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Mapping of actors, instruments, and integration of concepts in climate policies: Synthesis of case studies (France -Guadeloupe/Martinique; Brazil / Pernambuco; Colombia / Cauca)

Eric Sabourin, Carolina Milhorance, Fanny Howland, Leticia Checchi, Océane Biabiany, Olivia Blondel, Yves Montouroy, Marie Hrabanski, Abigaïl Fallot, Gilles Massardier, et al.

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Artimix

Articulate policy combinations between scales and sectors to address climate change adaptation issues in vulnerable tropical agricultural territories

D1.2 : Mapping of actors, instruments, and integration of concepts in climate policies: Synthesis of case studies

(France - Guadeloupe/Martinique; Brazil / Pernambuco; Colombia / Cauca)

Eric Sabourin, Carolina Milhorance, Fanny Howland, Leticia Checchi, Océane Biabiany, Olivia Blondel, Yves Montouroy, Marie Hrabanski, Abigail Fallot, Gilles Massardier, Jean-Francois Le Coq

With the support

Agence Nationale de la Recherche ANR

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ARTIMIX aims to determine the conditions for success in the design and implementation of policy mixes to support adaptation to climate change in vulnerable tropical agricultural territories in Guadeloupe and Martinique, Brazil and Colombia.

This project, funded by the ANR, is led by a multidisciplinary team of researchers in political science, economics, sociology, agronomy, animal science and environmental science from CIRAD, INRA, IT2, UAG, UnB and CIAT.

Project objective:

1. Analyze the concepts addressing adaptation in agriculture (agroecology, climate-intelligent agriculture, ecosystem-based adaptation) and how they are taken into account in climate change adaptation policies

2. Identify the factors favouring or limiting their implementation by considering their coordination with sectoral policies

3. Characterize how current policy mixes affect farmers' practices and their socio-economic and environmental outcomes.

D1.2 : Mapping of actors, instruments, and concept integration in climate policies: Synthesis of the case studies (France - Guadeloupe/Martinique; Brazil / Pernambuco Colombia / Cauca)

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April 2019

Executive Summary

The objective of the ARTIMIX project is to contribute to determining the conditions for success in the design and implementation of *policy mixes* for agriculture's adaptation to climate change in vulnerable tropical agricultural territories. The first phase of the project (WP1) consisted in analysing the concepts dealing with adaptation in agriculture and how they are taken into account in adaptation policies in the CC.

This document presents a synthesis of part of the results of WP1 of the ARTIMIX project along two axes: 1) a mapping of national and local policies dealing with the adaptation of agriculture to climate change (AACC) and 2) an assessment of the integration of concepts dealing with AACC into national and/or territorial policies.

In all three cases, combinations of instruments were identified and characterized, sometimes associated with specific interest groups or coalitions. The case-country studies clearly show which concepts have been taken up, how, by which actors and with which justifications.

The text is divided into three main parts. The first is dedicated to the theoretical and methodological repositories used; the second presents a summary of the results by question and by country. The third section deals with cross-sectional or comparative analyses by issue, lessons learned and perspectives.

Keywords: Climate change, agricultural adaptation, interactions between public policies, policy mix, concepts related to adaptation, Latin America and the Caribbean

Table of Contents

Executive Summary 4
Introduction 7
1. Theoretical frame of reference and methodology: 8
1.1 Reference framework on the mapping of public policies and their interactions 8
Mapping of policies, actors and network analysis 8
Analysis of instruments and their interactions 9
Integration of climate policies 11
1.2 Theoretical framework and categories of concepts related to adaptation 11
The status of adaptation in CC policies 11
Putting adaptation policies on the agenda at the CC 13
Translation mechanisms 13
Le rôle des individus / policy brokers 14
1.3 Methodology 14
An analysis grid 14
Three case studies 15
Application of the method 17
2. Main results and cross-sectional analysis of the three cases 18
2.1- Framework and trajectories of national policies for adaptation to the CC 18
Guadeloupe: in search of instruments for adaptation to the CC 18
Colombia: a gradual process of integrating the CC into the agenda 21
Brazil: an aggregation and superposition of policies/instruments 24
2.2 Mapping, identification of interactions and combinations between policies 27
Guadeloupe: essentially local and territorialised instruments 27
Colombia: a plethora of normative and economic instruments 29
Brazil: policies in the semi-arid zone (Petrolina, Pernambuco State) 31
2.3 Adaptation concepts used in policies and their implementation 35
Guadeloupe 35
Colombia 36
Brazil 37

3. Lessons learned and prospects for the work carried out 39
3.1 Lessons Learned in the Formulation and Implementation of VAC Policies 39
3.2 Mechanisms that promote integration between AACC instruments 40
3.3. Use and integration of adaptation concepts into national policies..... 41
3.4. Methodological and theoretical advances, limitations of the study 42
Conclusion: Perspectives and Next Steps 44
Bibliographical references 45
Appendices..... 50
A1. WP1 method 50
A2. Publications related to WP1 52
Articles 52
Communications..... 53
Working papers & Rapports de recherche 57
Dissertations and theses..... 57

Introduction

Over the past two decades, a growing body of literature has highlighted the potential effects of climate change (CC) on economic development, the environment and human well-being, particularly in tropical rural areas. Agriculture, although contributing to the CC, is also affected by variability and CC. Adapting agriculture to the CC has thus become a major challenge in vulnerable tropical agricultural territories.

To address this challenge, different concepts have been proposed, national policy frameworks for adaptation to the CC have been formulated and many local initiatives have flourished. The main hypothesis of the ARTIMIX project is that the lack of articulation between the interpretation of concepts and the design of CC policies, between levels and sectors in the implementation of policies, and between *policy mixes* and producers' priorities, can lead to poor adaptation to CC.

The objective of the research conducted in the ARTIMIX project is to help determine the conditions for success in designing and implementing *policy mixes for* adaptation to CC that promote ecological transition in vulnerable tropical agricultural territories.

To achieve this objective, the project aims to analyse the concepts dealing with adaptation in agriculture and how they are taken into account in adaptation policies in the CC (WP1), to identify the factors favouring or limiting their implementation by considering their coordination with sectoral policies (WP2) and to characterise how current policy combinations affect farmers' practices and their socio-economic and environmental outcomes (WP3)

This document presents a synthesis of part of the results of WP1 of the ARTIMIX project along two axes: 1) a mapping of national and local policies dealing with the adaptation of agriculture to climate change (AACC) and 2) an assessment of the integration of concepts dealing with AACC into the framework of national and/or territorial policies.

In this perspective, it is important to understand the process of developing CC adaptation policies in Brazil, Colombia and Guadeloupe for the agricultural sector. Three questions underlie this problem:

- What are the dynamics of the CC's inclusion in the political agenda?
- Which actors have been involved in these processes and which policies and policy instruments have been created, modified and combined to create one or more specific policy mixes in each country?
- What has been the use of concepts to address AACC and how have they been translated into these policies?

WP1's initial assumption was that the integration of concepts into national policies to address agricultural adaptation problems to climate change is still very limited and that their different interpretations by different actors do not contribute to a coherent policy approach to the combination and implementation of instruments for adaptation to the CC.

The first specific objective of this phase was therefore to carry out a dynamic mapping of national and local policies related to the AACC, the actors involved in their development process and their instruments.

The second objective was to identify and critically examine the concepts proposed to address adaptation to the CC by highlighting controversies, clarifying differences and convergences, synergies and antagonisms between them. This objective involved a second task: the analysis of current national policy frameworks related to the issue of adaptation by examining their degree of dependence on these concepts.

The document consists of three main parts in addition to this introduction and conclusion. The first is dedicated to the theoretical and methodological repositories used; the second presents a summary of the results by question and by country. The third part deals with transversal or comparative analyses by issue, lessons and perspectives in particular in relation to other complementary publications issued by WP1 or in preparation.

1. Theoretical frame of reference and methodology:

1.1 Reference framework on the mapping of public policies and their interactions

The work in WP1 was based on a literature review of approaches to address the complexity and interactions of public policies.

Mapping of policies, actors and network analysis

Rapid policy network mapping is a form of social network analysis because it provides information on the balance and models of: responsibility, authority, resources, relationships and power in a political process (Bainbridge et al., 2011). Lewis and Mosse (2006) refer to actor network theory (ANT) according to which there are networks of practices involving human and non-human actors who are bound by negotiations and defined by their way of acting and reacting (strategies) and their representations. Thus, network analysis can provide information on the content of policy instruments, their position in the policy formulation process and the role of actors in the implementation of policy decisions (Bainbridge et al., 2011). Social networks are composed of individuals or instruments connected by different parties. The specific structure of a network contributes to the success or failure of an objective (Agrawal and Perrin, 2008, Newman and Dale, 2007). Social network analysis (SNA) is useful for understanding and illustrating the interactions between individuals and groups and the knowledge flows between them or the articulation between policy instruments (Spielman et al., 2011).

This analysis focuses on an egocentric approach where "ego" corresponds to a political actor or instrument linked to another actor/instrument in a political community. As a result, political actors are grouped according to their "policy domain" and policy instruments are grouped into categories (Bainbridge et al., 2011). This analytical input is also highlighted by Flanagan et al,

(2011) to analyse political processes insofar as the reasons implicitly or explicitly formulated by political decision-makers constitute the starting point for policy analysis.

The interest of using the notion of network lies in moving the analysis to an intermediate or meso level that focuses on "intergroup intermediation" in a bottom-up approach (Massardier et al., 1997). Thus, its interest is to illustrate that public action is built on informal relationships between various actors (Massardier et al., 1997). With the help of the GEPHI software it is possible to visualize these links and perform additional analyses such as modularity and centrality. Indeed, the modularity analysis makes it possible to identify groups of nodes (visual densities that denote structural densities) within the network (sub-networks) (Jacomy et al., 2014). In addition, the centrality analysis makes it possible to visualize the weight of certain actors within the network and their potential power to control the transmission of information between network members (Lamb et al., 2016).

Analysis of instruments and their interactions

The literature on interactions between public policy instruments addresses intersectoral interfaces, their conflicts, governance between different levels of public action and competition for public resources. Despite the multiple origins and distinct thematic developments, this literature focuses on mechanisms to avoid fragmented decisions and promote policy coherence. The multiplicity of approaches used in this literature reflects the fragmentation of power in public action, characterized by an interweaving of organizations, norms and negotiation procedures with an increasing number of actors (Lascoumes; Le Galès, 2004).

The term "environmental policy integration" refers to the integration of environmental concerns into sectoral policies (Persson, 2004). A number of international documents, the most important of which is the Brundtland Report (1987), have focused on the objective of jointly considering environmental and economic aspects. However, it should be noted that this objective has emerged fundamentally as a rhetorical reference in the field of the environment rather than as a political strategy (Hertin; Berkhout, 2003). In addition, as noted by Persson (2004), many of these documents are based on organizational processes, neglecting the preferences of national decision-makers and environmental/sectoral offsets. Although normative, studies in this area recognize the controversies over the political agenda of the CCA and resistance to change that lead to integration problems, which cannot simply be associated with ineffective policy implementation. In this context, recent studies on climate policies propose a less normative and rational approach to this process (Adelle; Russel, 2013), incorporating the hypothesis of tensions or competition/rivalities between actors in the manufacture of public policies and the identification of problems and means by which to act (Di Gregorio et al., 2016).

Similarly, the "nexus" (policy nexus) approach is based on the argument that the limited emphasis on the interfaces between food, water and energy security would normally lead to conflicting interventions and inefficient use of natural resources (Howells et al., 2013). It is argued that sectoral strategies conducted in isolation from each other can increase vulnerabilities while limiting capacity or increasing risks in another location or sector (Biggs et al., 2014; Rasul; Sharma,

2016). The analysis of this nexus through an environmental lens makes it possible to associate it with the idea of "security", which can be achieved, according to Biggs et al (2014), when the unit of analysis (from country to individual) has the capacity and assets to use natural resources in a sustainable way to support or improve their well-being. In this perspective, environmental insecurity would often be felt more acutely by poor and vulnerable populations in developing countries (Upreti, 2013).

Finally, the idea of a *policy mix was* imported from the economic debates of the 1960s, which focused on regulating fiscal and monetary policies (Flanagan; Uyarra; Laranja, 2011). Some of the literature has been limited to analyzing the definition of an "optimal policy mix" (Bahn et al., 2015). Nevertheless, as Flanagan et al (2011) indicate, a policy mix is not only the result of instrument mixes, but the result of processes from which instruments emerge and interact. Recently, this literature has converged with that of policy integration, analysing how different combinations of instruments can meet the multiple objectives of policy strategies and enhance synergies (Ring; Barton, 2015).

At the level of policy instruments, it is necessary to analyse their combination (policy mix) Two visions coexist on the definition of a policy mix, as explained by Flanagan et al., (2011). On the one hand, it is considered that a policy mix includes stable policy instruments aimed at a single explicit objective. In this sense, different types of instruments can complement each other to achieve the same objective (Lambin et al., 2014). This view contradicts that of innovation policy mixes, which consider broader instruments (beyond a sector or theme), which are seen as less stable over time and can target several objectives and policy areas (Flanagan et al., 2011). Indeed, the design and implementation of new policy instruments are always integrated into pre-existing contexts where remnants of previous policy initiatives are found in established paradigms, institutions, practices and stakeholder networks (Rayner and Howlett, 2009). In the latter case, it is then interesting to evaluate the trade-offs (in the sense of compromise) of these instruments to achieve innovation policy objectives.

The analysis of policy instruments must integrate their flexible and evolving nature over time and space, and in this sense, their classification into typologies may accentuate the formal and official dimensions of the instruments. There is a risk of highlighting their most formal aspects and masking those that are less formal, as well as the reasons that influenced their choice: interests, access to information, modes of operation (Flanagan et al., 2011). Similarly, public policies do not pursue a single goal or even a coherent and hierarchical set of objectives, but rather a wide range of evolving explicit and implicit objectives that can sometimes conflict (Flanagan et al., 2011).

Thus, there are risks of instrument overlay or policy stratification that may be counterproductive, complex and costly to administer (Flanagan et al, 2011; Howlett and Rayner, 2007; Rayner and Howlett, 2009). For Flanagan et al. (2011), the characteristics of interactions are relative and potentially transient to the extent that policy instruments are described as flexible and evolving (Flanagan et al., 2011). The evolution of these instruments may depend, for example, on the evolution of the institutional environment and the actors involved (Flanagan et al., 2011). On the

other hand, the discourse on the choice of policy instruments and their coherence must also be taken into account. Therefore, Flanagan et al. (2011) explain that the context and implementation of an instrument can be fluid over time as the instruments are interpreted and reinterpreted in light of the new logic.

There are several dimensions in which political interactions can take place and which must be taken into account in the analysis of policy mixes. These are the "*policy space*" dimension (which corresponds to the abstract space in which different policy areas coexist), the governance space (between different levels of governance), the geographical space (interactions between policy instruments) and the temporal dimension (Flanagan et al., 2011; Barton et al., 2013). In the context of biodiversity conservation, Barton et al, (2013) define "*policy space*" as the area of competence of entities in charge of nature protection but also the area in which conservation and social cost reduction objectives must be achieved, while "*policy scape*" refers to the spatial configuration of a *policy mix* or combination of policies.

Integration of climate policies

According to Di Gregorio et al. (2017), climate policy integration (CPI) is considered effective when there is (i) internal climate policy coherence between mitigation and adaptation objectives and policies; (ii) external climate policy coherence between climate change and development objectives; (iii) vertical policy integration to integrate climate change into sectoral policies; and (iv) horizontal policy integration through comprehensive governance structures for intersectoral coordination. Indeed, integrated approaches to mitigation and adaptation can help reduce the risk of damage caused by impacts, help local populations cope with trade-offs and exploit synergies in agriculture, and reduce threats to biodiversity and food security (Di Gregorio et al., 2017). This framework is based on the concepts of policy coherence between multiple policy objectives and the vertical and horizontal dimensions of policy integration (Di Gregorio et al., 2017).

1.2 Theoretical framework and categories of concepts related to adaptation

The second objective of this document is to characterize the process of integration/ translation of concepts related to the adaptation of agriculture to climate change into national instruments from international regimes.

The status of adaptation in CC policies

Adaptation to climate change is a relatively recent subject of study in the social sciences. Indeed, since the path of mitigation has been favoured when the political problem of climate change is raised, it is logical that the literature on this theme is more important than that on adaptation. For authors Füssel and Klein (2006), the strong attention that the principle of mitigation has received with regard to adaptation in the history of international negotiations can be explained by at least three reasons. On the one hand, mitigation helps to reduce the impacts of climate change on all sectors while adaptation is concentrated on specific sectors. Moreover, while developing countries would have greater adaptation needs, it is not those that have contributed

most to climate change; conversely, in the case of mitigation, the polluter pays principle applies. Finally, it is even more difficult to measure the effectiveness of adaptation measures than that of mitigation instruments. The difference is that the measurement of mitigation is more standardized than that of adaptation. Mitigation is more suitable for normative analyses focused on the calculation of greenhouse gas emissions. There is no equivalent standard for measuring adaptation.

As the concept of adaptation spread in international and national political arenas during the 2000s and 2010, a literature then dominated by biophysical approaches began to emerge. Gradually, the implementation of adaptation and its institutional and organizational dynamics are also becoming a subject of political science research. While the first step is to study adaptation and mitigation side by side to compare them, the issue of adaptation to climate change is gradually becoming a subject of study in its own right.

With the multiplication of social science research on climate change, a universe of concepts is emerging around adaptation that are mobilized in public policy documents and in research on these themes. Among these, the concept of "maladaptation" is used to refer to the result of adaptation policies whose objective has failed and which ultimately increase the vulnerability of other sectors, systems or social groups according to the definition proposed by Barnett and O'Neill (2010). The authors propose a typology of five factors that determine whether or not adaptation intentions are ultimately "maladaptive": in the event of an increase in greenhouse gas emissions and/or a disproportionate burden on the most vulnerable people and/or high opportunity costs and/or reduced incentives for adaptation and/or the establishment of trajectories that force future generations to limit their choices.

Increasing vulnerability tells us Barnett and O'Neill, but what vulnerability are we talking about? This polysemous term has different definitions depending on the fields of research that use it. Füssel and Klein thus distinguish three distinct models of vulnerability conceptualization: the *risk-hazard framework* emerging from a literature focused on the governance of natural disasters and risks proposes a definition of vulnerability close to that of sensitivity, the *social-constructivist framework* from the political economy and human geography understands vulnerability in its social dimension and highlights socio-economic and political factors, and finally research on climate change mobilizes vulnerability in order to designate a system's exposure to climate hazards on the one hand and its sensitivity and adaptability on the other hand. Scientific research proposes a definition through the Intergovernmental Panel on Climate Change (IPCC) in its 2011 report. For the expert group, vulnerability is defined as the "degree to which a system is likely to, or unable to cope with the adverse effects of climate change [...]. Vulnerability is a function of the character, magnitude and rate of climate change to which a system is exposed, its sensitivity, and its adaptive capacity[1].

[1] cf. Special Report of the Intergovernmental Panel on Climate Change IPCC 2011 : https://www.ipcc.ch/pdf/special-reports/srren/SRREN_FD_SPM_final.pdf

Putting adaptation policies on the agenda at the CC

Although it has been recognized that countries committed to the Kyoto Protocol, including Brazil, Colombia and France, have taken measures to mitigate the CC, government action is not considered "aggressive" for fear of negative political consequences (Pralle, 2009). Thus, since some political issues may emerge and then disappear from the agenda, it is important to look at the factors underlying these developments for the climate issue from a historical perspective.

The agenda setting perspective makes it possible to identify the factors that facilitate the rise (and persistence) of the CC issue on the agenda and thus to better understand current climate policies (Pralle, 2009). To understand the arrival of the CC theme on the Colombian political agenda, it is also necessary to identify, from a historical perspective, key events. This analysis provides a better understanding of the factors that have led to the emergence of the CC issue in France, Brazil and Colombia.

Translation mechanisms

The concept of translation was introduced by Michel Callon (1986) to analyse the phenomena of construction of new signifiers within networks of actors that allow the production of agreement on the actions to be carried out between heterogeneous agents. Applied to public policy analysis, the notion of translation refers to the process of reformulating political problems, orientations or proposals in a different language and context. The translation may be more or less complete, and more or less distant from the original formulation. Policy discourses must then be analysed using international frameworks and focusing on two main questions: how frameworks are translated and how public policy proposals are legitimized (Hassenteufel et al., 2017).

According to Hassenteufel and de Maillard (2013), the notion of translation reveals how public action models are reformulated and how actors mobilize and negotiate to bring about policy changes. For Hassenteufel (2005), the model proposed by Callon (1986) is operational in the context of public policy analysis to characterize the processes of change or innovation in the forms of collective or organized action in relation to the State. It focuses on the existence of specific interaction networks and the role of actors in the production of shared document signifiers, such as the drafting of laws or policy statements.

These translation processes therefore have a strong political dimension, as a result of power relations and stakeholder strategies linked to public policies. Translation also depends on existing institutional arrangements and power relations, and organizational capacities to implement change. In this context, Hassenteufel et al (2017) argue that the concept of translation includes three dimensions of public policy analysis: reformulation of political problems formulated within international institutions to make political changes acceptable and legitimate at the national level (discursive dimension); mobilization of actors for and against the circulation of policies and power interactions between them (interactive dimension); and adaptation to existing institutions and organizational capacities (institutional dimension).

In the case of global climate agreements, the responsibilities assumed by national governments are translated into differentiated policies, this process being configured according to the dimensions described by Hassenteufel et al (2017): discursive, linked to the ability to argue and convince of the importance of policy construction; interactive corresponding to negotiation, mobilization of actors and assignment of roles, the institutional dimension, considering norms, values, resources, controversies and implementation capacities of action.

Le rôle des individus / policy brokers

From an actor oriented perspective, it is possible to explore how social actors meet in negotiations about resources, meaning, legitimacy and institutional control (Long, 2001). Taking these elements into account provides a better understanding of policy change processes such as the introduction of the CC issue or adaptation into national policies. Thus, an approach that takes interactions as an entry point is useful for understanding stakeholder strategies, challenges in dealing with a problem (Olivier de Sardan, 2001).

At the national and international levels, the concept of "*policy broker*" refers to those "double agents" present in national and international arenas/interfaces that play an export/import role in models and standards (De Maillard and Hassenteufel, 2013; Dezalay, 2014; Surel, 1998). Delazay (2014) defines international brokers as agents who claim to be universal but who are present in several national spaces and who use multiple scholarly and/or idealistic registers.

1.3 Methodology

An analysis grid

For the mapping of policies and instruments, a series of characteristics have been identified:

- Objectives,
- Foundations (concepts- narrative- justification- origin),
- Target audience and level(s) of implementation,
- Actors and institutions involved in their development and implementation,
- Technical design: resources and financing methods, legal systems,
- Governance: who decides and how ? institutional decision-making process.

To analyse the consideration of concepts dealing with the adaptation of agriculture to the CC, it was necessary to characterise the process of integration/translating concepts mobilised in existing national and international regimes, policies or reference frameworks into national and regional policy documents and at the level of the actors interviewed.

An indicative list had been identified (in case no concept emerges)[2]. She concerns:

- General concepts related to climate change adaptation: Ecosystem-based adaptation, community-based adaptation or nature-based adaptation, in contrast to other "technological" adaptation models such as "cohabiting with drought" or "risk management";
- General concepts as final variables: vulnerability, resilience, adaptive capacity, sustainability
- Concepts specific to agriculture: *climate smart agriculture* (sustainable/intelligent agriculture adapted to the climate) or agroecology,

Three main categories of actors/institutions were consulted:

- public policy makers and managers (at different levels)
- representatives of interest groups and coalitions (identifying their controversies)
- key individuals (political entrepreneurs, smugglers, translators).

Three case studies

The work of the ARTIMIX project was applied to 3 situations offering a set of common and specific criteria (Table 1):

- A diversity of concepts for adapting to the CC in national and local policies,
- A gradient in the integration and institutionalization processes of CC adaptation in rural areas,
- Contrasting intersectoral or multi-level articulation problems (the 3 cases combine at least national and local policies, or even 3 levels in Brazil (Union, federated state, municipalities) and Guadeloupe (state, region/department and municipalities)
- Different agricultural and livestock production systems.

Due to socio-economic and institutional specificities, it was not a question of making a strict comparison of case studies leading to normative recommendations. The objective was to use this diversity of cases to identify the main explanatory features of the process of integrating concepts and policies for adapting agriculture to the CC, trends and developments while qualifying the specificities of each case by putting them in perspective.

The first case study concerns France with the overseas departments and regions (DROMs) of Guadeloupe. National policies exist but local stakeholders are not very aware of the issue of adaptation to climate change, so there is no specific policy, but a complex juxtaposition of sectoral and territorial policies for agriculture with the adoption of agro-ecological transitions without intentional CC adaptation, in a context of prevalent issues related to the increasing

[2] See report of the workshop to launch the Artimix project.
https://www.artimix.fr/content/download/4188/32119/version/1/file/Rapport+ARTIMIX+Kick+off+V03+EN.pdf

impacts of hurricanes, water and soil pollution (Chlordecone) and energy transition issues. Agricultural production combines diversified/integrated systems combining livestock and monoculture for export (bananas).

The second case study is that of Colombia/Cauca, where the national strategy and regional plan on climate change are being developed through regional platforms. There are intersectoral coordination mechanisms (CICC) at different scales (*Regional Nodos).* Various adaptation actions are implemented in the study area, for example by promoting practices (rainwater harvesting, improved beans, compost, etc.) of *Climate Smart Agriculture* (CSA) as part of the TESAC (Sustainable Climate Adaptable Territory) project, which is part of the Climate Change, Agriculture and Food Security (CCAFS) program. Nevertheless, adaptation in the Cauca agricultural sector is still in its infancy.

The third case is Brazil / State of Pernambuco / São Francisco River Valley. This case is characterized by the history of chronic droughts (semi-arid zone) and irrigation programmes (fruits for export) set up since the 1970s and 1980s. This situation has led to a growing contrast between rainfed production (benefiting from bottom-up adaptation measures) and irrigated production focused on competition for the use of water from the Sao Francisco River with the energy sector (hydroelectric dams).

Table 1: Main characteristics of the three case studies

Cases	France (Guadeloupe and Martinique)	Colombia (Cauca)	Brazil (State of Pernambuco)
CC Adaptation Policy Framework	National Adaptation Plan for the CC (PNACC)	National Adaptation Plan for the CC (PNACC 2011)	Plan National plan of CC in Brazil
Local policy framework for adaptation to the CC	Rural Development Plan (RDP), 2018 EAFRD 2014-2020	Regional CC Adaptation Plan	National CC Plan & Water Resources Policy of Pernambuco
Main concepts of adaptation to the CC	Ecological transition, Agro-ecology	Climate smart agriculture	Agro-ecology
Articulations from	Adaptation / Mitigation / Agriculture (Competitiveness, equity) / water and soil pollution / energy / tourism	Adaptation / Mitigation / Agriculture (poverty) / food security / water supply	Adaptation / Mitigation / Agriculture (competitiveness, equity) / food security / access to water / soil degradation
Local sites	Sites representative of the diversity of situations in Guadeloupe and Martinique	Sustainable territories adapted to the climate (Tesac)	Semi-arid zone of the San Francisco River (3 municipalities).

Type of climate shocks associated with the CC	Extreme event (Cyclone) and increasing drought, sea level rise	Increased drought and lack of water, intense rainfall event (el Nino)	Increased drought and lack of water
Agricultural system	Diversified system (pluriculture and livestock) and monoculture (banana)	Diversified systems (sugar cane, beans, livestock) and export cultivation (coffee)	Polyculture dryland livestock farming and fruit crop irrigation for export

Application of the method

WP1's data collection work was carried out in two stages (document analysis and resource person interviews), both for concept integration and policy mapping on the basis of a common analysis grid (separating the two parts), applied to the reading of the documents and used as a basis for an interview guide (see Annex 1).

A first step was dedicated to the analysis of documents (national and/or local laws, plans, strategies and policies; implementation decrees and standards; budgets and their implementation, etc.).). In addition to the treatment of concepts related to adaptation (in general and the agricultural sector in the CC), the documents made it possible to identify the main generic or specific policies, their trajectory, the actors behind them and the narratives that justify them.

On the basis of the information and data obtained from the documents, a series of actors were identified: institutions, policy or programme managers or managers, resource persons (scientists, politicians, etc.) for the application of targeted interviews. These interviews had two objectives. The first objective was to complete/validate the reading of the integration of concepts into national policies, in particular their dilution or persistence at the local level. Then, it was a question of collecting data on the effective implementation of the instruments at the local level and identifying the interactions and/or articulations between the various instruments and programmes dedicated or mobilized for the adaptation actions of agriculture to the CC.

Based on the proposed theoretical frameworks, the work in the three countries/lands analysed the integration of the concept of adaptation of agriculture to climate change and other related concepts into the national and local policy agenda. The analysis focused on official documents, reports, plans, laws, among other reference texts, as well as on the use of these concepts by actors directly or indirectly related to the construction, coordination or implementation of public policies for adaptation to climate change.

2. Main results and cross-sectional analysis of the three cases

This section presents the summarized results of the AACC policy mapping by country/case and an attempt to synthesize and contextualize them, including in other specific project publications for each of the two sub-parts[3].

The first concerns the framework and trajectories of AACC policies. The second presents the sets/combinations of AACC policies or instruments at the national (Colombia) or regional/territorial (Guadeloupe and Brazil) level and the types and levels of interactions between these policies or their actors.

2.1- Framework and trajectories of national policies for adaptation to the CC

Guadeloupe: in search of instruments for adaptation to the CC

History of the AACC in Guadeloupe: from European guidelines to local governance

As an Outermost Region of the EU and an Overseas Region, agriculture's adaptation strategies to climate change in Guadeloupe are part of multi-level dynamics. On the one hand, agricultural adaptation strategies are part of the Common Agricultural Policy (CAP) at European level. While since 1992, the environmental aspect has been limited to the second pillar, the new 2014-2020 CAP integrates the climate issue into its two pillars, which has earned it the nickname "Green CAP" (Ansaloni, 2015). It operationalises the new MAEC (Agri-Environmental and Climate Measures) which follow on from the MAET (Territorialised Agri-Environmental Measure) of the 2007-2013 programming. MAETs allow farmers to have measures to adapt their agricultural routes (choice of varieties and change of practices) co-financed.

At the national level, the first generations of national policies on climate change (French Climate Change Prevention Programme in 1993, National Climate Change Programme in 2000, Climate Plan in 2004) are primarily organised according to a sectoral and quantitative approach, and highly centralised (Bertrand & Richard, 2014). It is only after the Grenelle laws (Grenelle I in 2009 and Grenelle II in 2010, which follow the Grenelle II process launched in 2007) that a series of more elaborate legislative measures are adopted, including the National Climate Change Adaptation Plan (PNACC-1) in 2011, which covers the period 2011-2015. The PNACC is reflected in the Regions through the Guadeloupe Regional Air Energy Climate Scheme (SRCAE) (Poupeau, 2013) and at the municipal level through the Territorial Air Energy Climate Plan (PCAET). Their objectives are to define locally the challenges of adaptation to the CC and practices in each sector, and thus to strengthen the territorialization of public climate policies. This dynamic was recently confirmed when defining the PNACC-2 (2017) for the period (2018-2022). In addition, the 2014 Future Law for Agriculture, Food and Forestry (LAAF) essentially sets as a priority for agricultural

[3] Each country/field was the subject of specific briefs and reports (see Appendix A2)

policy to promote agro-ecological systems adapted to climate change at the territorial level. To this end, it creates a new policy instrument, the Economic and Environmental Interest Groups (EEIG).

While since the 2000s, the French governments and the European Union have gradually developed strategies and mechanisms for adapting agriculture to climate change, 2015, with the holding of COP21 in Paris, will be a major turning point in the evolution of adaptation policies. Adaptation to climate change will indeed become an unavoidable theme, thus confirming the thesis of the air conditioning of public policies (Dahan, 2018), including agricultural policies. However, the practical implementation, if necessary in Guadeloupe, of instruments that support agricultural adaptation policies to climate change faces local, political, economic and social challenges.

A vulnerable tropical island area and a laboratory for innovation

As a tropical island area, Guadeloupe is already suffering the consequences of climate change on its territory. Rising sea levels, the increasing violence of extreme weather events and the proliferation of invasive species are already perceptible threats on the island. It is in this context that Guadeloupe hosted the International Conference on Biodiversity and Climate Change in 2014, which sought to address the environmental issues specific to the Outermost Regions of Europe (ORs) and the Overseas Countries and Territories (OCTs). This first event made it possible to politically recognize the vulnerable nature of these islands to climate change, and to promote proactive and concerted strategies to face these new challenges. For Guadeloupe, the Conference highlighted ways to adapt to climate change based on "nature-based solutions", and stressed the importance of biodiversity issues and the need to further develop renewable energies. A year later, in 2015, during the preparation of COP 21 in Paris, the Committee on Spatial Planning and Sustainable Development and the Senate Delegation for Overseas France presented a report aimed at providing guidelines for adapting public policies to climate issues in overseas France. The overseas territories are presented as "climate outposts": if they are already suffering the impacts, they are also climate observatories but also laboratories for innovation in terms of public policies. The fact that Guadeloupe is vulnerable to climate change requires better quantification and qualification of its impacts on the territory. Created in 2013 by a group of partners including the Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME), Météo France, the Guadeloupe Region and the Direction de l'Environnement de l'Aménagement et du Logement (DEAL), and EDF Archipel Guadeloupe, the Observatoire Régional de l'Energie et du Climat (OREC)[4] constitute the main observation centre for climate change in the region with the

[4] In 2001, the National Observatory on the Effects of Global Warming (ONERC) was created, marking the beginning of the State's action in the field of adaptation. Its purpose is to disseminate scientific information on the impacts of climate change and raise awareness of their implications, propose adaptation measures and contribute to IPCC reports. It thus contributes to integrating the effects of climate change into public environmental policies. ONERC is organized around a policy council that brings together representatives of the State from various ministries (Agriculture, Industry, Environment, Interior, Overseas France, Equipment, Research and Cooperation), researchers (IRD, CIRAD, IFREMER), representatives of the National Assembly and the Senate,

aim of supporting the implementation of public policies for local authorities and government services. In 2016, OREC drew up a first vulnerability profile of the island to climate change by measuring exposure to climatic hazards and the sensitivity of the territory. Based on the Climate Impact tool developed by the French Environment and Energy Management Agency (ADEME), the impacts are clearly specified by sector of activity.

In Guadeloupe, it is ADEME that has positioned itself as a central player in the field of adaptation to the CC. ADEME has therefore developed tools for local authorities wishing to carry out a "vulnerability diagnosis" of their territories. Rather specialized in energy and waste management issues, it mobilizes its skills in these two sectors and circulates information to the communities with which it works. It is therefore a partner in the development of the Regional Climate Air Energy Scheme (SRCAE) drawn up by the Guadeloupe Region. In this document, which has a strong component dedicated to climate change, it is significant to see that 19 guidance sheets are dedicated to recommendations labelled "mitigation" when only 6 are dedicated to adaptation. The energy issue is indeed a central focus of work for the Region and explains the preponderance of mitigation measures over adaptation guidelines.

The invisibility of climate change

Agriculture accounts for 5% of greenhouse gas emissions in Guadeloupe, with mineral fertilizers from cane and banana crops and cattle cattle accounting for the largest share. Perceived as one of the sectors responsible for climate change, a cognitive reversal began to take shape in Guadeloupe in the years 2010 with the development of new farming practices, agroforestry and greener sectors. However, beyond the rhetoric, policies labelled as climate change adaptation still concern very marginal initiatives in the agricultural sector. However, a wide range of policy tools are used to inject environmental themes into agriculture. These instruments often have positive impacts on climate change and could be part of an adaptive approach. For example, the Economic and Environmental Interest Groups (EIGs) set up at regional level by the DAAF provide a network of knowledge and operating equipment and support projects such as the conversion to organic farming or the development of biomass, which, by having a positive impact on climate change, could be considered as adaptation actions. Other alternative practices that are more environmentally friendly refer, for their part and following the example of the sugar cane sector, to mitigation measures such as the spreading of organic matter rather than the use of plant protection products or, in the beekeeping sector, the demand for the protection of pollinating insects in order to maintain the good state of ecosystems and local food production systems. Similarly, planning documents, such as the Regional Development Scheme (SAR) (revised in 2018) and Guadeloupe's recent Convergence Plan, signed in January 2019, continue to isolate agriculture and adaptation to climate change. Only the Rural Development Plan (RDP) adopted

scientists (CNRS, CIRED, INSU), representatives of territorial authorities and approved environmental protection associations (WWF, FNE).

in 2017 addresses the challenges of adapting agriculture to the CC in terms of foresight and farmer training, but not so much in terms of coordinating actors.

Rather than talking about climate change, it is the concept of "agro-ecological transition" that is retained by the actors of the DAAF, the DEAL and the Departmental Council to label all the actions undertaken for the "greening of agriculture". Presented in 2012 by Stéphane le Foll, this concept is part of the "agro-ecological project" wanted by the Ministry of Agriculture. In the case of the Guadeloupe GIEEs presented above, there are project objectives stated as such: "to optimise their farming systems on an agro-ecological basis" (GIEE Tropicales Fleurs Guadeloupe) or "to acquire and apply agro-ecological practices" (GIEE Adarg Agro Bio). This will also be the case for the banana sector, through its Sustainable Banana Plan launched in 2008, which takes up this concept of agro-ecological transition. Under the impact of cyclones, increased economic competition, legislation and local societal demands, the sector is organizing itself to be more resilient to extreme weather events and reduce its environmental and health footprints, but never does the concern for adaptation appear in speeches. However, these agro-ecological practices do not seem to cover a stable whole or even to have a consensus on their definitions. Thus, on a computer graphics brochure available on the website of the Ministry of Agriculture, entitled "The fundamentals of agroecology", we can find climate adaptation as one of the dimensions related to the global concept. However, the link between climate change and agro-ecology does not seem to be obvious to the public actors who relay these instruments:

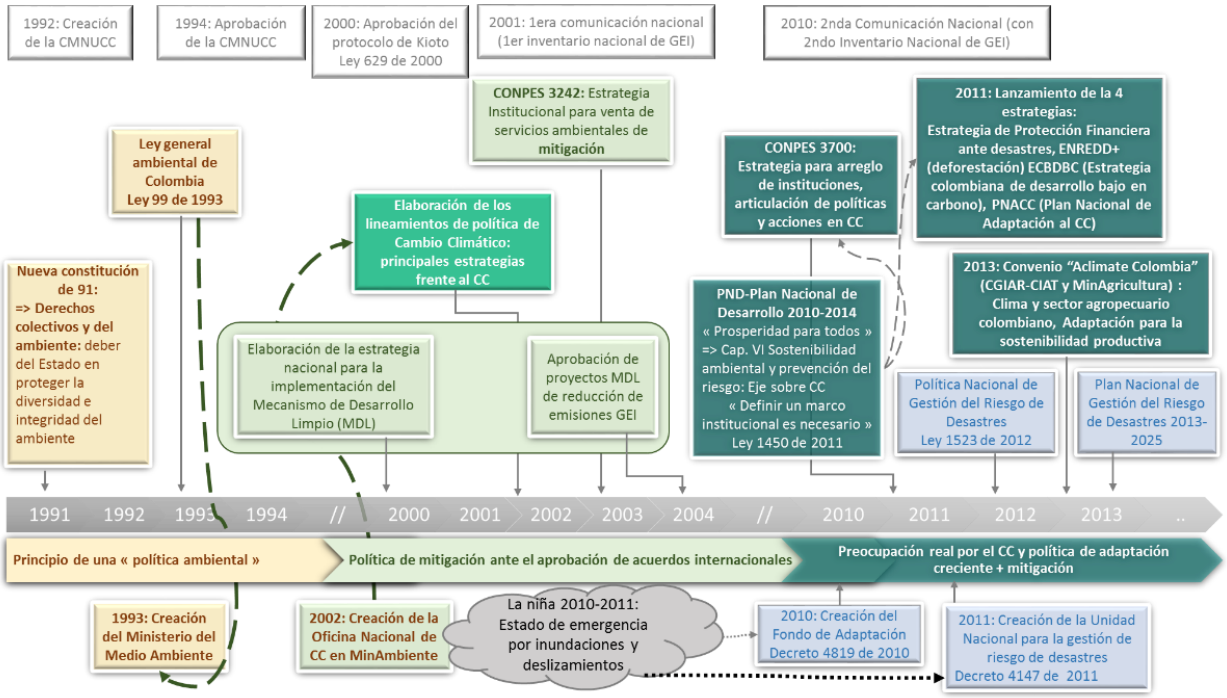
Colombia: a gradual process of integrating the CC into the agenda

The arrival of the CC issue in Colombian public policies took place in three stages from 1990 onwards, marked by key moments and the creation of policy instruments:

- First period: 1991-1994: integration of environmental principles;
- Second period: 2000-2004: Implementation of a climate change policy based on mitigation;
- Third period: 2010-2018: Attempts to articulate, clarify and affirm the existing political and institutional framework in a post-conflict context.

For each of the three key periods, the key events will first be presented and then the narratives of the actors interviewed around these events (Figures 1 and 2).

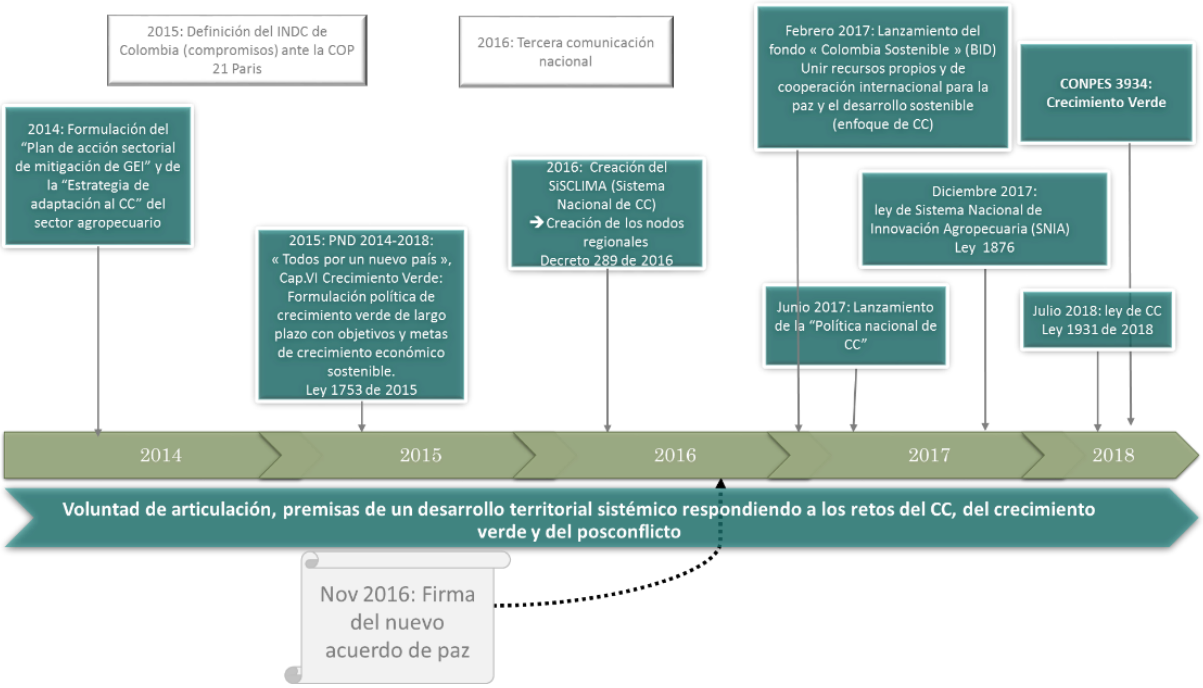
Figure 1Timetable for the arrival of the CC in the Colombian government (1991- 2013). Source Cécile Sénégas (2017)



The three periods presented illustrate, first, the arrival of environmental issues through an internal event, the drafting of the new Constitution in 1991, which resulted in the creation of the Ministry of the Environment. Then, it is the signing of international treaties (Kyoto) that advances and guides (mitigates) the climate agenda in Colombia. Two non-competitive approaches then coexist; disaster management and mitigation management. The Ministry of Environment and Sustainable Development - MADS monopolizes the questions on the CC. Finally, during the third period, which corresponds to J. M. Santos' two terms of office, it is a climate event (the Niña of 2010-2011) that reinforces the government's interest in the CC. The response to this event requires the strengthening of the disaster risk management unit (moved directly under the presidency and funded). Subsequently, the National Planning Department - DNP makes the concept of adaptation to the CC visible by breaking the monopoly on the MADS CC. The argument put forward is the need to hold the sectors accountable for the effects of the CC (which are responsible for developing their plans). The strategic role of the DNP moves the CC forward on the political agenda. International discussions and commitments (OECD, COP21) play an accelerating role in the progress of the CC. In addition to this political-environmental context, there is the issue of peace agreements (which potentially competes with the issue of climate change), another theme on the agenda of J.M. Santos' two national development plans (NDPs), which allows the creation of mixed instruments such as the *Colombia Sostenible* fund, which combines objectives linked to the CC and peace. In the case of Colombia, the three flows described by the *Multiple Stream Framework* approach (Cairney and Jones, 2016, Kingdon, 1995, Pralle, 2009), necessary to put the climate problem on the agenda, have been combined. In other

words, a window of opportunity has allowed for a significant policy change. First, the attention of policy makers has been drawn to the 2010-2011 La Niña climate event, as it has been shown that decision-makers are sensitized to a problem through spectacular events that attract the attention of the public and decision-makers (*problem stream*) (Pralle, 2009).

Figure 2Timetable for the arrival of the CC in the Colombian government (2014-2018). Source Cécile Sénégas (2017)



Secondly, the available answers to this problem come from international specialists discussed at events where countries, including Colombia, have made commitments. The solutions prioritized by decision-makers were, first, the risk management approach with the creation of the adaptation fund, then the management (separate and then integral) of the CC (*policy stream*).

The motivation and opportunity to transform these solutions into policies was made possible by the role played by the DNP in taking charge of the management of the case in collaboration with the MADS. The motivation of the actors (DNP, MADS) is mainly linked to what the coordination of the theme allows in terms of power and access to and control of financial resources (national and international). The function and strategic location of the DNP (planning role) is sufficient to motivate this unique actor (with the support of the President) to transform the problem into policy and law. The support of the population (strongly affected by Niña) and the media facilitates this agenda-setting process (Pralle, 2009). The DNP and MADS can then be described as political entrepreneurs (Pralle, 2009) who have seized the opportunity and pushed for government action.

As economic priorities often place environmental problems and solutions at the bottom of the list of priorities, the strategy deployed by these entrepreneurs has been to focus on the economic

gains associated with green technologies (Pralle, 2009). The development of the national CC policy, the CC law, the Integrated Climate Change Management Plans - IGCCP before the end of J.M. Santos' second term of office, but also the long-term commitment (e.g. NDC) can also be considered as a strategy to keep the CC on the agenda in the future. However, there are risks of a decline of the political issue on the government agenda. For the implementation of the law, it will be necessary to motivate more actors (beyond the DNP and MADS), both at sectoral and territorial level. Another risk is the risk of a change of government (conflict between the outgoing president and the new president). In addition, public support could be undermined by other issues considered to be of higher priority (post-conflict, food security, etc.). Indeed, the CC can be high on a government's agenda after natural disasters and then weaken as politicians become more interested in other issues (Pralle, 2009).

Brazil: an aggregation and superposition of policies/instruments

A broad framework of national climate change policies

The construction of climate change mitigation and adaptation strategies in Brazil has always been associated with the evolution of this agenda in the international regime, including the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. At the national level, by Decree No. 6,263 of 21 November 2007, the Brazilian Government established the Inter-ministerial Committee on Climate Change (CIM) and the Executive Group (GEx) to guide the development and implementation of the National Climate Change Plan. Published in 2008, the plan aimed to integrate and harmonize the creation of public policies to reduce greenhouse gas emissions in the country (ICD, 2008).

The expectation of signing a global climate agreement at COP 15 in 2009 accelerated the proposal negotiated since 2008 in the Chamber of Deputies that established the National Climate Change Policy (PNMC). In 2009, the National Climate Change Fund and the Brazilian Panel on Climate Change (PBMC) were created. This year the Brazilian government announced a voluntary commitment to reduce greenhouse gas emissions from 36.1% to 38.9% by 2020. However, Brazil has positioned itself as one of the leading developing countries to undertake efforts in climate change mitigation and adaptation (MAPA, 2012).

Following COP 21 in Paris in 2015, the new global climate agreement was ratified by the Brazilian government in 2016. In this context, the nationally determined planned contributions (iNDC) committed the country to reduce its greenhouse gas emissions by 37% (compared to 2005 levels) until 2025 - with an indicative emission reduction contribution of 43% until 2030 (MMA, 2016a). It is also this year that the Brazilian government announced the National Climate Change Adaptation Plan (NCP), which aims to reduce national vulnerability to climate change and the management of risks associated with it (MMA, 2016a).

Climate change adaptation policies

The National Climate Change Adaptation Plan (NCP) was launched in 2016 with the objective of promoting the management and reduction of climate risk in Brazil, in response to the adverse

effects associated with climate change. According to its core document, the plan should ensure the coordinated and satisfactory implementation of sectoral and thematic risk management strategies, with priority given to food and nutritional, water and energy security (MMA, 2016b). It considers 11 sectoral and thematic strategies, corresponding to the competencies and priorities of the federal government in relation to the country's areas of vulnerability: Agriculture, Biodiversity and Ecosystems, Cities, Natural Disasters, Industry and Mining, Infrastructure (Energy, Transport and Urban Mobility), People and Vulnerable Populations, Water Resources, Health, Food and Nutrition Security and Coastal Zones.

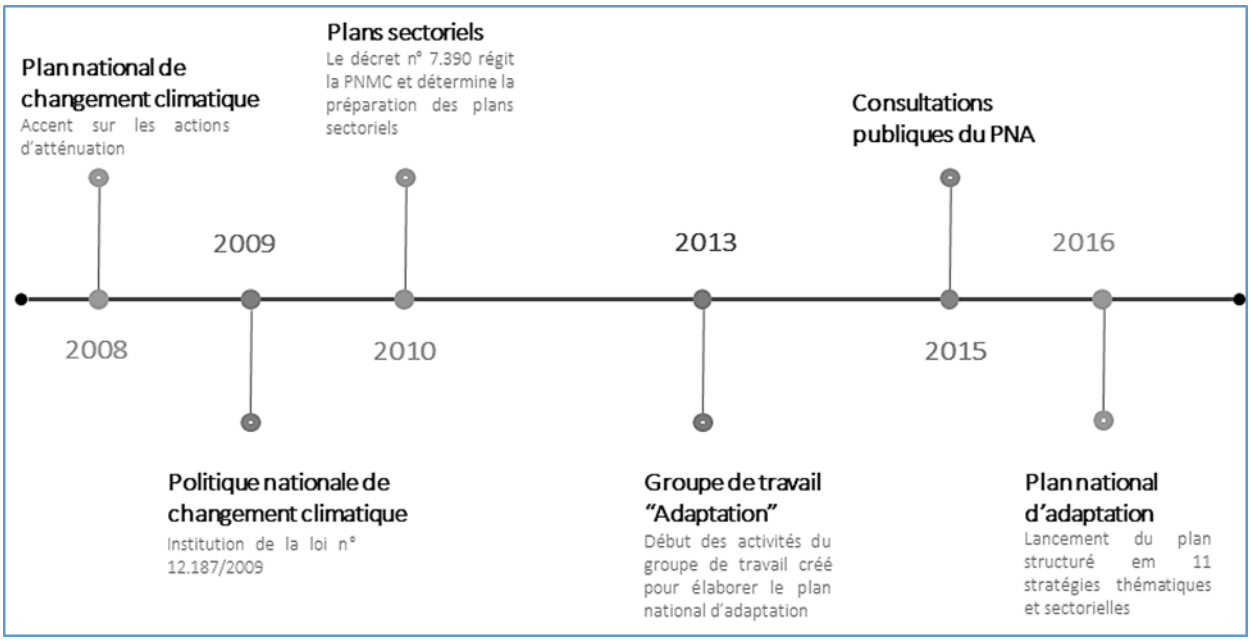
Studies by the Brazilian Research Network on Global Climate Change (Rede Clima) have shown that the emergence and evolution of the climate agenda in Brazil and in international arenas has been directed, mainly towards mitigation actions (addressing the causes of climate change) at the expense of adaptation actions (addressing the effects of climate change) (Rodrigues Filho et al., 2016). However, the adverse consequences of these changes are already apparent, which implies that mitigation actions will not be sufficient to cope with the ongoing transformations, and that adaptation strategies are necessary to improve the resilience of eco-sociosystems (Scarano, 2017).

Recently, adaptation has been put on the political agenda. An international framework was adopted in the Cancun Agreements for Adaptation at COP 16, held in 2010. For the first time in the history of the Climate Convention, adaptation has received the same attention as mitigation. This framework also recommends the establishment of national adaptation plans (Rodrigues Filho et al., 2016).

In Brazil, despite the asymmetry between the two climate policy objectives, adaptation has gained in importance. In 2011, the National Centre for Monitoring and Alerting of Natural Disasters (Cemaden) was created to carry out monitoring and alerts that can help reduce the social, environmental and economic vulnerability associated with extreme events. Its institutionalization was based on a multisectoral programme allowing coordinated action by the services concerned (CEMADEN, 2017).

The formulation of the NAP promoted a similar vision of the integration of sectoral agendas and mobilized several actors. In 2013, a Working Group to define measures to support adaptation (WG Adaptação) is created, composed mainly of technicians and representatives of ministries and coordinated by the Ministries of Environment (MMA) and Science, Technology and Innovation (MCTIC) (Figure 3). According to information from this WG, its creation follows the revision of the sectoral plans of the National Climate Change Plan - PNMC, during which the members of the Executive Group pointed out the lack of a national adaptation plan (MMA, 2018b). In addition to the public sector, representatives of organised civil society and the private sector contributed to the NAP. The scientific community participated through the Brazilian Climate Change Forum (FBMC), the Rede Clima network and Cemaden (Rodrigues Filho et al., 2016).

Figure 3: Sequence of the elaboration of the National Adaptation Plan
Source: (Milhorance et al; 2018)

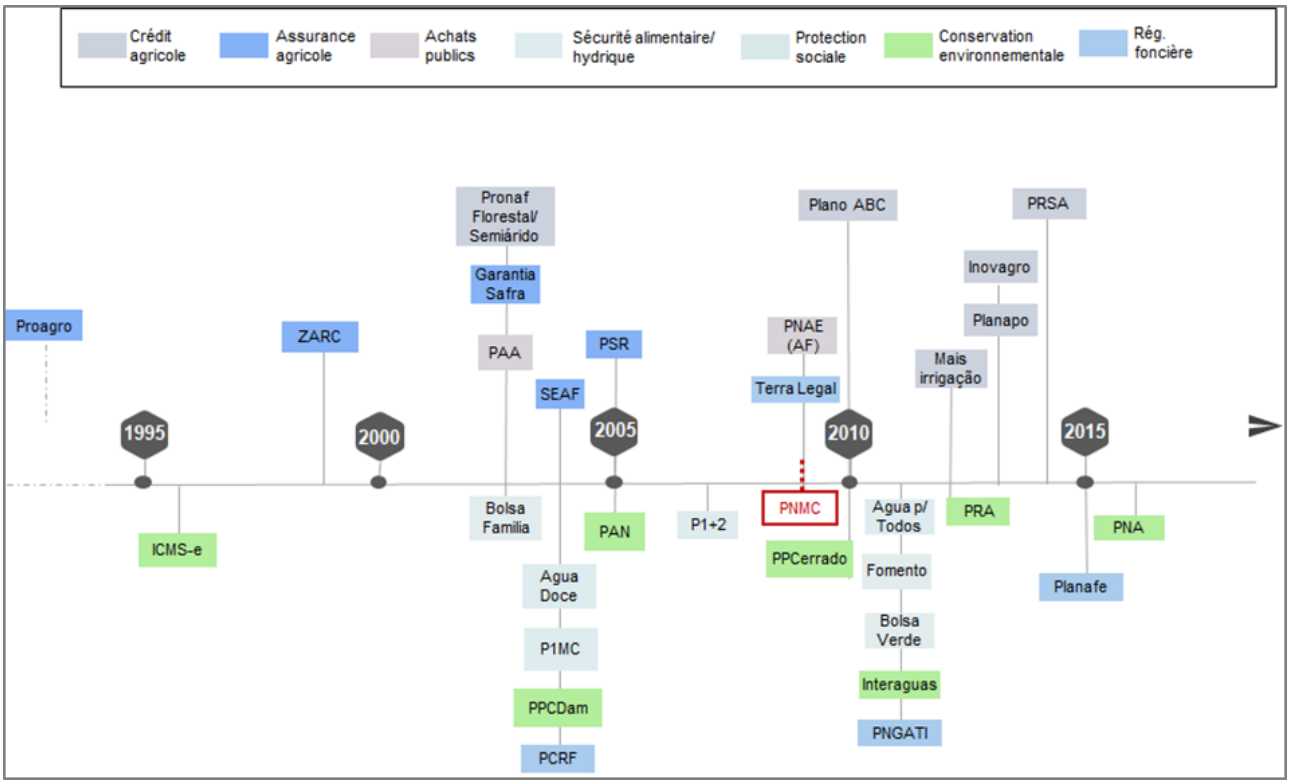


However, from an analysis of the minutes of the meetings for the construction of the NAP, it was possible to observe that, even though the NAP was developed through a participatory and multisectoral process that lasted two years, the final document focused on sectoral agendas to the detriment of integration mechanisms. It is a plan that juxtaposes sectoral and thematic agendas in a single architecture, but without establishing mechanisms for dialogue between institutions, between the different actions and between the actors responsible for its implementation.

However, few actions have actually been implemented, mainly studies and the creation of an information dissemination platform, which is the main innovation of the NAP. These measures are not yet sufficient to initiate a link between the various sectoral actions. The review of the discussions on the translation of the plan into the national budget clearly highlights the priority given to sectoral agendas rather than an intersectoral and integrated strategy. The purpose of the plan would also be to cross-fertilize adaptation within other sectoral agendas, for example, by guiding the incorporation of resilience criteria into other government instruments and plans.

The sectoral and thematic strategies developed within the NAP refer to existing plans and programmes and not necessarily to new initiatives or coordination mechanisms. Figure 4 shows the trajectory of the institution of each of the main instruments included in the NLP that directly or indirectly concerns adaptation for the rural environment.

Figure 4 : Chronology of climate change adaptation instruments for the rural sector
Source: Milhorance et al, 2018



2.2 Mapping, identification of interactions and combinations between policies

This section presents for the three countries a synthesis of the AACC policy mapping, which has been supplemented, as appropriate, by an identification of instrument and stakeholder combinations and a first draft of the types of interactions.

In Colombia, the study focused on national policies and in Guadeloupe and Brazil on all adaptation policies that apply at the territorial or local level.

Guadeloupe: essentially local and territorialised instruments

The concept of adaptation in Guadeloupe does not function as a meta-standard, it is not established as a guiding principle for a set of public policies in the agricultural world. Thus, to understand how adaptation is territorialized in Guadeloupe, i.e. how actors interpret and co-construct this notion and the challenges of climate change in Guadeloupe to translate it into a political instrument, it is necessary to broaden the spectrum of analysis. Indeed, by limiting itself to the analysis of actions labelled "adaptation to climate change", few data could have been mobilized. We have therefore tried to understand which actions and policy instruments, through the concepts they mobilize and the objectives they pursue, are ultimately instruments of

adaptation that are ignored. Thus, all policies dealing with adaptation to climate change in Guadeloupe can be categorised into three types: instruments that are not labelled "climate" but which take up actions that are consistent with the principle of adaptation, existing instruments that attempt to integrate the climate variable and instruments created specifically for adaptation purposes.

The first category includes the instruments developed as part of the "Agro-ecological Project" presented by the Ministry of Agriculture in 2012. This national orientation should make it possible to support the evolution of production systems that would make it possible to combine economic and environmental performance. This directive is divided into a range of actions that take place at several territorial levels. Among these, we find in particular the creation of the Economic and Environmental Interest Groups - GIEE. These are linked to the Rural Development Policy led by the Region, which is largely independent on the criteria for selecting applications. Among the instruments consistent with a climate change adaptation approach are also the Ecophyto Plans 1 and 2. Launched in 2008 following the Grenelle de l'Environnement, this is a national plan led by the Ministry of Agriculture and implemented at the territorial level by the Chamber of Agriculture. The main objective of this instrument is to reduce the use of plant protection products, by training farmers in alternative practices and promoting the sharing of good practices through a network of pilot farms. In the Guadeloupe region, which is heavily polluted by chlordecone, reducing dependence on plant protection products is an important issue for farmers and some of the actions implemented in this context meet climate change adaptation objectives (research for varietal selection, farmer training, knowledge sharing on agro-ecological practices, etc.). However, none of these instruments integrate the concept of climate change into their arguments or as a way of legitimizing their actions.

The second type of policy instruments identified in Guadeloupe corresponds to existing public policy tools that have subsequently integrated the climate theme. This is the case for Agri-Environmental and Climate Measures. Launched in 2014 as part of the 2nd pillar of the Common Agricultural Policy (CAP), they are the second generation of such measures, after the MAET (Territorialised Agri-environmental Measures) of 2007-2013. The main objective of this instrument is to support changes in agricultural practices in order to reduce pressure on the environment. In the first generation of measures that focus on promoting agricultural practices with positive impacts on biodiversity, the climate dimension has not yet been taken into account. It is only in 2014 that the term "climate" is added to the title of the instrument. In Guadeloupe, this instrument is a significant example of the poverty of climate integration.

The detailed analysis of each of the twenty measures implemented by the DAAF and the Regional Council is convincing in many respects. These concern both the banana and sugarcane sectors and plant diversification and aim to reduce the use of plant protection products. Agri-environmental measures are defined on the basis of a national framework, but each region can choose from a list of possible measures those that best correspond to the challenges facing its territory. In Guadeloupe, it appears that these measures were implemented "from the bottom

up", i.e. they were developed above all by professionals (representatives of the banana sector according to an agro-ecological and cane transition approach, in particular according to an approach based on alternative practices that respect the environment) as well as by the Chamber of Agriculture and that they were subsequently validated by the Region and then by Brussels. Thus, DFAIT in Guadeloupe may deviate slightly from the national framework, which explains why this instrument is more focused on phytosanitary issues given the challenges of the territory and the sectors involved in the process of developing this policy and shaping these instruments.

Finally, the third category of the climate change adaptation policy mix in Guadeloupe includes instruments that are truly designed to respond to a climate change adaptation logic. These are planning tools at the territorial level, emanating from local authorities rather than a real strategy at the level of Guadeloupe. In Guadeloupe, it is the Communauté d'Agglomération du Nord Grande Terre (CANGT) which integrates climate issues into its territorial action plans, in particular through the Territorial Air Energy Climate Plan (PCAET) made mandatory by the Energy Transition for Growth Act (2015). The latter sets up public action mechanisms according to original methods: it thus proposes, within the framework of the elaboration of a vulnerability diagnosis, a "vulnerability walk" with all the actors concerned to assess the effects of climate change. It also sets up participative processes and meetings in order to bring together and integrate as well as possible the actors of the territory by sector of activity (tourism, agriculture...). Adaptation to climate change is a central part of CANGT's actions here, and it is undertaking communication work with stakeholders to familiarize them with the theme. The urban community here is developing an intersectoral policy to address climate change, but no measures have yet been adopted in the agricultural sector. At this stage, therefore, these are mainly information, knowledge sharing and guidance actions, but no real political instruments have been implemented in this context.

Colombia: a plethora of normative and economic instruments

Policy mapping reveals a diversity of normative and economic instruments directly and indirectly related to the management of the CC. The documents mention the effort of articulation between the new instruments developed. However, no significant level of implementation or territorialisation of these instruments has been observed so far. The timing of this study (between two presidential terms) also creates uncertainty as to the priority that will be given to the implementation of these instruments. On the other hand, interviewees identified obstacles to the development and implementation of instruments, which could have an impact on implementation.

Three sets of instruments have been identified and grouped together (Figure 5).

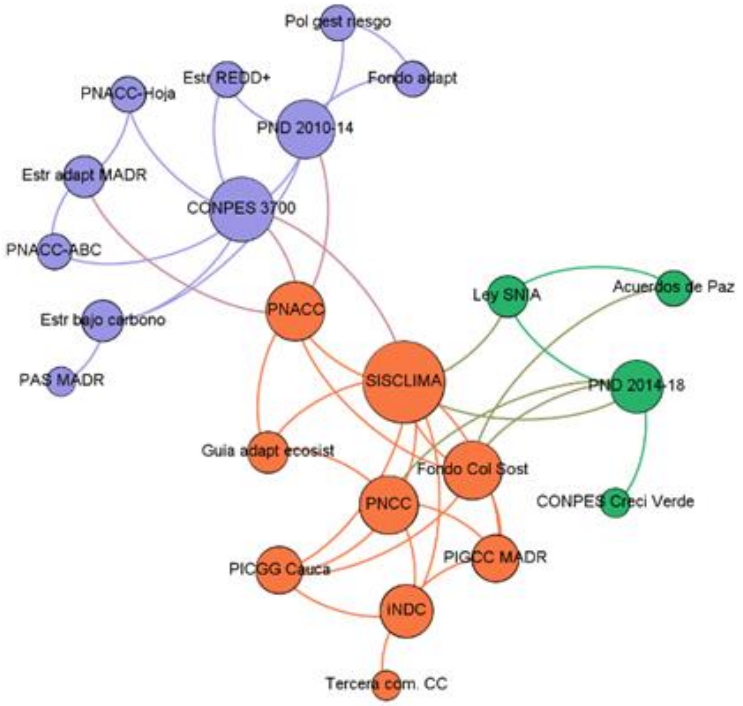
A first group (in blue) focuses on risk mitigation and management, characteristic of the government's first approach. The Ministry of Environment and Sustainable Development -MADS is leading the National Strategy to Reduce Emissions from Deforestation and Forest Degradation - ENREDD+ and the Colombian Low Carbon Development Strategy - ECDBC with support from

international cooperation (USAID). On the other hand, the National Disaster Risk Management Unit - UNGRD coordinates the national risk management policy and the Adaptation Fund (to rebuild the damage caused by the Niña) which is therefore not used for adaptation actions. Instruments such as the National Council for Economic and Social Policy - CONPES, identify the need to articulate mitigation and adaptation instruments.

The second set (orange) brings together instruments that are characterized for the transversal nature of adaptation and mitigation themes. This is the case of SISCLIMA, a tool for articulating CC-related issues with bodies at national level (in charge of sectors) and at territorial level. Their articulation is more theoretical than real. This body, led by the National Department of Planning-DNP and the MADS, questions the power of UNGRD. In this context, the National Climate Change Policy - NCCP coordinates the creation of the Comprehensive Climate Change Management Plan - ICPCCP at sectoral and territorial level. For the agricultural sector, this is the mitigation and adaptation plan and the full IGCP. FAO supports the adaptation component of this plan. At the territorial level, plans at different scales coexist (regional, departmental, municipal, ecosystem). Some integrate the issue of adaptation and mitigation, others only the adaptation aspect. The DNP coordinates the sectors, the MADS the territorial level. The actors testify to a problem of articulation between these two levels and to a heterogeneous quality of the plans. The territorial level is less advanced than the sectoral level. Sectoral plans are not well integrated with sectoral policies. For implementation, the challenges are financial (ambitious plans), technical capacity (high staff turnover) and a lack of ownership of the theme by local actors. An instrument such as the Colombia Sostenible Fund created by international cooperation (IDB) is identified as a tool for the implementation of these plans.

The third group (green) includes instruments not directly related to the CC. These are recently developed instruments, which facilitate the integration of CC themes (Peace Agreements, Technical Assistance Law, CONPES document on green growth).

Figure 5. Mapping of CC instruments and risk management.
Source: Howland and Le Coq, 2018



The investment analysis for the 2016-2017 CC shows increasing investments oriented towards mitigation (2016) and adaptation or cross-cutting actions (2017). This is in line with international results and trends (towards cross-cutting issues of adaptation and mitigation). It is the environment sector that benefits from more investment; this sector is the leader in the country. Finally, with regard to distribution issues in the territory, the investments seem to be the same: some ministries receive little (or no) investment and other ministries receive a lot.

Brazil: policies in the semi-arid zone (Petrolina, Pernambuco State)

The construction of the National Adaptation Plan for the Brazilian CC, although it brings together in a single framework a series of pre-existing programmes, was guided by an integration objective and the perspective of promoting resilience to the impacts of climate change. The process was based on a participatory and multisectoral approach; however, the final result was limited to a juxtaposition of sectoral agendas to the detriment of the consolidation of mechanisms for articulation and institutional dialogue. This sectoral and poorly connected orientation was, in part, a reflection of the budgetary organization of its implementation, separated into sectoral programmes.

The detailed policy mapping identified the sets of instruments that support agriculture's adaptation to climate change implemented in the Petrolina region (Pernambuco).

Irrigation policies have historically contributed to these objectives, transforming part of the region into an important agro-exporting pole based on irrigated fruit growing. The gradual promotion of efficient use of water resources for irrigation has ensured greater resilience of the sector to increasingly frequent and prolonged droughts. In fact, the last drought cycle in the region has further increased the challenges of water resource management in the São Francisco River Basin, where the use of water for hydropower production is also very important. In this context, the problem of regulating the flow of landfills at the Sobradinho Dam downstream of Petrolina has generated political debates between stakeholders and users in different sectors. But in these debates, both the irrigated agricultural sector and the energy sector are not mobilized by the question of the economy of water use for environmental reasons or to adapt to drought, except to defend their interests through the negotiation of a river flow quota.

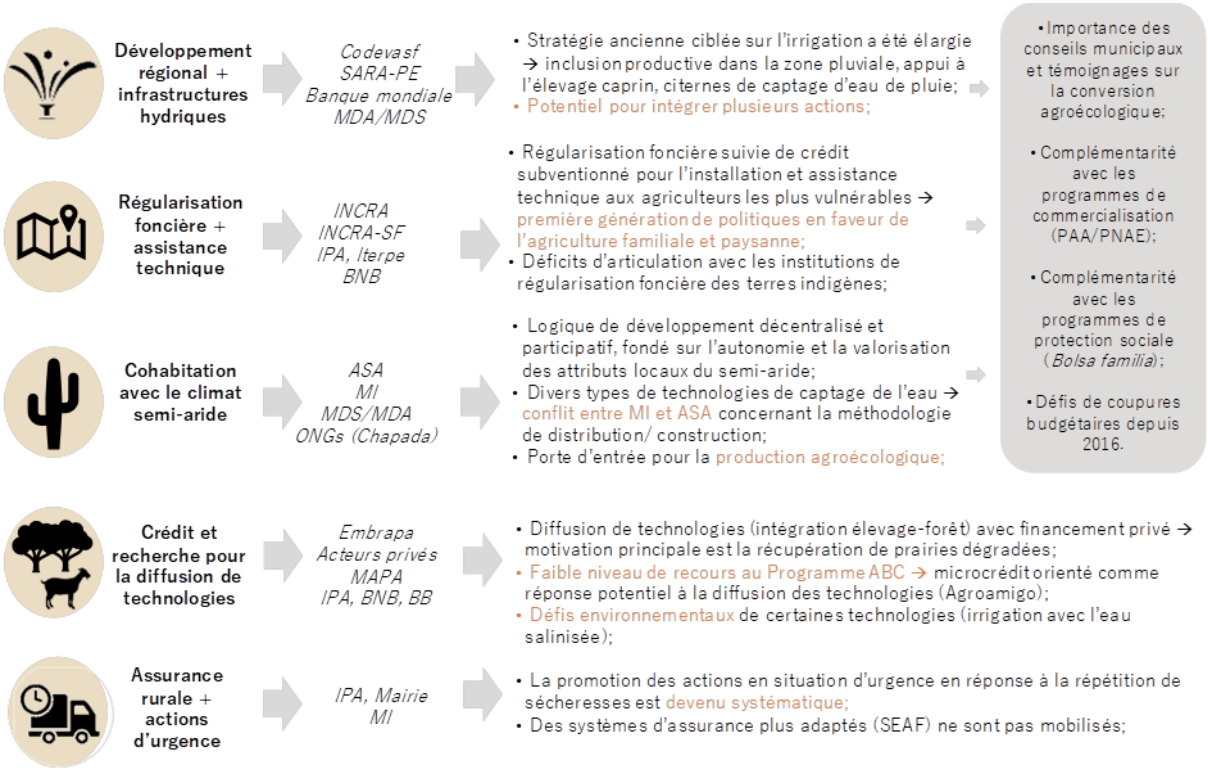
An important set/mix of policies concerns rainfed agriculture (in semi-arid environments), for which the need to implement adaptation strategies is even more essential. These policies have the advantage of presenting several modalities of interaction and articulation between instruments or groups of instruments, particularly at the local/territorial level (Figure 6).

Regional and territorial development programmes are mechanisms for integration between complementary actions to promote water security and productive inclusion. Their coverage in programmatic, territorial and institutional terms contributes to the establishment of articulation platforms between actors and actions in each region, in particular through municipal rural development councils and territorial colleges, local spaces for coordination and orientation of these actions.

The negotiation and planning spaces with civil society created in the 2000s by the Ministry of Agrarian Development - MDA and the Ministry of Social Development - MDS (territorial colleges, food and nutrition security councils) were still active and met in September 2018 despite the extinction of the MDA and the reduction in budgetary resources after the change of government in 2016[5]. They were therefore interlocutors not only of federal policies, but also of those of the federal state of Pernambuco and of civil society organized mainly within the Semi-Arid Articulation of Brazil (ASA, Brasil).

[5] At the end of January 2019, President Bolsonaro's new government put an end to the existence of the Food and Nutrition Security Councils at all levels (federal, state, territory) and the National Council for Rural Development and Family Agriculture.

Figure 6: Climate policy mix - agriculture, instrument mapping
Source: Milhorance et al, 2018



The paradigm of cohabitation with semi-arid corresponds to a public action strategy prior to climate adaptation policies, but contributes directly to these objectives. It represents a development perspective for family agriculture characterized by a participatory governance model, driven by the massive installation of rainwater harvesting tanks. Combined with a transition to organic production or agro-ecology, the proposal presents itself as a technical and political alternative for the development of rainfed agriculture. The productive tank model (from 60 to 80,000 litres fed by an impluvium from the P1+2 project) has been well received by family farmers, especially when it is associated with production support financing (subsidies or credit). This policy, initiated with a system of self-construction of family tanks (made of pre-molded cement slabs), contrasts with the actions of the Água *para Todos* (Water for All) programme of the Ministry of National Integration, which gives priority to the distribution of plastic tanks not produced locally.

Public purchases from family farming have been other fundamental instruments for the productive inclusion of this segment, based on rainfed production or occasional supplemental irrigation. The Food Acquisition Programme - FAP as well as the National School Feeding Programme - NSFP are mentioned by the majority of stakeholders and managers as tools to learn and improve the marketing of local products and sources of income for a large part of rural families. Even if they are not programs formulated with the objective of adapting to climate

change, they have proven to be complementary to these strategies, as they allow organic or agro-ecological products to be marketed with a bonus of 20. Another growing marketing space is provided by agro-ecological markets.

Social protection programmes (*Bolsa* Familia/Family *Grant* type social transfers; rural pensions, access to the Universal Health System, etc.) are mentioned as complementary and fundamental instruments for reducing socio-environmental vulnerabilities. Promoting adaptive capacity requires a combination of interventions that address not only the risks directly related to climate, but also the structural deficits (such as income levels, access to services and political structures) that shape vulnerability. Relatively higher levels of access to income and services can facilitate the use of new adaptive technologies and practices.

Limits in the provision of technical assistance to producers in rainfed systems and difficulties in accessing "green" credit terms are the two main bottlenecks to the adoption of alternative adaptation and low-carbon technologies. Even if the State of Pernambuco still has an official technical assistance institution, human, institutional and financial resources are too limited. The degradation of pastures has motivated producers to invest in integrated systems that correspond to the main credit modality available under the Low Carbon Agriculture Plan (LCA). However, demand for these credit lines remains low. In addition to the limitations in technical assistance, the low level of interaction between technological and financial institutions also limits the inclusion of new techniques better suited to credit lines. Micro-credit programmes with integrated technical assistance are the solution to promote this type of inter-institutional articulation.

The last cycle of droughts in the region has led to the reformulation of a series of government actions and changes in production systems, mainly rainfed.

- Renegotiation of credit, extension of deadlines and release of emergency credit in extended dry periods have been a constant. There has been an increase in the need to produce and distribute seeds of varieties that are more drought-resistant. Goat and sheep farming has remained at the expense of cattle thanks to the spread of buffalo grass (*Cenchrus ciliaris L*) and fodder cactus (*opuntia sp*.). However, even the latter needs irrigation in the event of intense drought, achieved by using water from (often safe) wells. This practice brings new challenges in terms of maintaining soil quality and must be accompanied by adequate management (drainage) and new research activities.
- Despite their operational costs, emergency programmes such as Garantia Safra continue as a continuous intervention.

Finally, the vast majority of the institutional stakeholders consulted expressed concern about the federal government's successive budget cuts since 2016 and the reformulation of a series of actions that guaranteed satisfactory results. In some cases, obtaining resources from parliamentarians has been able to ensure continuity. However, this type of programming and implementation is very unstable and dependent on political negotiations.

2.3 Adaptation concepts used in policies and their implementation

In addition to the more generic concepts of adaptation to the CC, vulnerability, risks, resilience, the WP1 method proposed to examine more specifically in the case of agriculture the concepts of agroecology and CSA. Thus the main concepts analysed are of three kinds:

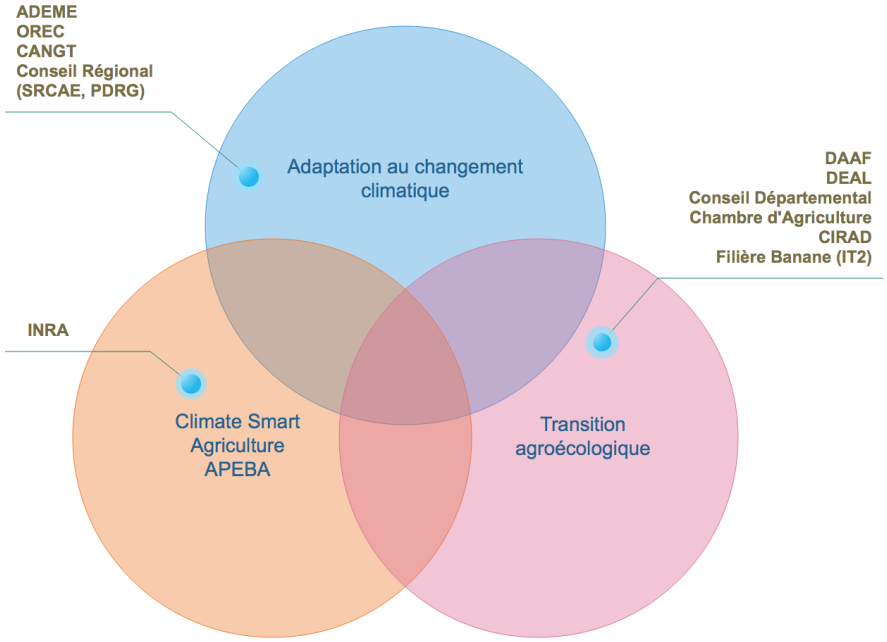
- General concepts related to adaptation: nature-based adaptation, ecosystem-based adaptation, community-based adaptation, transformative adaptation (compared to other models such as technological adaptation, risk management, green growth);
- General concepts as finalized variables: vulnerability, resilience, adaptive capacity, sustainability, etc.
- Specific concepts related to agriculture: climate-smart agriculture, agroecology.

Guadeloupe

The concept of adaptation to climate change is not widely used in public policies implemented in Guadeloupe. A more detailed analysis of the sets of actors and the content of the instruments shows that a number of actions could meet an objective of adaptation to climate change, but that the concept itself was rarely used in the agricultural sector. The reasons for this invisibility of climate change adaptation are due to local political and environmental factors, which rank climate change as a secondary priority, taking into account the other imperatives of the agricultural world in Guadeloupe. It is therefore specific concepts related to agriculture such as agroecology that are used by stakeholders and in public policy documents, without any particular link with climate being made (Figure 7).

However, some actors such as the Agence de l'environnement et de la maîtrise de l'énergie-ADEME (France) are continuously working to disseminate the concept of adaptation to climate change at the level of local authorities, which is reflected in the implementation of adaptation action plans and the Air Territorial Energy Climate Plan - PCAET which incorporate this variable.

Figure 7Mobilisation of the different concepts studied by actors in Guadeloupe (source Blondel, 2018)



In Guadeloupe, some sectors opt for a greening of their production, thus influencing local policies, reflecting interactions and dialogues between farmers and public policy entrepreneurs at the territorial level.

Colombia

The climate policy development process was led first by UNGRD and then by MADS and finally shared between MADS and DNP with the important support of international cooperation at the financial and technical level as well as in the dissemination and translation of concepts related to CC management (CSA, ecosystem-based adaptation...). The development of CC policies in Colombia is the result of a process of transnationalization of public policies that is stabilizing. The global models that influence the form of these policies are associated with CC-related concepts that refer to a specific vision and are themselves translated by political brokers for government actors. (Table 2).

If within the policy documents the concepts are neutralized (we speak of adaptation without specifying the approach) each one mobilizes a specific concept. However, governmental and international actors continue to mobilize different concepts, showing that the debates remain open. Adaptation is seen as a preventive and planned process for the majority of the stakeholders interviewed, while it is more reactive for UNGRD. The choice of concepts also shows a vision of adaptation as purely technological (MADR, DNP) which is opposed to a vision that integrates the human dimension (FAO, UNGRD).

Table 2Use of concepts related to adaptation to CC by actors in Colombie
Source : adapted from Howland and Le Coq, 2018

Mobilized concept	Actors	Rationale
Ecosystem-based adaptation (EBA)	MADS; MADR; GIZ; TNC; USAID;	EBA of the competence of the MADS; for MADR is relevant for the agricultural sector; for DNP: relevant and realistic concept in the face of limited budgets
Socio-ecosystem-based adaptation (ABS-E)	UNGRD; FAO	A B S-E Excludes variable Male that involves health variables, risk management....
Transformative adaptation	FAO	Inclusion of social and economic aspects in VAC
Resilience	FAO	Linked to adaptation based on socio-ecosystems
Ability to adapt	IDEAM; IPCC	IDEAM uses the concepts of IPCC reports for the preparation of national reports
Climate Smart Agriculture (CSA)	DNP ;CIAT ;UPRA	DNP = relevant approach for agricultural planning
Green growth	DNP; MADR	For DNP link with CSA because they include the productivist aspect
Climate variability/ risk management	UNGRD	For UNGRD climate variability causes more damage than CC in the long term

The study of concepts related to adaptation also makes it possible to identify a knowledge interface between UNGRD, which sets variability and climate change in opposition (as two disconnected phenomena), and the other stakeholders interviewed, which establish a link between the two phenomena. It also illustrates the process of adaptation and selection that takes place by the actors who translate these concepts. For example, a member of the DNP pointed out that the productive aspects of the CSA concept were taken into account and that the other variables of the concept (mitigation, adaptation, resilience) were not.

However, government actors agree on an economic translation of adaptation that aims to limit economic losses and open up new economic opportunities. There is also a consensus that adaptation must be institutional (facilitated and planned by government actors) and top-down. So far, it is difficult to measure the success or effectiveness of these policies and all policy instruments, with implementation being the next key step for the country (with measurement of implementation). Future financial support for international cooperation will depend on the results of implementation.

Brazil

In institutional documents, particularly in the ABC Low Carbon Agriculture Plan and the National Adaptation Plan - NAP, adaptation is associated with aspects such as reducing vulnerability, promoting resilience, managing climate-related risks and increasing the efficiency of agricultural production. From the analysis of the documents and interviews with agents who develop and/or implement climate policies, it was possible to observe the translation of the concepts identified earlier to justify and legitimize some political positions. The ABC plan coordinated by DAFA uses the term "low-carbon agriculture" to legitimize agribusiness field crop practices and their

integration into international markets. Similarly, the concept of "climate-smart agriculture" (CSA) is mobilized by justifying the promotion of agricultural productivity (increasing income and food security), mitigation and adaptation (see Table 4). The NAP coordinated by the Ministry of Environment and other national policies also mobilizes the concepts of agroecology, ecosystem-based adaptation and the "Food-Water-Energy" nexus as shown inTable 3.

Table 3: Concepts related to AACC in Brazilian national policies (Source Milhorance et al, 2018)

Plan	Objectives of the project	Adaptation in the structure	Concepts
ABC Plan	Promote reduction of GHG emissions in agriculture by improving the efficiency of natural resource use and strengthening the resilience of production systems and rural communities (MAPA, 2012).	six programmes focusing on the dissemination of CC mitigation technologies and a programme presenting adaptation actions	Adaptation/resilience: diversification of production to promote increased agroecosystem resilience; technology transfer, especially those that combine mitigation and adaptation; and environmentally sustainable and efficient production. CSA: One of the main actions of the ABC Plan is the implementation of a climate-smart agriculture programme. Operationally, the program is not very specific/contextualized.
ANP and others	PNA underlines the objective of promoting the management and reduction of climate risks in the country and the creation of instruments for the adaptation of natural, human, productive and infrastructure systems (MMA, 2016).	Different concepts according to the chapters/sector strategies of the NLP Diverse origins: international community (CSA), socio-environmental movements (agro-ecology), national/international scientific community (AbE, Nexus)	Resilience - present throughout the NAP CSA - Agriculture strategy, which proposes to analyse the sector's vulnerabilities, identify actions to promote agroecosystem resilience and lead the revision of the ABC plan. Agroecology - "Agriculture" strategies (mentions SEAF and PNAPO) and "Food and Nutritional Security" strategy: "Agroecology is an alternative in opposition to new models that have emerged as solutions to face the negative effects of climate change, under the name of intelligent agriculture' (...) which are generally highly dependent on agricultural inputs, machinery and equipment" (MMA, 2016, p. 228). ENA - Biodiversity and Ecosystems Strategy: "an approach that uses ecosystem management, conservation and recovery to provide ecosystem services that enable society to adapt"; and scientific reports from the Brazilian Panel for the CC (coastal zones) Nexus water-energy-food - structuring concept of the 4 National Climate Communication

At the local level (Petrolina -Pernambuso) for irrigated agriculture stakeholders, it is clear that recent investments to increase efficiency in the use of water resources have helped producers to cope with the effects of drought and reduce water use for irrigation. However, their primary motivation is to reduce production costs and not to adapt to climate variations or to be concerned about the sustainability of the water resource of the São Francisco River.

For rainfed agriculture, a broader repertoire characterizes the strategies used to cope with the effects of drought. An important and rather broad perspective refers to the idea of "cohabitation with the semi-arid climate". This paradigm seeks to promote productive options that respect local

knowledge and use technologies appropriate to the climatic and environmental context of the semi-arid zone.

Few interviews refer to farmers' vulnerability to drought. On the contrary, representatives of family farmers mention the "resistance" of these farmers to successive droughts.

3. Lessons learned and prospects for the work carried out

3.1 Lessons Learned in the Formulation and Implementation of VAC Policies

Some common points can be highlighted between the three cases:

The implementation of the CCA was later than that of mitigation and even later in terms of adaptation of agriculture to the CC compared to the water, energy or transport sectors, thus following the international development of the climate theme (important link with international discussions: first mitigation then adaptation, then articulation between mitigation and adaptation).

All three cases show the importance of climate-related events/disasters for the implementation of certain instruments or to strengthen the agenda (e. g. violence and frequency of cyclones in Guadeloupe, La Nina phenomenon in Colombia, water crises in Brazil).

There is a low level of implementation of specific VAC plans in all three cases, particularly at the territorial level.

National adaptation plans have intersectoral ambition, but they are often located within the Ministry of Environment (Guadeloupe, Brazil, Colombia - in Colombia strategy coordination is shared between the Ministry of Environment and the planning department) and therefore juxtapose sectoral strategies.

All three cases point to a risk of a decline in VAC PP agendas in the face of other priorities (health crisis/pollution in Guadeloupe; insecurity in Colombia; political and economic domination of the agribusiness sector without limits in Brazil) in a context of economic crisis in the entire macro-region.

With the changes linked to the recent presidential elections, the risks of a decline in the climate issue on the government agenda are high in Colombia, with a resurgence of insecurity in the Peace Territories/areas supposed to be demilitarized, violence linked to military groups, the attack in Bogota. They are already well underway in Brazil. Elected officials or politicians lobbying agribusiness, forestry and mining companies have been appointed to head the Ministries of Agriculture, Environment, Science and Technology. The Ministry of Environment has been atrophied and its Sustainable Development Department has been eliminated. The Secretariat for Family Agriculture and Rural Development has been abolished, as has the Coordination of Agroecology and Organic Agriculture of the Ministry of Agriculture. A part of its competences is

inserted in a Secretariat of "Defences of Cultures". The National Institute for Agrarian Reform is part of the Ministry of Agriculture and is chaired by a general and various decrees facilitating the illegal productive occupation of public lands, natural and indigenous reserves.

3.2 Mechanisms that promote integration between AACC instruments

The three cases studied have several common features.

The first is the great diversity of instruments and actors involved only in the adaptation component of the CC, which is reflected in the multiplicity of acronyms and the complexity of networks (see Figure 07 Brazil).

In all three cases, national adaptation policies mainly propose the recycling of previous instruments and national or sectoral plans constitute aggregations of instruments, sometimes already existing, which complicates their characterisation and the possibilities of comparison between cases. In this sense, it is not surprising to note interactions, even minimalist and inevitable, due to the juxtaposition of interventions of different policies and different actors on the same territories and/or the same localities. This can encourage articulation (Territorial Plans and DFAIT in Guadeloupe) but also lead to tensions or even oppositions such as those observed in Brazil: irrigated vs rainfed, federal vs. federated state; governmental vs. non-governmental, self-built plate tanks vs. plastic tanks...

Colombia is witnessing the creation of new instruments specific to agriculture, but mainly mixed and dominated by mitigation measures, driven by standards or economic tools.

The real instruments for adapting agriculture to the CC are found in previous policies or not designed for this purpose and linked to territorialized mechanisms: rural territorial plans, agri-environmental and climate measures, local GIEE in Guadeloupe, co-existence with semi-arid, agroecology, public procurement of organic products for school canteens in Brazil, sustainable territories adapted to the climate -TESAC in Colombia.

However, beyond interactions by juxtaposition or superposition, or "pseudo coordination" on paper at the top of the national level, the real articulations and coordinations take place at the territorial level, either by the voluntarism of the actors (common sense or obligation), or through dedicated (territorial nodes/Sisclima in Colombia, TESAC) or pre-existing concertation spaces (Territorial Plans and GIEE in Guadeloupe and Municipal Rural Development Councils and Territorial Schools in Brazil).

But even with goodwill and proximity, it is difficult to create coherence between instruments at the territorial or municipal level if this coherence or integration has not been thought of at the higher levels. The case of Brazil shows that even if this will exists and has been anticipated or included in the plans, the salami-slicing of budgets and their execution is the sensitive point that reduces these ambitions (no different time frames, different scales of action, different intermediaries and institutions, different control mechanisms, etc).

Moreover, in Colombia, the significant importance of international actors (FAO, UNDP, IDB, IICA) is not so much in the formulation as in the implementation of policies, whereas it is the national level that is most significant in Brazil and France.

3.3. Use and integration of adaptation concepts into national policies

WP1's initial assumption was that the integration of adaptation concepts into national policies is still limited and that different interpretations of a diversity of dimensions do not contribute to a coherent implementation of the combination of adaptation instruments in the CC. In other words, the mobilization of these concepts does not bring more coherence or articulation to AACC's national or local policies.

The case-country studies clearly show which concepts of international traffic are used, how, by which actors and with which justifications.

The diversity/multiplicity of the institutions involved in AACC policies and their dependence on international organisations and cooperation agencies, which each promote their own privileged concepts, leads to a juxtaposition of concepts in the documents and their pragmatic mobilisation by the actors according to the context. Thus the three case studies show that the concepts identified are variously reused by coalitions of actors to position themselves according to their own interests and specific agenda. This is the case for agribusiness actors with the notion of CSA (Brazil and Colombia) and those of family agriculture with agroecology, taken over by the major banana growers in Guadeloupe.

There are specific cases: the concept of resilience tends to be diluted in multiple interpretations, the concept of vulnerability is more mobilized as a pretext and justification for public policies than as a truly structuring dimension. However, these "various" integrations do not really interfere in the formulation of national plans, which are often drafted under the supervision of the same international organizations (FAO) or on the basis of consultants and experts belonging to the same networks (IPCC, etc.).

These observations support the secondary hypothesis concerning the role of actors in the forms of transfer and translation of concepts and the specific influence of intermediaries or brokers, often individuals positioned between different spheres (government, academia, international organizations, expertise).

Even if a specific appropriation of the concepts in national policies is verified, the studies show the dilution of these concepts, their erosion during the implementation phase of instruments and programmes at the local level. The concepts circulate well among international elites but they have little impact on local actors, including technical leaders in the implementation of policies outside those that correspond to the demands of rural social movements: agro-ecology, cohabitation with the semi-arid...

If this phenomenon of dilution of concepts between macro conception and local implementation is classic (Sandra, 2004; Bezes and Pierru, 2012), it is nonetheless a disjunction or paradox, between on the one hand, climate injunctions at the international level and relayed by states

and, on the other hand, an implementation that is disconnected or favours other entries at the local level. There is indeed a local action via instruments, but there is no longer any referent.....

Finally, concepts that were not pre-identified during the development of the project appeared in policy documents or the mouths of stakeholders: this is the case of "agro-ecological transition in Guadeloupe"; green growth, climate variability, transformative adaptation in Colombia, "cohabitation with the semi-arid" in Brazil when policies do not position themselves in terms of adaptation to the CC even if they contribute to it, or because they are more ancient.

3.4. Methodological and theoretical advances, limitations of the study

Three main themes animated the reflexive debates of the ARTIMIX project team around the methods mobilized: the interest of entry through concepts, the contribution of mapping policies, actors and their interactions, the use of the notion of *policy mix.*

What lessons can be learned from the analysis of the integration of concepts into policies?

For this question, the three cases examined a core of identical concepts, in particular those of vulnerability, risk and resilience on the one hand and those specific to agriculture (agro-ecology, CSA, etc.) on the other hand, supplemented by specific or peripheral concepts. Cross-fertilization and comparison are therefore possible, for example, with regard to the mobilization and use of certain concepts in policy agenda setting processes.

To understand the dynamics of the CC's insertion in the climate agenda, it is useful to adopt a historical perspective that makes it possible to identify the successive production of documents and events that precede them, on the one hand, and to analyse and compare their orientation over time, on the other hand. In Colombia, for example, La Niña in 2010-11, like the signing of the Kyoto Protocol, are key moments that precede and guide policy decisions at the national level and the use of concepts.

In Brazil, controversies over concepts have appeared in official texts, including within the same document. The Low Carbon Agriculture Plan supported by the agribusiness sector emphasizes the idea of "smart agriculture". However, in the National Adaptation Plan, intelligent agriculture is presented as a strategy that is quite distinct from or even opposed to that of organic production and agroecology, which are oriented towards promoting the resilience of agroecosystems.

How does the mapping of actors and policy instruments help to analyse the implementation of CC plans?

The mapping of policy instruments, always from a historical perspective, makes it possible to illustrate two types of strategies for making progress in the CC's political management: on the one hand, the multiplication of plan creation (mitigation plan, adaptation plan, then ACCC instruments) or the modification of existing instruments (adaptation fund used for reconstruction of the effects of La Niña in Colombia, crop insurance and irrigation and cohabitation programmes

with the semi-arid in Brazil, territorial plans and IGE in Guadeloupe). These strategies are the result of international influence, which has first influenced mitigation, then adaptation and then promoted integrated management of the two issues.

The mapping of actors makes it possible to show that the dynamics of the CC's inclusion in the agenda involve struggles of interest and power under the guise of debates on ideas. In Colombia, the concepts used during the three key periods identified illustrate the rise in power of some actors (UNGRD) and their decline to the benefit of others (MADS/DNP); in Brazil, the agribusiness sector has taken up the theme of mitigation (Agriculture Bas Carbone and CSA) to make the green revolution greener or more sustainable; irrigated sector entrepreneurs mention the efficiency of new irrigation methods in terms of water saving. Even if these developments correspond to the promotion of certain concepts promoted by these interest groups, it is not the concepts that ensure the content of the instruments but the actors who mobilize them.

What does the concept of policy mix bring to the analysis of the articulation/interaction between ACCC instruments?

The challenge of valuing the first results of WP1 and the next ones of WP2 will therefore be to qualify the processes and modalities/levels of interaction, articulation and coordination between the actors linked to the various instruments implemented.

This perspective led the project team to a return to concepts and theory to reach agreement on the definition of a) the public policy instrument and b) the *policy mix*

Do we need the concept of a "policy mix", even if it means redefining it? Beyond the reference to Flanagan (2011), it is not defined in the project's scientific document and in any of the case studies. Or should we focus on the instrument mix (Rogge & Reinhardt, 2016). In terms of environmental policy, is the term *policy mix not* reserved/circumscribed to economic instruments? (Ring & Barton, 2015).

The vagueness that may exist behind this type of concept leads to the qualification of a different *policy mix* object: a CC Fund because it can be used to finance several instruments or an Agri-Environmental and Climate Measure, for example, insofar as it would include several basic instruments (a specification, a contract and a grant).

These examples are based on a somewhat mechanical or descriptive view of the use of the "policy mix" category. She made a participant in the Cali workshop say "the notion of "policy mix" is static whereas it is a question of dealing first of all with the mechanisms of integration or articulation between policies that are dynamic".

Limitations of the approach

The case studies carried out within the framework of WP1 present analyses that are sometimes still exploratory of the instruments for adapting agriculture to climate change that are operational at the national, territorial or local level, depending on the case. Although limited to

the adaptation of agriculture to the CC, the field of research was still considerable due to the recent multiplication of new instruments or the recycling of pre-existing measures or programmes.

Given the diversity of situations, their representativeness at the country or regional level, the levels of governance involved and the types of instruments, the scientific project did not provide for a systematic comparative analysis between the three cases studied. Nevertheless, beyond the common trends identified for each question, the data obtained make it possible to compare and contrast the political processes examined.

Conclusion: Perspectives and Next Steps

This first phase of the ARTIMIX project made it possible to achieve most of the two objectives:

- on the one hand, to analyse the integration, the place of concepts related to adaptation to the CC in the public policies implemented and the games of actors around their use;
- on the other hand, to map policies contributing to the adaptation of agriculture, their main actors and the interactions between their instruments.

In all three cases, policy packages or combinations of instruments were identified and characterized, sometimes associated with specific interest groups or coalitions.

In the next phase of deepening these interactions and policy linkages, the study will focus on a specific group of limited number of interacting instruments within the project's WP2. The analysis will be supplemented by qualitative interviews with the actors and managers of these instruments in order to identify the factors that promote or inhibit interactions, intra-intersectoral, multi-level, inter-institutional or between individuals.

Finally, interviews with its policy makers and managers will be conducted at several levels in order to characterize the coalitions of actors involved in the implementation of each set of instruments and to analyse their various modalities of multi-level interactions. The aim will be to identify factors facilitating or inhibiting more effective implementation of agricultural adaptation policies to climate change and synergies and tensions between instruments designed to strengthen farmers' capacities to adapt.

Finally, the third phase of the project (WP3) will conduct qualitative and quantitative assessments with farmers, their organizations and rural communities to assess how existing sets of adaptation policies in particular affect farmers' practices and their socio-economic and environmental outcomes.

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Appendices

A1. WP1 method

1. mapping of policies and their actors

- Before the interviews, carry out policy mapping on the basis of documents
- Analysis of policy documents + targeted interviews with resource persons
- Identify existing policies and main instruments that are applied in the field
- Chronologies of existing policies and instruments based on documents (time line, trajectories, key moments and events (international, national or local)

2. Integration of concepts

- Characterize the process of integration / translation of concepts in relation to existing national and international regimes, policies or frameworks
  1. in national and regional policy documents
  2. for the actors interviewed

Interview guide

1 - Description of the actor met (training, curriculum, current position)

2 -Policies and processes

- what are the specific proposals in national/local policy for adapting agriculture to the CC that they consider relevant, appropriate to the country, region of study?

- other elements to be specified after analysis of policy documents

- if not, what alternatives can they indicate and on which notions or concepts are they based?

Among the policies, laws, instruments for adapting agriculture to the CC at the national and local levels:

-What are the important policies to consider to allow the adaptation of the territory?

-What are the public policies / instruments / actions actually applied, implemented and by whom at different levels (national, local, state / region)?

3- Content analysis and implementation of policy instruments

-Which instruments are actually implemented?

-For the instruments used:

-What level of implementation was initially targeted? (e.g. how many farmers? How many credits granted etc...)

-What level of achievement to date?

-How was their operation thought out and organised? What laws, funding instruments, institutions/administrations/actors need to be mobilized in implementation?

-Which actors and institutions are actually involved in the current implementation?

-What problems have been encountered in implementation?

- in terms of articulation complementarity, superposition or conflict?

- in terms of resources, financial and human capacity, etc.?

4. *Concept mobilized in these policies*

According to what the interviewee replied during the interview, track down the following

(i) what it means by adaptation

ii) whether or not it refers to or mobilizes certain concepts (see remark on concept in 2)

-To clarify a little according to the analysis of the documents with more specific questions that make it possible to understand where the mobilization of these concepts comes from?

- In your opinion, in the National CC policy for agriculture and more precisely in the adaptation/agriculture component, what concepts are mobilized to address adaptation to the CC

- Which ones do you think are most relevant, operational, adapted to your region/agricultural systems

- where do you think these concepts come from? (Institutions, country?)

- who mobilized, transmitted, mediated them in your country?

- To what extent has the use of the concept changed existing adaptation policies? What levels and scales?

- What innovations related to the issue of climate change or recycling of pre-existing tools and policies?

A2. Publications related to WP1

Articles

1. Milhorance C. & M. Bursztyn, **Emerging hybrid governance to foster low-emission rural development in the amazon frontier.** *Land Use Policy*, V 75, 2018 : 11-20 https://doi.org/10.1016/j.landusepol.2018.03.029

Abstract: The Governor of the state of Mato Grosso in Brazil announced during the United Nations Framework Convention on Climate Change Conference of Parties, in December 2015, a plan to reduce considerably the state's greenhouse gas emissions–the Produce, Conserve and Include Strategy (PCI). Its governance structure - made up of members from the civil society, the private sector, and distinct government agencies - was planned to promote the integration of public policies. This article presents the building process of PCI strategic plan, questioning its innovation regarding former experiences in the state of Mato Grosso and its potential effectiveness in promoting low emission rural development agenda in Brazil's largest carbon emitter. It concludes that PCI has a great potential to consolidate innovative governance towards more sustainable and integrated strategies; however it does not intend to promote a politico-economic paradigm shift.

2. Milhorance C., M. Bursztyn, E. Sabourin **Policy interactions: Concepts, gaps, and future research agenda** (in press, *International Journal of Public Policy*)

Abstract : Various concepts have emerged from relevant discussions regarding the interactions between public policy instruments, cross-sectoral interfaces and conflicts, governance between multiple levels of public action, and competition for public resources. A series of literature reviews is already available. However, the authors have focused on each concept separately, and the works have been applied to distinct policy fields. This study presents a comprehensive literature review of different concepts, aiming to identify their points of contact, and to provide a heuristic outline for further research.

3. Milhorance C., M. Bursztyn, E. Sabourin, **From policy mix to policy networks: Assessing climate and land use policies' interactions in Mato Grosso, Brazil** (soumis à *Journal of Environmental Policy & Planning*)

Abstract: This article proposes an analytical framework based on documental sources to address interconnected networks of policy actors and policy instruments in the fields of climate change and land use governance. The framework is applied to the climate and land use policies implemented in the Amazonian state of Mato Grosso, Brazil, and it draws on social network analysis to characterize policy mixes being effectively implemented in the region. The article also illustrates policy networks built on institutional and financial links between organizations involved in the implementation of these policy mixes, and it sheds light on the actors and networks that perform key functions in connecting levels and sectors as well as on the formal dimension of power.

4. Milhorance C., M. Bursztyn **Climate adaptation and policy conflicts in the Brazilian Amazon: Prospects for a Nexus+ approach** (soumis à *Climatic Change*)

Abstract: In a scenario of the apparent adverse effects of climate change, adaptation strategies are needed. The complex cross-sector nature of climate challenges provides a compelling case for a more coherent policy approach. Combinations of policy instruments take different shapes and involve a different set of actors depending on the territory in which they materialise. In this article, the spatial distribution patterns of climate public investments are analysed by mapping the territoriality of policy priorities, functional overlaps, and instrument conflicts. It draws on the case of Mato Grosso, located in the south-eastern region of the Brazilian Amazon, where the effects of climate change are expected to impact key economic and social activities. Furthermore, an analytical framework named Nexus+ is provided, which empirically defines the scope and interfaces of adaptation strategies.

5. Milhorance C. et al, **O desafio da integração de políticas públicas para a adaptação à mudanças climáticas no semiárido brasileiro** soumis à *Revista Brasileira de Climatologia*

The article discusses the challenges of the water-energy-food-climate nexus in the context of the São Francisco River Sub-region, identifying historical conflicts and perspectives for natural resource governance. The evolution of socio-historical and land use processes and the implementation of public policies will be presented in a first section, focusing on energy projects and their interactions with the use of water resources and with productive and agrarian issues. The second section presents the primary public investment data in the region, which has targeted wind projects, as well as interinstitutional interactions for the execution of these resources. The third section discusses the risks presented by wind projects, in order to reproduce unequal patterns of investments in the territory and increase social and environmental vulnerability, despite the potential of these projects to promote climate change mitigation.

Communications

1. Biabiany, O. ; Massardier G., Montouroy Y., Hrabanski M. **The wicked problem of climate policy integration in Guadeloupe (French West Indies): between invisibility and grabbing** (ICPP Conference Montreal, juin 2019) T14P10 - Policy Integration for Boundary-Spanning Policy Problems: Climate Change Mitigation and Adaptation Policy

Abstract The communication aims at enlightening the issue of climate-oriented public policy forms, scales and means of their implementation, as well as their limitations (Adelle and Russel, 2013; Howlett, 2014). Based on empirical case study in French West Indies (Guadeloupe), our study analyses the climate policy integration and urges greater consideration of the issue on the existence of so-called ‘new’ climate policies, thus fueling debate on the potential emergence of a new climate-oriented public policy sector. Our discussions also foster analysis of the idea of mainstreaming international climate change governance concepts in national (Biesbroeck et al., 2010) and local (Wilbanks, 2003) policies. The Guadeloupean case study consequently focuses on analyzing inter-level and -sector interactions, such that “transversal policies enhance the ‘territorialization’ process regarding public policy and activity areas, in turn challenging historically established sectoral boundaries” (Hassenteufel, 2011) regarding agricultural, tourism and economic policies. In Guadeloupe, if the international concept of agroecology is largely used, it is through a framework stranger to climate change considerations. First of all, adaptation of climate change is forgotten in vertical climate policy integration with the European, national and

regional policy level. Then, the concept is influenced by national and regional priorities that lead to the invisibility of climate change. Indeed, adaptation to climate change does is not appear as a priority in the local agenda but finds herself relegated behind other themes (health, development, employment, Sargassum pollution...) and it is once dealt with the other emergencies settled. Nevertheless, the State plays a critical leadership role in coordinating climate policy efforts and integrating climate change into bureaucratic and institutional structures to ensure timely and effective outcomes, that is to say that climate policy is integrated within existing structures and programs. However, that it is not a "strong" strategy because, first, policy instruments such as Climate and Agri-environment measures (CAEM) are grabbed by bananas sector. Indeed, as European and national climate change policies are integrated and appropriated by sectoral processes, the bananas sector can rely on several kind of resources (economic, social…) that enable a transcoding (Lascoumes, 1996) of such measures.

2. Hrabanski, M.; Le Coq J. F.; Biabiany O. **Making scientific knowledge for promoting agricultural issues in global climate policy: three epistemic communities in competition** in ICPP Conference Montreal, juin 2019, T07P07 - Making 'Credible' Knowledge for Policy: the Politics (and Practice) of Expertise

3. Milhorance, C; Sabourin E., Mendes P. D**. Adaptation to climate change and policy interactions in Brazil's semiarid region** in ICPP Conference, Montreal, juin 2019. T14P10 - Policy Integration for Boundary-Spanning Policy Problems: Climate Change Mitigation and Adaptation Policy

Climate projections predict important changes in temperature and precipitation patterns for Brazilian ecoregions. Given the intersectoral nature of climate challenges, more integrated approaches to policy are considered fundamental to reduce social vulnerability and promote adaptive capacity to climate change. However, different systems have different sensibilities and disturbances and have an unequal potential to adapt to change; in addition, adaptation-led policy mixes take different forms and involve different sets of actors, depending on the territory in which they materialize. Regionalized analyses of the formulation and implementation of climate policies are needed, including the different combinations of instruments that are implemented in each territory, the interactions between actors at different levels, and the mobilization of different narratives on climate adaptation. Brazil's northeast semiarid region represents an important case study on climate change. Although the occurrence of drought represents a chronic situation in the region, climate change is expected to increase precipitation variability and decrease groundwater recharge, which will likely generate a series of socioeconomic impacts. The most recent episode of extreme drought, which began in 2011, has been generating socioenvironmental and economic costs, such as reduced agricultural and livestock production, as well as reduced water levels in reservoirs for human supply, animal feed, and power generation. The problem of regulating the flow of discharges from hydropower dams in the São Francisco River has caused political struggles among the different sectoral actors. This paper analyzes the emergence of climate adaptation agenda in Brazilian political scenarios, discussing its divergences regarding the climate mitigation program and the missed goal of the National Adaptation Plan to promote the integration of sectoral agendas. Moreover, drawing on extensive on-the-ground surveys and analyzing a significant number of institutional documents of the semiarid region of Pernambuco, the paper seeks to

examine the combinations of policy instruments that have been contributing to the adaptation of rural populations to climate events. It also sheds light on the subsequent processes of translation and the re-signification of old policy strategies regarding "living in a semiarid climate" from earlier international climate adaptation paradigms. The paper thus intends to provide methodological and empirical advances by presenting findings regarding the definition of the scope of adaptation policies in different contexts, and the representation and assessment of policy mixes at the territorial level. Furthermore, it seeks to provide tools for analyzing the multilevel governance of climate adaptation, including interactions among and within policy networks and the role of particular coordination mechanisms.

4. Milhorance, C; Sabourin E., Le Coq J. F. **Climate and water policy integration in Brazil's semiarid region: insights from an ACF perspective in** ICPP Conference, Montreal, juin 2019, T01P09 - Advocacy Coalition Framework: Advancing Theory and Evidence about Phenomena of Policy Processes.

Climate change governance relies on complex structures that span across global, national, and sub-national levels, comprising both formal and informal policy networks. In these multilevel systems, public action includes a multitude of closely intertwined domestic and international institutions. Moreover, the causes and vectors of climate change and adaptation are embedded across a number of policy sectors, each of which show different priorities and involve distinct sets of actors with varying interests. These challenges showcase a complex cross-sectoral and cross-level nature. In Brazil's northeastern semiarid region, climate change superimposes an additional layer of challenge in a region that historically faces water scarcity and water struggles. Rainfall variability is expected to increase, which—along with the process of vegetation degradation—has been accelerating the process of desertification and soil salinization. In addition to reduced agricultural and livestock production and a decrease in the reservoir levels for drinking water, continuous reduction of precipitation affects hydropower generation in the region, particularly after the most recent episode of extreme drought, which began in 2011. Drawing on semi-direct interviews and documentary research, this paper aims to analyze the processes of agenda-setting and implementation of climate adaptation policies in Brazil's semiarid region. It sheds light on the role of particular advocacy coalitions in facilitating or hindering the integration and local implementation of policies and on the key role that actors play in connecting levels and sectors. Using network analysis, the paper also addresses the interactions across and within coalitions that extend to multiple levels, from international to local. In addition to the sharing of ideas and interests among actors, it is also important that the distinct positions and social characteristics of members in structuring the coalitions be examined. This involves an understanding of power differentials across policy subsystems, the potential for integrating decision-making spaces, and additional tests brought about by the effects of climate change on a region already dealing with drought management challenges.

5. Hrabanski Marie & Montouroy Yves **What air conditioning system(s) for public policies?** (LC2S, University of the West Indies). **Organisation of a Thematic Section** at the 15th National Congress of the Association Française de Sciences Politiques, AFSP, Bordeaux, 2-4 July 2019

6. Hrabanski Marie & Montouroy Yves **What air conditioning for public policies? Transcalar governance of climate policies and policy mix**. Communication to the 15th National Congress of the Association Française de Sciences Politiques, AFSP, Bordeaux, 2-4 July 2019, Thematic Section 61, "What air conditioning(s) for public policies?"

7. Biabiany, O.; Massardier G., Montouroy Y., Hrabanski M. **The wicked problem of climate policy integration in Guadeloupe**: **between invisibility and grabbing** in XVème congrès Association Française de Sciences Politiques, Bordeaux, 2-4 juillet 2019, Section thématique 61, "Quelle(s) climatisation(s) des politiques publiques?"

Abstract The communication aims at enlightening the issue of climate-oriented public policy forms, scales and means of their implementation, as well as their limitations. Based on empirical case study in Guadeloupe, our study analyses the climate policy integration and urges greater consideration of the issue on the existence of so-called 'new' climate policies, thus fueling debate on the potential emergence of a new climate-oriented public policy sector. Our discussions also foster analysis of the idea of mainstreaming international climate change governance concepts in national and local policies. The Guadeloupean case study consequently focuses on analyzing inter-level and -sector interactions, such that "transversal policies enhance the 'territorialization' process regarding public policy and activity areas, in turn challenging historically established sectoral boundaries" regarding agricultural, tourism and economic policies. In Guadeloupe, if the international concept of agroecology is largely used, it is through a framework stranger to climate change considerations. First of all, adaptation of climate change is forgotten in vertical climate policy integration with the European, national and regional policy level.

8. Howland F.; Le Coq J. F. Consideration of the **climate challenge in Colombian policies: from risk management to adaptation to climate change** Communication to the 15th National Congress of the Association Française de Sciences Politiques, AFSP, Bordeaux, 2-4 July 2019, Thematic Section 61, "Quelle(s) climatisation(s) des politiques publiques

Summary: Following the publication of the fourth IPCC report in 2007, many countries developed national CC legislation and formalized climate policies, but these efforts have not significantly reduced global emissions (Muller, 2015), nor improved the situation in terms of risk management and adaptation to CC (IPCC, 2014). According to the IPCC (2014), addressing the challenge of effective adaptation requires the implementation of policies at multiple scales: international, national and local, and taking into account multiple sectors and territorial contexts (Howlett & Rayner, 2007). The objective of this paper is to present the process of climate policy development in Colombia through the analysis of the perceptions and interactions of actors at the national and international levels, as well as the choice of policy instruments, their orientation and articulation to address the challenges related to the CC.

The methodology is based on a qualitative approach, with a multi-level analysis perspective focusing on the relationships between actors, institutions and discourse that structure the construction of policies and their evolution over time. Approaches to socio-anthropology of development (Long, 2007; Mosse, 2005; Olivier de Sardan, 1995), political science (policy mix, Howlett and Rayner, 2007; coalition of causes, Sabatier and Weible, 2007; 3i, Surel, 1998) and

sociology of translation (Callon, 1986; De Maillard and Hassenteufel, 2013) have guided this study.

The results show that the process of manufacturing climate change adaptation policies in Colombia is the result of a combination of external (ratification of international climate agreements) and internal (response to the Niña climate shock) factors. Beyond the transnationalization of climate public policies, we highlight a process of "hybridization" through a process of translation based on operating modes, values and interests (De Maillard and Hassenteufel, 2013). The actors involved in this process are at different levels and include different sectors (agriculture, energy, transport, housing, health, trade, tourism and industry) each with specific responsibilities and interests. Their interactions taking place at the interface of these interests and responsibilities, have made it possible to identify 2 opposing coalitions in terms of vision regarding the management of climate issues: a group of leading CC stakeholders (adaptation and mitigation), and a group of stakeholders in charge of risk management. These two coalitions compete on power and resource issues. Thus, leadership on climate issues has shifted from the monopoly of the Risk Management Unit (reactive approach to climate variability) to that of the Ministry of Environment (MADS) and finally shared between the MADS and the Planning Department (more proactive vision in terms of adaptation to the CC). The implementation of climate policies has been characterized by the creation of new instruments, most of which are normative (and some financial instruments). There is an effort to link up not only climate policy instruments but also sectors considered to be priorities (in particular agriculture). To this end, intersectoral coordination mechanisms (CICC) and at different scales (Regional Nodos) have been set up. So far, it is difficult to measure the success or effectiveness of these very recent policies; the effective implementation of instruments and mechanisms is the next key step for the country (as well as the measurement of their results). Future financial support for international cooperation will depend on the results of implementation.

Working papers & Rapports de recherche

1. Howland F. 2019. Adaptation to climate change (CC), concepts and integration into policy design - WP1 Report - Colombia Cali/CIAT; Montpellier/Cirad.

2. Milhorance of Castro C., Sabourin E., Chechi L. 2018. Climate change adaptation and public policy integration in the semi-arid region of Pernambuco, Brazil. Brasilia: ANR, 45 p. (Working Papers Series, 2).

Dissertations and theses

1. Blondel. O. (2018) Adaptation to climate change in agriculture in Guadeloupe Montpellier, CIRAD. Master's thesis, Political Sciences, University/IEP Toulouse

2. Chechi L. A. (2019) Multilevel analysis of national climate change policy: translation and implementation of public policies Thèse de doctorat en Développement Rural, Porto Alegre, UFRGS-PGDR .

3. Mendes P. (2020) Climate change and agriculture: a study on public policies for mitigation, adaptation and their interfaces. Thèse de doctorat en Développement Durable, Brasília, CDS/UnB.

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