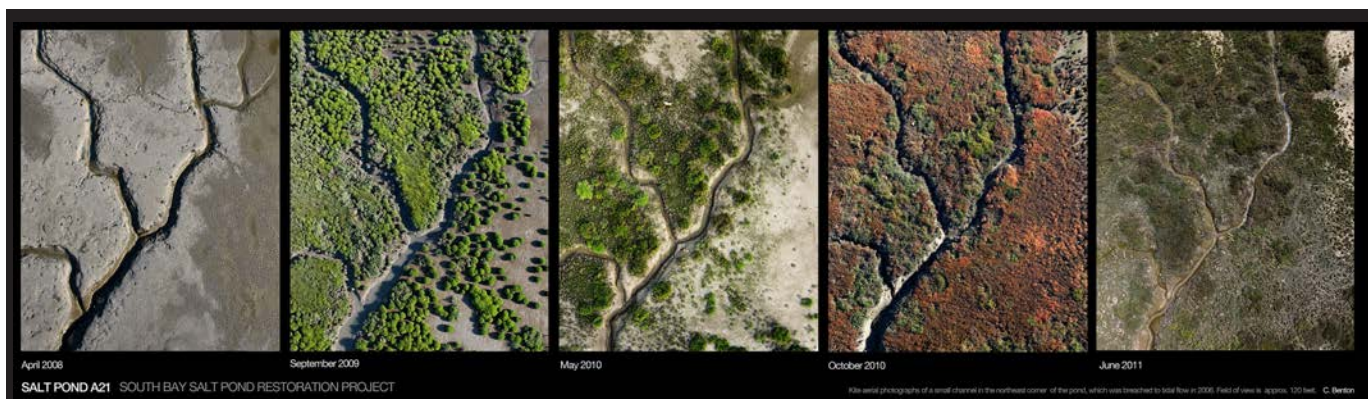


Image 5. Wetland restoration project in California to increase resilience to sea level rise. GOVERNMENT OF CALIFORNIA



guide the state in identifying the most vulnerable communities and coastal areas. The Fourth Climate Change Assessment utilizes various climate models that help inform departments that are investing in vulnerability assessments that inform decision-makers about those areas most vulnerable to sea level rise. These projected scenarios can be used to help state and regional managers develop plans to help communities adjust and adapt to the inevitable changes to **California's** coast and design adaptation measures including wetland restoration efforts that will mitigate the effects of sea level rise on the coastline. Furthermore, the 2014 Safeguarding document

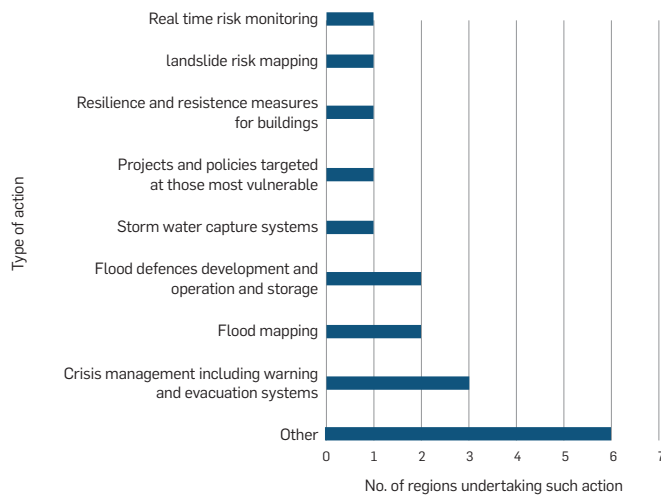
provides general guidelines for hazard avoidance for coastal and ocean ecosystems and communities that are most vulnerable to sea level rise. **California** is in the process of updating the Sea-Level Rise Guidance Document to ensure the best science available is incorporated into specific policy guidance for state and local decision-makers. **Québec** also uses sea level rise models and studies of impact on coastal submersion and erosion in order to reduce vulnerability to sea level rise within its territory.

8. IPCC, 2014: Op. cit.

## Increased frequency of large storms

An increased frequency of large storms exacerbates flood risk and thereby threatens not only human lives but also buildings and key infrastructure. Coastal erosion, land and mud slides have been also identified as risks resulting from more frequent large storms. Around one-third of the disclosing governments face or will face risks resulting from an increase in frequency of large storms. Most of them see those risks as serious or extremely serious and therefore already started to adapt their territories to this climate change impact with a total of 19 different adaptation actions reported in 2017.

Figure 15. Adaptation actions to large storms



The government of **Alberta** is currently expanding and updating flood hazard mapping in order to anticipate risks associated with large storms. Five hazard mapping studies in Southern **Alberta** are expected to be completed by December 2017. A river hazard study for Fort McMurray is scheduled to be completed by March 2018. Opportunities to incorporate climate change projections into flood hazard maps are also being explored. The government of **Reunion Island**, a French territory in the Indian Ocean, put in place several measures against the impacts of climate change. Among them is the financing for a plan targeted at the management of flood risk and the subsidization of various studies in order to better determine the vulnerability of the island. The government of **British Columbia** uses flood defenses development and operation, and storage, as well as improved weather forecasting and warning dissemination to enhance preparedness ahead of major storms. Further, the government promotes climate-resilient infrastructure through requiring and providing engineering design processes and procedures. The government of **Rio de Janeiro** developed a broad

Table 7. Regions affected by increased frequency of large storms

Region	Impact seriousness	Anticipated timescale
<b>Alberta</b>	n.d.	n.d.
<b>Australian Capital Territory</b>	serious	short-term
<b>British Columbia</b>	serious	short-term
<b>California</b>	extremely serious	medium-term
<b>Fatick</b>	other	long-term
<b>Misiones</b>	serious	current
<b>Prince Edward Island</b>	serious	medium-term
<b>Québec</b>	extremely serious	current
<b>Rabat-Salé-Kénitra</b>	less serious	current
<b>Reunion Island</b>	n.d.	n.d.
<b>Rio de Janeiro</b>	extremely serious	current

range of actions in order to reduce vulnerabilities within the state. Until now, the State Environment Institute (INEA) dredged 84.7km of rivers in emergency, extended the flood warning system to 80 stations and acquired two SBand Doppler Weather Radar System, relocated 478 families and has been executing a total investment of R\$ 631.3m (US\$ 191m) on measures for flood control and environmental restoration. Ten years ago already, INEA created Rio de Janeiro's Flash Flood Warning System, which has a team of meteorologists and technicians who analyze hydrological and meteorological network data 24 hours a day, 7 days a week. When there is a heavy rain or overflow forecast, INEA sends alerts via SMS to the registered population and to the Emergency Team ("Defesa Civil"), which receives a call and another communication via INEA's digital radio system. In addition, maps indicating the risk of flooding and/or landslides were developed in order to identify the need for evacuation and relocation of residents, depending on the risk and evacuation training for the population, as well as systems to communicate the danger of landslides and flooding were installed in critical areas. Moreover, weather radars are used to establish landslide risk protocols. In **Misiones** in Argentina, an early warning system was put in place, which includes threat monitoring, risk assessment, mapping, the dissemination of warning messages and the preparation of response measures. The government of **Québec** integrates climate change adaptation into risk prevention and public security policies, with crisis management including warning and evacuation systems being part of these policies. In addition, projects in natural disaster risk prevention, including increasing resilience of infrastructure and building of structures to protect against coastal erosion, are carried out. In **California**, climate change will alter the timing of storm and snowmelt runoff and thereby the time when dam operators manage storms will change. A US\$ 437m near-term investment in flood control and

emergency response was announced that includes proposed legislation to require the owners of all 1,250 dams regulated by the state to craft emergency action plans, including maps that show potential inundation areas in the event of dam failure. Moreover, the Department of Water Resources collaborates closely with the Governor's Office of Emergency Services in the preparation of the 2018 Hazard Mitigation Plan to address extreme events, such as flooding and other disasters, that require emergency support. The **Australian Capital Territory**, as part of its stormwater system, has a number of water-sensitive urban design measures, such as wetlands and retarding basins – designed to mitigate flood risk by storing runoff temporarily and releasing it at a controlled rate. These systems work to reduce the peak flow in the downstream drainage system. The **Australian Capital Territory** also has a water-sensitive urban design planning requirement for onsite detention, being the temporary storage and controlled release of stormwater runoff generated within a block. Onsite detention is also promoted for redevelopment sites, ensuring that the capacity of the municipal stormwater system is not exceeded. Additionally, the **Australian Capital Territory** government has incorporated the latest climate-adjusted rainfall intensity, frequency and duration data from the Australian Bureau of

Meteorology to update **Australian Capital Territory** flood mapping to account for less frequent higher-intensity events. Furthermore, water quality infrastructure is being implemented over the 2016-2019 period as part of the \$93.5m Australian Capital Territory Healthy Waterways Project "Improving long-term water quality in the Australian Capital Territory and Murrumbidgee River System." The government of **Prince Edward Island** has mapped erosion risk province-wide, which is being used to guide development decisions. Further, storm surge has also been mapped in many locations and land use planning policies are being developed to address flood risk concerns.

This section showed the most pressing physical risks resulting from climate change and how regional governments aim to adapt to them. Nevertheless, there are various other climate change impacts, as well as adaptation actions that could not be displayed in this report, that show the commitment of regional governments to climate action. In addition, climate change poses other risks to regions worldwide, such as water supply risks and risks connected to the socio-economic conditions of a region. These topics will be addressed in the following sections of the report.



Image 6. Beach replenishment to protect Percé coast, Québec.  
VILLE DE PERCÉ

# Regional governments addressing water supply risks

## Water supply risks

**W**ater is the fundamental link between the climate system, human society and the environment.<sup>9</sup> The International Panel on Climate Change's (IPCC) most recent Assessment Report (AR5 – 2014) explicitly indicates the unavoidable interconnection between water and climate change. This reference predicts, for instance, that climate change will considerably decrease renewable surface water and groundwater resources in most dry subtropical regions over this century. In addition, by altering the functioning of hydrological systems and making natural variability greater, through abnormal precipitation or melting perennial snow for example, climate change shifts and intensifies the extremes – which impacts not only the quantity, but also on the quality of water resources in the long term. Consequently, competition for water among sectors is expected to intensify over the next decades. As the United Nations foresees, “around 40 per cent of the world's population will face water shortages by 2050, accelerating migration and triggering conflict, while some regions could lose up to six per cent of their economic output, unless it is better managed.”<sup>10</sup>

In coherence with the centrality of this issue, COP23 reaffirmed the precedent of the last conference and dedicated a full thematic day to water security (on November 10th). On the occasion, the international water community endorsed a so-called “Nature-Based Solution Declaration,” with the objective to foster the usage of natural systems in managing sustainable water resources. Although water currently stands in the spotlight, hydrologic data to effectively plan adaptive alternatives are not always sufficiently available yet. In fact, such a lack of information to adequately subsidize decision-making processes at all levels of government has been detected in the literature since almost a decade ago, at least. “Most countries, developed and

developing, need to give greater attention and more resources to monitoring, observations and continual assessments of the status of their water resources.”<sup>11</sup> Moreover, because climate change impacts vary dramatically across and within territories, data collection and monitoring are especially needed at a subnational level.

In this context, the graphs and tables of the present section summarize the multiple challenges and solutions regarding water supply risks in the jurisdictions that participated in *RegionsAdapt*'s last reporting process. Confirming the prevalence already registered in 2016, the data disclosed in 2017 reiterate that most disclosing governments consider their territories to be exposed to substantive risks to water supply in the short or long term. This was the case for 27 of the 32 regional governments that answered the questions related to this section. The only few exceptions were basically the same from last year's report – **Gossas, Québec, Reunion Island, and Tocantins**.<sup>12</sup> Figure 16 displays the most frequent challenges reported in 2017 by those 27 regional governments, plus Wales. Quite remarkably, the rank of these risks remained the same, but the frequency of each one of them increased between 2016 and 2017 (figures 16 and 17).

9. United Nations World Water Assessment Programme 2009: The implications of climate change on water, Briefing Note, Paris: UNESCO, and London: Earthscan.

10. UNITED NATIONS. New initiatives in energy, water and agriculture sectors announced as Action Days begin. Available at: <http://www.un.org/sustainabledevelopment/blog/2017/11/new-initiatives-in-energy-water-and-agriculture-sectors-announced-as-action-days-begin/>. Accessed on Dec. 13th 2017.

11. United Nations World Water Assessment Programme 2009, Op. cit.

12. In total, 27 answered “yes”, 4 answered “no” and 1 (Wales) answered “Don't know.” The 3 governments not included in this section are: Fatick, Rio Grande do Sul, and Tombouctou.

Figure 16. Substantive risks to water supply in 2017 (% of governments reporting each risk)

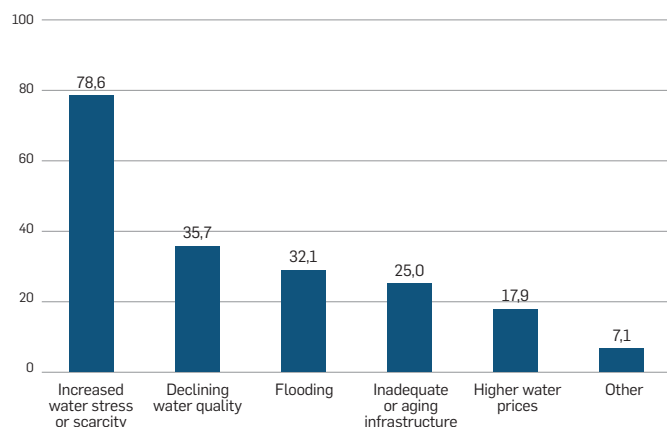


Figure 17. Substantive risks to water supply in 2016 (% of governments reporting each risk)

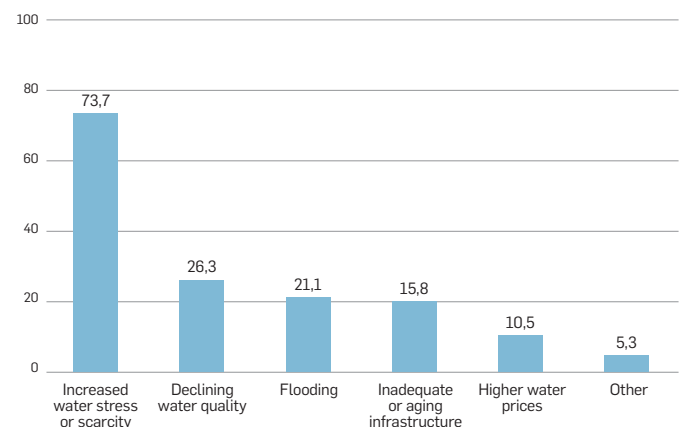






Image 7. The 2014/15 drought in Rio de Janeiro.  
ANDRÉ LEONE (INEA)

## Increased water stress or scarcity

The most reported risk was increased water stress or scarcity, with 22 of these 28 governments (78.6%) predicting it in the short or long term, which amplifies the figure measured in 2016 (73.7%). Among these 22, 7 (31.8%) reported that they are currently facing this risk. Also in relation to water stress or scarcity, 14 governments reported a serious level of risk, and 6 considered it extremely serious. Together, these two answer categories account for 20 of 22 (91%) surveyed governments foreseeing increased water stress and scarcity in their territories. The governments declaring extremely serious water stress or scarcity were **California, Catalonia, Ceará, Minas Gerais, Rio de Janeiro** and **Santa Elena**.

Table 8. Regions affected by increased water stress or scarcity

Region	Timescale	Level of risk
Alberta	Long-term	Serious
Australian Capital Territory	Long-term	Serious
Azuay	Medium-term	Serious
Basque Country	Long-term	Serious
British Columbia	Short-term	Serious
Brittany	Medium-term	Serious
California	Current	Extremely serious
Catalonia	Current	Extremely serious
Ceará	Current	Extremely serious
Jalisco	Medium-term	Serious
KwaZulu-Natal	Medium-term	Serious
Lombardy	Short-term	Serious
Minas Gerais	Current	Extremely serious
Misiones	Current	Less serious
Pichincha	Medium-term	Serious
Prince Edward Island	Long-term	Less serious
Rabat-Salé-Kénitra	Medium-term	Serious
Rio de Janeiro	Current	Extremely serious
Santa Elena	Long-term	Extremely serious
São Paulo	Current	Serious
South Australia	Medium-term	Serious
Wales	Long-term	Serious

## Declining water quality

The second most frequently reported risk was declining water quality (35.7%), whose incidence increased more than 35% when comparing 2017 to 2016. This risk was reported either as serious or extremely serious for 80% of the regions facing it (Table 9). This thematic is one of the priority topics of *RegionsAdapt*'s Working Group (WG) on Water Resources and Management. As previous discussions of this WG indicate, the complex interaction between water quality and climate change requires further scientific investigation to be better understood. Yet, there is already enough evidence suggesting that water bodies become even more sensitive to climate change impacts once their water quality and ecological functioning are altered by human activity, such as through increases in the flow and inputs of chemical and biological waste, for instance.<sup>13</sup>

Table 9. Regions affected by declining water quality

Region	Timescale	Level of risk
Alberta	Long-term	Serious
Azuay	Medium-term	Serious
Brittany	Long-term	Serious
Catalonia	Current	Serious
KwaZulu-Natal	Long-term	Serious
Lombardy	Short-term	Extremely serious
Morona Santiago	Medium-term	Serious
Rabat-Salé-Kénitra	Long-term	Less serious
Saint-Louis	Medium-term	Serious
Wales	Current	Less serious

13. United Nations World Water Assessment Programme 2009, Op. cit.

## Flooding

Almost as frequently reported as the previous risk, flooding was mentioned as a substantive threat to water supply by 9 disclosing governments (32.1%). It was considered a serious risk for 6 regions and extremely serious for the other 3 (Table 10). As a matter of fact, flooding is another thematic focalized within the Water Resources and Management WG, under the priority topic *Preparing for extreme events related to floods and droughts*.

While scientific data suggest that the global hydrological cycle is accelerating, this phenomenon implies increased frequency of floods in some regions. According to UNESCO's World Water Assessment Programme (WWAP), "the impact of past major flooding, which has resulted in many deaths and has cost billions of dollars in damages, is an indication of what could lie in store from future climatic variability."<sup>14</sup>

14. Ibid.



Image 8. Uruguiana City in Rio Grande do Sul during record flood event in 2017. TADEAU VILANI - PRESS RELEASE

Table 10. Regions affected by flooding

Region	Timescale	Level of risk
<b>Brittany</b>	Medium-term	Extremely serious
<b>Catalonia</b>	Medium-term	Serious
<b>Cross River State</b>	Medium-term	Serious
<b>KwaZulu-Natal</b>	Medium-term	Serious
<b>Minas Gerais</b>	Current	Extremely serious
<b>Misiones</b>	Current	Serious
<b>Prince Edward Island</b>	Medium-term	Serious
<b>Rabat-Salé-Kénitra</b>	Short-term	Extremely serious
<b>Wales</b>	Medium-term	Serious

## Inadequate or aging infrastructure

Another major risk to water supply reported by disclosing governments was inadequate or ageing infrastructure. The incidence of this risk increased from 15.8% in 2016 to 25% in 2017, and most reporting governments (6 out of 7) considered it a serious issue that is already ongoing or to be faced in the short term (Table 11).

Because of the interlinkages between water, climate change and sustainable development, water-related infrastructure entails spillover effects that can either positively or negatively influence the environmental, social and economic dimensions. As the WWAP suggests, "creating the infrastructure of water resource development and distribution has been shown to have high macroeconomic benefits; conversely, countries lacking such infrastructure can suffer damaging shocks from droughts and floods."<sup>15</sup>

Table 11. Regions affected by inadequate or ageing infrastructure

Region	Timescale	Level of risk
<b>Esmeraldas</b>	Current	Serious
<b>Lombardy</b>	Short-term	Serious
<b>Misiones</b>	Current	Serious
<b>Pichincha</b>	Medium-term	Serious
<b>Rabat-Salé-Kénitra</b>	Long-term	Less serious
<b>Rio de Janeiro</b>	Short-term	Serious
<b>Wales</b>	Current	Serious

15. Ibid.

## Higher water prices

In 2017, higher water prices were also among the most frequently reported risks in this section. Although only 17.9% of regional governments foreseeing substantive risks to water supply mentioned it, this is the risk whose frequency has increased the most – a more than 70% rise – in comparison with 2016, when only 10.5% of disclosing governments cited it. Also noteworthy is the fact that all governments reporting this risk deemed it serious.

Table 12. Regions affected by higher water prices

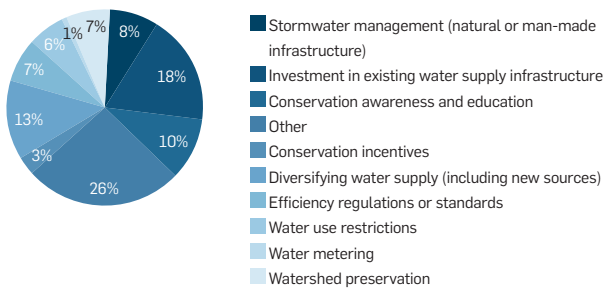
Region	Timescale	Level of risk
<b>California</b>	Current	Serious
<b>KwaZulu-Natal</b>	Medium-term	Serious
<b>Rabat-Salé-Kénitra</b>	Short-term	Serious
<b>South Australia</b>	Medium-term	Serious
<b>Wales</b>	Current	Serious

# Adaptation actions related to water supply

According to the WWAP, “governments must adapt to climate change, and give priority to water resources management as a key aspect of adaptation to changes already in train.”<sup>16</sup> Taking into account that the effects of climate change on water resources tend to figure among the most serious ones, adaptation actions in this realm are absolutely crucial. “Water resources issues should therefore be prominent in climate change negotiations and governments should commit themselves to the necessary degree of support, including finance, for adaptation measures.”<sup>17</sup>

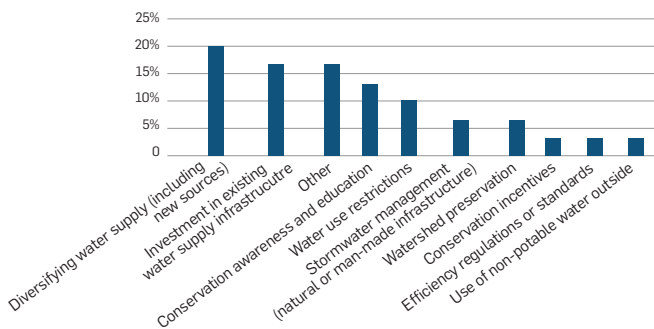
In the face of the aforementioned climate-related risks affecting water supply, regional governments play a vital role in adapting territories and communities through multiple concrete actions taken on the ground. In 2017, disclosing governments provided 72 examples of adaptation actions addressing risks to water supply. The following figure offers an overview of the most commonly reported.

Figure 18. Most common adaptation actions addressing water supply risks



Consistent with the fact that increased water stress and scarcity was the most frequently reported risk to water supply, addressing it was also the most commonly mentioned objective among the disclosed adaptation actions (more than 40%, or 30 out of 72 actions, had this purpose). Figure 19 presents the most common actions adopted in the face of this risk.

Figure 19. Most common actions in the face of increased water stress or scarcity (%)



When considering water supply risks in general, investments in existing water supply infrastructure are the most frequent action reported. Eleven governments have mentioned this action. Among them, **Alberta** is addressing issues related to water supply infrastructure needs primarily through Municipal Sustainability Initiatives (MSI) grants. In this territory, provincially-owned water management infrastructure includes over 200 water management sites with an asset value of over C\$8bn, ranging from small dams and weirs, diversion structures, canals and pumping projects to extremely large dams and water conveyance systems.

Large infrastructure investments are also part of the **Australian Capital Territory**’s strategy to diversify sources and improve the resilience of its water supply system. This government is managing risks related to water by creating a diverse range of independent water sources and demand management measures; improving network interconnectivity to take advantage of any excesses in the system; and ensuring planning flexibility to allow the implementation of the responses best suited to actual emerging futures. Apart from this government, 8 other jurisdictions also reported that they are diversifying water supply in their territories.

Conservation awareness and education measures to deal with water supply risks were also frequently mentioned in the list of reported actions (7 occurrences). Among them, **Azuay** and **Morona Santiago** have provincial committees that organize forums and awareness-raising campaigns aiming at promoting ecological conservation and restoration related to water bodies, while **Ceará** runs environmental education campaigns to reduce water wastage.

Actions related to stormwater management were mentioned by 6 regional governments. In **Rabat-Salé-Kénitra**, rainfall water is being conserved to mitigate risks of water shortage. Several other actions were frequently described under the label “efficiency regulations or standards.” In **KwaZulu-Natal**, municipalities are renewing their operational baselines and reprioritizing their plans with the primary objective of raising the current performance status in terms of municipal drinking water quality management, for instance. **Lombardy** is currently examining its legal water-related framework and, when necessary, improving standard requirements (e.g. for residual flow, thermoelectric discharge, lake regulation, and water restitution). The government of **South Australia** created a policy on Water Sensitive Urban Design (WSUD) in October 2015, outlining objectives, principles, targets and 14 different actions to support greater uptake and the eventual mainstreaming of WSUD as a common practice in the province.

Other adaptation actions that were often mentioned also include conservation initiatives and watershed preservation (in **Catalonia**, **KwaZulu-Natal** and **Rio de Janeiro**, among others); water use restrictions (in **California**, **Kafrine** and **South Australia**, for example); the usage of wastewater or non-potable water outside (**Alberta** and **Rabat-Salé-Kénitra**, for instance); addressing floods and droughts and their risks to water supply (the **Basque Country**, **British Columbia**, **Misiones** and **Prince Edward Island**, among others) and water metering (**California**).

In addition to these measures, several governments also informed to have or being developing region-wide plans, strategies or programs on water management that directly deal with climate change impacts. Examples reported include: **Alberta** (Water for Life Strategy and Watershed Resilience and Restoration Program); **British Columbia** (Drought Response Plan); **California** (Water Action Plan); **Catalonia** (Flooding Risk Management Plan); **Prince Edward Island** (Water Act); **Rio de Janeiro** (Water Pact) and **South Australia** (Water for Good Strategy). In fact, taking into account that water management and climate adaptation are inextricably intertwined, solutions in these realms should always be implemented through holistic and integrated approaches – which also includes bearing in mind potential impacts on water supply – in order to avoid counterproductive outcomes in environmental, social and economic dimensions.

16. Ibid.

17. Ibid.

# Climate change impacts create socio-economic risks

The socio-economic impacts of climate change are undeniable. According to the most updated academic data, this is a deep concern that is growing considerably across the world. Climate change is particularly harmful in already vulnerable environments when coupled with other societal drawbacks and weaknesses. In these contexts, climate change can be seen as a multiplier of socio-economic difficulties.

Out of the 35 regional governments reporting to **RegionsAdapt**, 31 confirmed they are facing or will face social risks due to climate change (Figure 20). It is also important to stress that damages are already being felt: one third of all risks reported by the disclosing governments are current – and almost one-quarter of them will be felt in a short-term (Figure 21).

Figure 20. Regions that face or will face social risks due to climate change

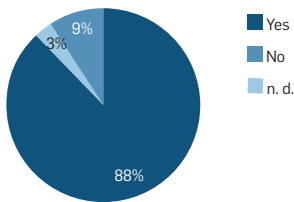
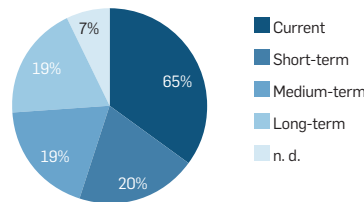


Figure 21. Anticipated timescale of social risks resulting from climate change



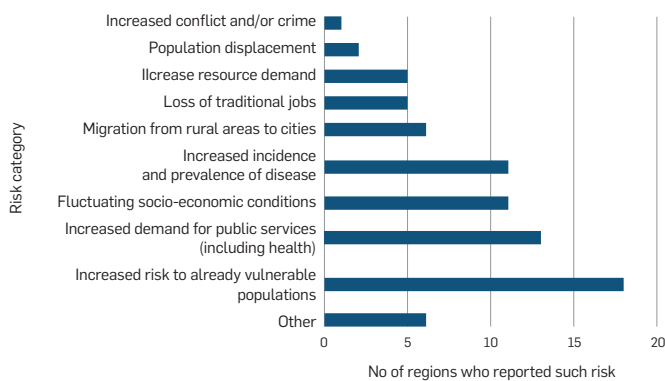
## Main findings

Ten categories were available for disclosing governments to describe their main socio-economic challenges. In contrast to the other sections of CDP’s reporting platform, this section only included social and economic risks related to climate change, and did not collect information related to the adaptation actions being implemented in the face of these risks. Therefore, although it is possible to presume that the disclosing governments are also taking action in this realm, the available data suggest that the socio-economic risks related to climate change require multiple responses from regional governments to be effectively addressed.

is already a main concern, or will certainly become one in the near future (e.g. in rural areas). More than one third of the disclosing regions face problems related to agriculture activities (crop losses and problems related to seasonality, among others). In this context, there are also some compounding factors that aggravate this situation, such as:

- Food insecurity;
- Water shortage;
- Worsening conditions of livelihood; and
- Rural exodus.

Figure 22. Social risks resulting from climate change



The collected data shows that the aggravation of conditions in rural areas of some regions is clear, which means that addressing them and finding durable solutions should be a priority. The United Nations High Commissariat of Refugees (UNHCR) confirms this trend. According to the UNHCR, the risk of displacement is greater in places where infrastructure is deteriorating and capacity building insufficient.<sup>18</sup> The annual average of displaced people due to climate change is considerably high: “Of the 24.2 million people newly internally displaced by sudden-onset disasters in 2016, 23.5 million were displaced by weather-related disasters, including storms and floods. This is more than three times the number of people newly displaced by conflict and violence.”<sup>19</sup>

Climate change consequences are innumerable and potentialized by socio-economic vulnerability. The case of vulnerable groups (children, elderly or economic unstable) is noteworthy, because these groups are abundant in a wide range of geographic areas where climate change

18. UNHCR 2016: Frequently asked questions on climate change and disaster displacement. Displacement linked to climate change is not a future hypothetical – it’s a current reality, available at: <http://www.unhcr.org/news/latest/2016/11/581f52dc4/frequently-asked-questions-climate-change-disaster-displacement.html>

19. Richards, J.-A.; Bradshaw, S. 2017: Uprooted by climate change: responding to the growing risk of displacement, Oxfam International.



Therefore, finding better solutions in this field is essential to guarantee livelihood both in rural and urban areas.<sup>20</sup> Furthermore, the increased demand for natural resources is a risk that some of the disclosing regions face or will face in the future. In this sense, prevention is of the utmost importance: partnerships among different government levels and society players may mitigate escalating tensions in some regions. Likewise, resource efficiency and wastage prevention are other important complementary approaches.<sup>21</sup>

Another major issue expressed by the disclosing governments, especially in the Northern Hemisphere, is a concern about their health systems: 43% of the regional governments reported that they already face or will face risks related to: i) increased incidence and prevalence of disease, and; ii) increased demand for public services (including health). The roots of these risks vary enormously from case to case. In many regions, there is a recurrent concern regarding the effect of heat waves in vulnerable groups and their impact on the demand for public health. In this sense, the improvement of health systems to respond quickly and effectively to the consequences of climate change is essential for the well-being of civil society – especially for the most vulnerable groups.

Last but not least, the disappearance of traditional jobs is also a major

issue reported by regions. Likewise, in five disclosing regions, climate change threatens the lifestyle of traditional and indigenous groups. This circumstance is especially worrisome, considering the identitarian value and the traditional knowledge that these populations can offer to their respective regions. Furthermore, indigenous people and traditional communities tend to act as agents for the conservation of natural resources and for the finding of innovative solutions related to climate change, especially for the implementation of ecosystem-based solutions.<sup>22</sup> As reported by the disclosing governments, the challenges faced by traditional groups are closely linked to climate change impacts in rural areas – such as changes in seasonality and biodiversity losses.

20. *Ibid.*

21. UNEP 2012: Renewable Resources and Conflict, Toolkit and guidance for preventing and managing land and natural resources conflict.

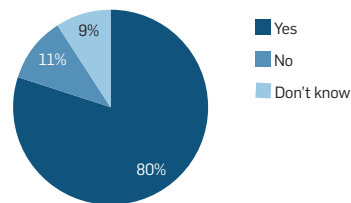
22. Inter-agency support group on indigenous peoples' issues 2014: The knowledge of indigenous peoples and policies for sustainable development: Updates and trends in the second decade of the world's indigenous peoples, Thematic paper towards the preparation of the 2014 World Conference on Indigenous Peoples.

## The influence of climate change in business

The vast majority of the disclosing regions reported that the effects of climate change threaten the ability of business to operate successfully. In this context, climate change also causes structural damages in consequence of climate events, such as bushfires, storms and heatwaves, among others. Losses can be felt in different ways: Some regional governments attested the existence of physical damages, like the destruction of buildings and infrastructure damage throughout their region. Furthermore, several disclosing regions reported that changes in climate could greatly impact the agricultural sector and lead to fluctuating socio-economic conditions: 11 out of 35 regional governments have confirmed this phenomenon. Half of them attested problems related to agriculture, a situation that underlines the urgent need for adaptation actions in this field. As a matter of fact, **RegionsAdapt** intends to launch its seventh Working Group dedicated to Agriculture and Zootechnics in 2018.

As shown in this section, attention must be given to the agricultural sector, since it is currently the balance point for many societies. If affected, many contemporary problems might intensify – as the migration from rural to urban areas, population displacement, increased resource demand or even the uprising of conflicts. Equally, problems related to the health sector are another key element. The preparation of health systems for new challenges brought by climate change is a dire and current necessity to face the impacts expected in

Figure 23. Climate change threatens the ability of businesses to operate successfully



the next 10 to 20 years. All these difficulties are enormously complicated for society to cope with on a daily basis – and even more so to its most vulnerable groups. They are the ones who directly feel the effects of climate change's most extreme consequences, as revealed in this report. Within the **RegionsAdapt** Initiative, the exchange of information on the social impacts of climate change occurs through the Working Group on Social Impacts and Adaptation. In this sense, one of the goals of this initiative is to continue the legacy of the United Nations Climate Summit of 2014 and the COP21 in Paris: To forward the exchange of information necessary to combine efforts and uphold climate adaptation.



# The first two years of *RegionsAdapt*

**R***egionsAdapt* is the first global initiative for regional governments to take concrete actions, cooperate and report efforts on climate adaptation. Launched at COP21, thanks to the initiation of the Governments of **Catalonia** and **Rio de Janeiro**, and with nrg4SD as its Secretariat, this initiative is open to all governments situated between the local and the national level from across the world, regardless of their size or stage of implementation of their climate policy. By joining *RegionsAdapt* initiative, governments commit to:

1. Adopt a strategic approach to adaptation and prioritize adaptation actions within two years of joining the initiative;
2. Take concrete action on adaptation in at least one of the seven key priority areas identified by the regions; and

3. Report data on the progress of adaptation actions on an annual basis through the risk and adaptation section of CDP's states and regions platform.

On December 3rd 2017, *RegionsAdapt* celebrated its second anniversary and the conclusion of its first phase. Such a landmark provides us the opportunity to assess the initiative's performance at this initial stage. To this aim, we propose two complementary approaches. First, to briefly outline the activities organized by the *RegionsAdapt* Secretariat in these two years and the initiative's accomplishments in general. Second, to present the founding members' fulfillment rate of their first three commitments.

## General accomplishments

**R***egionsAdapt* has grown consistently since its launch in December 2015. In these two years, its members have more than doubled in size, from 27 to 69 (out of which 64 are regional governments and 5 are national associations of these jurisdictions), and now represent a combined population totaling more than 295 million inhabitants from 26 countries on 5 continents.

In exchange for adhering to the aforementioned three commitments, *RegionsAdapt* members can receive technical support to adopt their adaptation strategies, such as best practice guidelines, exchanges of experience and support to accelerate action in the area. One of the ways to benefit from this support is by participating in Working Groups (WGs) organized for each of the initiative's key priority areas. These WGs are coordinated by one or two regional governments and foresee the participation of technical partners (specialized national and multilateral agencies, foundations, NGOs and academia, among others). Their purpose is to exchange experiences and learning processes related to cases of success and failure, to commonly develop and adopt good practice standards, and to implement joint pilot projects after identifying international cooperation matchmaking opportunities.

In *RegionsAdapt*'s first two years, six Working Groups were created – on Water Resources and Management; Resilience and Disaster Risk Reduction; Forestry, Protected Areas, and Biodiversity; Infrastructure and Territorial Planning; Economic Impacts and Opportunities; and Social Impacts and Adaptation – among which 25 (online) formal meetings were organized. In addition, members could also participate in nine webinars on cross-cutting thematic, and in the International

Conference on "Water Resources and *RegionsAdapt*," organized in partnership with the state of **Rio Grande do Sul**, last June 27-28, in Porto Alegre (Brazil). Apart from the regional governments themselves, the institutions that have contributed to these online meetings and webinars were (in alphabetic order): the Basque Centre for Climate Change (BC3), Brazil's National Water Agency (ANA), the CDP, Climatekos, the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), the Global Infrastructure Basel Foundation (GIB), the Munich Climate Insurance Initiative (MCII), and UNDP Cap-Net. More recently, *RegionsAdapt* has also explored synergies with nrg4SD's flagship initiative on biodiversity – the Regions for Biodiversity Learning Platform (R4BLP) – especially in the realm of its Working Group on Forestry, Protected Areas, and Biodiversity.

*RegionsAdapt* was also the thematic of multiple side-events that nrg4SD and its members held at major conferences – such as COP22, COP23, and the ICSD 2017, among others. Moreover, *RegionsAdapt* has also been included in many global coalitions, such as the Marrakech Partnership on Global Climate Action (MP-GCA) of the UNFCCC, the UN Sustainable Development Knowledge Platform, and the Climate Initiatives Platform of the UNEP DTU Partnership, and counted on the dissemination efforts of organizations like ORU-Fogar. In addition, the initiative provided inputs from the perspective of regional governments to the UNFCCC on several occasions, especially through the Nairobi Work Programme and the Yearbook of the MP-GCA, as well as through other several direct submissions to the UNFCCC.

## Founding members and their 3 commitments

**R**egionsAdapt's second anniversary also represents the completion of the deadline that founding members had to fulfill their three initial commitments. As a matter of fact, once joining the initiative, signatories have two years to deliver the following:

**Commitment 1** – Adopt a strategic approach to adaption and prioritize adaptation actions, e.g., through adopting or reviewing a regional plan or strategy on climate change adaptation within two years of joining the initiative;

**Commitment 2** – Take concrete action on adaptation in at least one of the 7 key priority areas identified by the regions. These could include: water resources and management; resilience and disaster risk reduction; agriculture and zootechnics; forestry, protected areas and biodiversity; infrastructure (including transport and the energy sectors) and territorial planning; economic impacts and opportunities; social adaptation and impacts;

**Commitment 3** – Report data on the progress of the adaptation actions on an annual basis through CDP's States and Regions reporting platform.

At the end of 2017, founding members had the opportunity to provide evidence of the accomplishment of these three commitments through an online survey, whose results are presented in the graphs and tables below.

Figure 24. Governments accomplishing Commitment 1

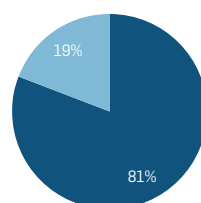


Figure 25. Governments accomplishing Commitment 2

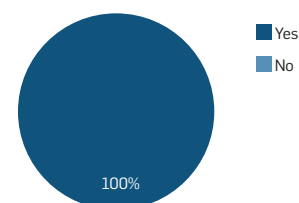


Figure 26. Commitment 3 – Governments reporting to CDP at least once

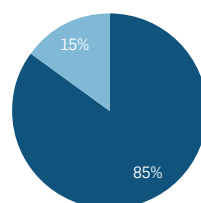


Figure 27. Commitment 3 – Governments reporting to CDP in both 2016 and 2017

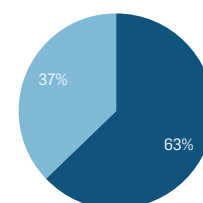


Table 13. Summary of commitments

Region	Commitment 1	Commitment 2	Commitment 3
Australian Capital Territory	✓	✓	✓
Azuay	✓	✓	✓
Basque Country	✓	✓	✓
British Columbia	✓	✓	✓
California	✓	✓	✓
Catalonia	✓	✓	✓
Ceará	✓	✓	✓
Fatick		✓	✓
Goiás		✓	
Gossas	✓	✓	✓
Jalisco	✓	✓	✓
KwaZulu-Natal	✓	✓	✓
Lombardy	✓	✓	✓
Paraná	✓	✓	
Prince Edward Island	✓	✓	✓
Québec	✓	✓	✓
Rio de Janeiro	✓	✓	✓
Rio Grande do Sul	✓	✓	✓
Saint-Louis	✓	✓	✓
São Paulo		✓	✓
South Australia	✓	✓	✓
Sud Comoé		✓	✓
Tocantins	✓	✓	✓
Tombouctou		✓	✓
Vermont	✓	✓	
Wales	✓	✓	✓
Western Province	✓	✓	✓

Table 14. Commitment 3

Region	Reported to CDP in 2016	Reported to CDP in 2017
Australian Capital Territory	yes	yes
Azuay	yes	yes
Basque Country	yes	yes
British Columbia	yes	yes
California	no	yes
Catalonia	yes	yes
Ceará	no	yes
Fatick	no	yes
Goiás	no	no
Gossas	yes	yes
Jalisco	yes	yes
KwaZulu-Natal	yes	yes
Lombardy	yes	yes
Paraná	no	no
Prince Edward Island	yes	yes
Québec	yes	yes
Rio de Janeiro	yes	yes
Rio Grande do Sul	yes	yes
Saint-Louis	no	yes
São Paulo	yes	yes
South Australia	yes	yes
Sud Comoé	yes	no
Tocantins	yes	yes
Tombouctou	yes	yes
Vermont	no	no
Wales	no	yes
Western Province	yes	no

## Next steps

**B**uilding on the initiative's achievements so far, founding members have agreed upon an initial proposition presented by the Secretariat to remain engaged with **RegionsAdapt** and keep on working together. Hence, those jurisdictions successfully fulfilling the first three commitments will be invited to embark on a renewed pathway, in order to increase the ambition and leverage the visibility of their adaptation actions through new rounds of two-year commitments.

In this context, the **RegionsAdapt**'s Secretariat has partnered with the **Basque Centre for Climate Change** (BC3) to offer a new phase of commitments to members based on a solid and innovative scientific background. Once having prioritized adaptation through their plans and strategies in phase 1, regional governments will be invited to improve the effectiveness of such instruments by carrying out self-assessments capable of identifying areas of potential progress. While governments will be able to choose the self-assessment they would like to adopt according to their own preferences, the **RegionsAdapt**'s Secretariat recommends using the Adaptation Policy Checklist (APC) kindly designed and offered by BC3. Among the multiple benefits of the APC tool, it enables an *ex post* evaluation of adaptation plans and policies, helping regions identify main gaps and guiding them towards future steps. This checklist can also be used *ex ante*, that is, as a guiding tool for those regions that are just now starting to work on adaptation, providing a framework of all the issues that current practice and research have identified to be critical in ensuring that adaptation is successful. Thanks to its flexibility, the Secretariat expects that this tool will be extremely useful to encourage mutual learning and an exchange of solutions among members.

Therefore, those regional governments successfully fulfilling their three initial commitments will be invited to adopt a renewed set of commitments, as the following:

### 2018 – 2019

**Commitment 4** – *To identify opportunities for improving the regional government's adaptation plan/strategy by answering the questionnaire of BC3's Adaptation Policies Checklist (APC), or of any other relevant tool, and inform the Secretariat about identified gaps;*

**Commitment 5** – *Take concrete action on adaptation in at least 3 of the 7 key priority areas identified by the regions. These could include: water resources and management; resilience and disaster risk reduction; agriculture and zootechnics; forestry, protected areas and biodiversity; infrastructure (including transport and the energy sectors) and territorial planning; economic impacts and opportunities; social adaptation and impacts;*

**Long-term commitment** – *Gradually broadening the scope of the data annually reported on the progress of the adaptation actions through CDP's States and Regions reporting platform (or other relevant reporting platform, as consensually agreed by members).*

### 2020 – 2021

**Commitment 6** – *To publish a report providing evidence of measures filling the gaps identified through APC or any other relevant tool.*

**Commitment 7** – *Take concrete action on adaptation in at least 6 of the 7 key priority areas identified by the regions. These could include: water resources and management; resilience and disaster risk reduction; agriculture and zootechnics; forestry, protected areas and biodiversity; infrastructure (including transport and the energy sectors) and territorial planning; economic impacts and opportunities; social adaptation and impacts;*

**Long-term commitment** – *Gradually broadening the scope of the data annually reported on the progress of the adaptation actions through CDP's States and Regions reporting platform (or other relevant reporting platform, as consensually agreed by members).*

In addition to its annual reporting process through CDP's states and regions platform (commitment 3), **RegionsAdapt** Secretariat expects to conduct two assessment reviews in each one of the semesters of 2018, asking members to provide evidence of the fulfillment of commitments 1 and 2. The founding members who were not able to accomplish all three commitments within the first two years of the initiative will be invited to participate in these reviews. Alternatively, they are also welcomed to voluntarily email the Secretariat informing the accomplishment of their commitments as soon as this might occur.

# Regional governments are committed to addressing climate change adaptation

The emissions gap resulting from the current NDCs indicates that climate change will exacerbate in the future, unless countries take extensive measures to further reduce greenhouse gas emissions. This makes risks resulting from climate change a pertinent threat to regions worldwide. In addition, climate change impacts can already be felt around the world, often with devastating effects. Hence, adaptation to climate change and its impacts is clearly needed and, as shown by this report, regional governments have recognized this and are committed to addressing this challenge, whether individually within their jurisdictions or in global initiatives like **RegionsAdapt**. In 2017, the **RegionsAdapt** initiative celebrated its two-year anniversary. Looking back at those two years, the initiative can count a number of achievements – and its individual members, regional governments from around the world, also accomplished a lot within this period. Within the different Working Groups of the initiative, they exchanged challenges and solutions, shared best practices and jointly worked on approaches to address climate change adaptation.

The 27 founding members of the initiative clearly showed their dedication to action on climate change adaptation. Most of them have accomplished their 3 initial commitments, as the two-year assessment attests through bold fulfilment rates: 81% adopted a strategic approach to adaptation, 100% took at least one concrete adaptation action, and 85% of them reported to the CDP at least once.

In addition, those governments that joined the initiative in a later stage showed their commitment to climate change adaptation as well. The data collected through CDP's states and regions platform in 2017 shows that almost all disclosing regions already address the impacts of climate change within their territories through adaptation strategies and measures. With 200 different adaptation actions counted, the disclosing regions addressed 68% of all physical risks reported. This is a significant number and shows the importance of regional governments in tackling climate change impacts. Furthermore, the report shows, that the ten recommendations formulated in last year's report are still valid, with regional governments already incorporating them. The disclosing governments continue to carry out vulnerability assessments, as well as develop strategic approaches to adaptation. As shown through the assessment of the fulfilment of commitments, but also through the data reported, governments take concrete actions on adaptation in different areas, including the **RegionsAdapt** key priority areas. Some of the regions also highly involve their citizens and try to engage with other sectors, like businesses and industries. The integration of climate change as a cross-cutting thematic is also a goal the regions are trying to reach.

Nevertheless, there is still room for improvement. One third of the reported risks are not addressed through any adaptation action and regions still face constraints with regards to the development of adaptation strategies. In addition, there are several compounding factors that may worsen the effects of climate change within the different regions. Multiple climate change impacts might occur at

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## Ten Adaptation recommendations for the future

- Carry out vulnerability assessments to understand physical, social and economic vulnerability to climate change and to identify adaptation measures.
- Develop a strategic approach to adaptation and prioritize adaptation actions.
- Take concrete action on adaptation in at least one of the key priority areas identified through **RegionsAdapt**.
- Foster citizen and community engagement in your region to develop and implement sustainable adaptation actions.
- Build lasting relationships with your regional industries to learn why adaptation matters to them.
- Engage your national government in dialogue to support the implementation of integrated National Adaptation Plans and policies.
- Integrate climate change and adaptation as a cross-cutting topic in your sectoral policies.
- Exchange and learn from other regions worldwide.
- Mobilize finance for climate change adaptation from public and private sources.
- Report data on your adaptation actions on an annual basis and track your progress.

the same time in some territories, thus worsening the overall impact of climate change. Likewise, policies by other levels of governance could conflict with adaptation efforts of some regional governments. Population growth that leads to higher resource demand among other effects, the high concentration of inhabitants in urban and coastal areas, ongoing deforestation, degradation of land and vegetation, unsustainable farming and breeding practices and competing demand for water sources (e.g. groundwater), are additional factors influencing the adaptive capacity of some regions. Moreover, the mobilization of climate finance for adaptation purposes from different sources is still an obstacle for many regional governments that hinders them from effectively addressing the climate change impacts their territories face. In addition, the data collected through this report does not always reflect on how regional governments are integrated in the development and implementation of National Adaptation Plans and other national policies, which are other contributions testifying to the fact that regional governments often play a crucial role on climate adaptation.

International initiatives, like **RegionsAdapt** can help regional governments to overcome such obstacles. Information-sharing among different regions is crucial, since various regions share the same risks resulting from climate change. By exchanging challenges and solutions, regions can help each other to better adapt to such risks. **RegionsAdapt** not only supports this knowledge exchange and facilitates the development of effective adaptation strategies, but also aims to work on the concrete implementation of dedicated projects within the years to come.

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## About nrg4SD



The Network of Regional Governments for Sustainable Development -nrg4SD is a global association that represents regional governments in the international agendas on climate change, biodiversity and sustainable development. Established in 2002, today it has over 50 members from 26 countries in 4 continents. The nrg4SD is the only international network on sustainable development matters representing solely subnational governments. It serves as the voice of regional governments at the United Nations (UN) negotiations, European Union initiatives and global discussions. The nrg4SD facilitates cooperation projects and partnerships between members and with international experts, as well as promotes expertise exchange, capacity building and knowledge transfer to assist in the implementation of international commitments. In addition, the nrg4SD advocates for recognition and supports further engagement of regional governments in the global agendas. The nrg4SD also acts as Secretariat of the **RegionsAdapt** initiative.

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## About CDP



CDP is an international non-profit that drives companies and governments to reduce their greenhouse gas emissions, safeguard water resources and protect forests. Voted number one climate research provider by investors and working with institutional investors with assets of US\$100 trillion, we leverage investor and buyer power to motivate companies to disclose and manage their environmental impacts. Over 6,300 companies with some 55% of global market capitalization disclosed environmental data through CDP in 2017. This is in addition to the over 500 cities and 100 states and regions who disclosed, making CDP's platform one of the richest sources of information globally on how companies and governments are driving environmental change. CDP, formerly Carbon Disclosure Project, is a founding member of the We Mean Business Coalition.

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