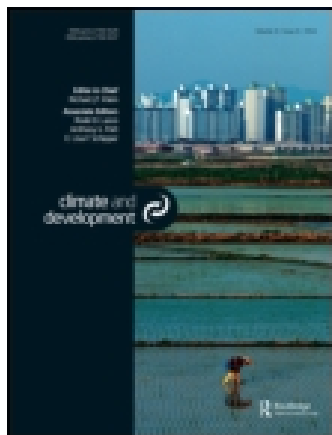


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### Comparative analysis of five case studies: commonalities and differences in approaches to mitigation actions in five developing countries

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## Comparative analysis of five case studies: commonalities and differences in approaches to mitigation actions in five developing countries

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In light of the ongoing international discussions about the Nationally Appropriate Mitigation Action concept, this study takes instead a more 'bottom-up' approach through a comparative analysis of five studies of mitigation actions (MAs) in Brazil, Colombia, Chile, Peru and South Africa. The analysis shows that MAs are driven by both developmental and climate objectives. The character, scope, policy horizon and potential success of an action are closely linked to the developmental path of countries such that MAs that directly address poverty and development seem to have a better chance of being implemented since they address issues higher on the policy agenda of developing countries. Where international support is sought, all five countries have some existing measurement, reporting and verification (MRV) and technical competence capacity that can be built upon. The choice of MAs is evidently linked to institutional capacity (both for design and implementation of MAs and possible MRV), emissions profile and the relative resource endowments of countries. The policy environments – from highly planned to less coordinated – and time-horizons – from 4-year plans to 40-year scenarios – differ substantially between the countries. Thus, the comparative analysis underscores the diversity of possible MAs and capabilities and the concomitant need for flexibility in definition, design and implementation.

**Keywords:** Brazil; Colombia; Chile; Peru and South Africa; mitigation actions; developing countries; policy; emissions profiles; stakeholders; implementation

### 1. Introduction

The objective of this study is to develop a better conceptual understanding of mitigation action (MA) by comparing countries' approaches to thinking and implementing MAs. The comparative analysis in this study builds on the textured and detailed analysis of MAs in five developing countries based on the articles on this volume – Brazil, Chile, Colombia, Peru and South Africa (Cadena Monroy et al., 2011; La Rovere, Dubeux, Perira, & Wills, 2011; Sanhueza & Palma, 2011; Takahashi, Zevallos, & Cigaran, 2011; Tyler, Boyd, Coetzee, & Winkler, 2011). The reader is referred to these studies for further detail; to avoid repetitive citations, we cross-reference only sparingly.

In this comparative analysis, we assess what is common across MAs in all contexts, and what is different. We structure the comparison by considering the elements specified in the methodology in Section 2. Thus, in the subsequent sections, we will address some key concepts, advance a methodology, provide a detailed comparison across the five countries for key elements (Section 4) and synthesize

this in a summary comparative table in order to finally draw conclusions.

### 2. Some key concepts: what is in a name

There are several ways to refer to the relevant concepts. This paper will focus on MAs. We will consider these as actions that result in the mitigation of GHG, as they are on-going in all of the compared countries, even if these were deployed for reasons of local sustainable development, rather than for climate change purposes. In this sense, we distinguish MAs on one side from low-carbon development strategies (LCDS) – countries put together (see Torres, Winkler, Tyler, Coetzee, & Boyd, 2012; UNEP, 2011). In contrast, from Nationally Appropriate Mitigation Actions (NAMAs), as those tend to be associated under the international climate negotiation as individual actions to be submitted to the registry under the United Nations Framework Convention on Climate Change (UNFCCC). NAMAs are being linked by the climate

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regime to a series of support institutions as they are being developed at the UNFCCC. MAs developed domestically may be submitted internationally as NAMAs, particularly if international support is sought for their implementation.

We believe that it is most important to understand the country's approaches to MAs in order to gain broad support and increase the number and ambition of actions implemented. A key challenge in developing countries is to get from policies and plans to implementation, given resource, institutional and capacity constraints. Moreover, in assessing what is common across MAs in all context and what is different or context-specific, this study strikes a balance between a wider and narrow view – more gets to be seen and more opportunities arise, while allowing addressing other key policy and national concerns, such as poverty and development. Hopefully, this will help identify what implicit and tacit knowledge we already have, what alternatives there are and how to better use them.

### **3. Methodology: how will we compare – and some guidelines**

The comparison is advanced as arising from the relevant issues considered in the country case. We assess the MAs from the five countries against the following elements: conceptual approaches, including planning and regulatory concepts, the stage of development of MAs (including specific examples), capacity (both institutional and technical), poverty and development, ownership and finance. Section 4 is structured around these elements. In assessing a diversity of MAs from five different countries, we are not suggesting a common template, but using these elements for comparative analysis, that is to identify similarities and differences.

These categories help focus the analysis on the capacity for policy action of domestic agents and institutions, taking into account the resource base and emissions profile within which they operate and which affects them. Thus, it can consider both how these agents can imagine different development futures as well as their capacity to act and implement the changes required to bring them forward – considering their circumstances. In doing this, the countries' own domestic options and constraints can be assessed, without hindrance from those deriving from the international climate regime.

Moreover, these categories also facilitate the consideration of MA within larger emerging economies (i.e. Brazil and South Africa) as well as smaller, high growth emerging ones (i.e. Colombia, Chile and Peru). Their various challenges may differ: while in the former, larger emissions profile in many sectors might make it crucial to reduce emissions or their growth, the latter needs to avoid their future growth. A focus on MA allows exploring

how underlying factors affect the required capacity to achieve this.

Last but not least, while linking well with the categories outlined above in examining the various countries' approaches, they also match well with UNFCCC negotiation language, and provide an adequate blend of guidance and flexibility to encompass both individual NAMAs and the more general LCDS as required. A focus on the latter alone would leave aside the potentially larger set of MAs the country is advancing on its own for whatever reason, focusing instead on the more limited number of actions that seek support and/or have been deployed following the UNFCCC's or best practice NAMAs or LCDS guidelines. As not all MA needs to eventually translate into either NAMAs and/or LCDS, a focus on the latter can be a serious bias.

Thus, an interpretative guideline would take cue from the policies and activities described in the context and circumstances surrounding the country case articles, and not solely on *ad hoc* NAMAs. It would also consider a closer link to the relation between the country's general policy framework and its mitigation opportunities and challenges, and would follow climate change mitigation approaches that shadow the main policy interests of the country, whether or not they emerge from the international climate regime.

### **4. Detailed comparison of MAs by issue**

Having considered the key concepts and outlined our methodology, this section provides a detailed analysis of MAs across key issues, identified in Section 2. The main sources for this analysis are the five studies from researchers. Readers wishing to see the comparison in tabular format might wish to look ahead to Table 1 at the end of this section.

#### **4.1. Concept**

The countries in all the cases examined in this article developed MAs initially as part or with a component including the Clean Development Mechanism or as autonomous developmental actions. In all five countries, MAs (and NAMAs particularly) were subsequently conceptualized more explicitly as part of pledges made in advance or in the context of Copenhagen (2009), at the fifteenth Conference of the Parties (COP-15) to the UNFCCC and the meeting of parties to the Kyoto Protocol. These were early movers with relatively ambitious overall MA goals – the smaller countries moving first, but all seeking to make an impact in the post-2012 negotiations.

In the opening of the high-level segment of COP-14 in Poznan in 2008, Peru offered substantial MA in forestry in exchange for further action by the developed countries. The same year, South Africa presented in a side event its long-

Table 1. Synthesis of comparative analysis of mitigation actions in Brazil, Chile, Colombia, Peru and South Africa.

	Brazil	Colombia	Chile	Peru	South Africa
Concept	National-wide target compiled in Law. Focus on AFOLU and energy	Sectoral targets embedded within national plan. Focus on forestry, energy, biofuels and carbon markets	National-wide target and several NAMAs under development, focusing on energy, transport and forestry	Sectoral targets, focusing on forestry, energy and waste	National-wide target and planning several MAs including both direct actions, indirect instruments and institutions
Stage of development	Sectoral plan for energy, forestry and agriculture available, others under development as per Decree, with further actions to be compiled	Specific climate change plan and strategy collecting activities currently under discussion. A number of actions at forefront (energy incentives, forest certificates, BRT, scrappage and modal shift actions, biofuels), some with challenges ahead	Identified and being designed in energy and transport; preliminary work in forestry. They are mostly at a design stage	Suite of actions in the energy, industry, transport, forestry and agriculture and waste sectors, at different stages	Most in design stage, with some advances on the BRT, a pilot in the settlement facility for housing
Institutional capacity	MA collected and implemented by decentralized bodies. Implementation in charge on national entities; with law enforcement and policy setting in Brazilian hands, but financial support admitted with foreign funds, inclusive of 1BnUS\$ Amazon fun, and with participation of subnational governments. Where relevant (particularly on agriculture)	Energy with capacity to design, implement and supervise; forestry likewise, but facing substantial inherent difficulties in deforestation; well structured scheme in biofuels, regulated by the MoA, and with close links with regional research bodies in agriculture	Ministry of energy with <i>ad hoc</i> bodies and expertise; and transport and forestry lacking these. However, the latter have long standing technical expertise. Forestry (under Agriculture) has the capacity to define and design NAMAS, while transport can do so with Ministry of environment support	Stronger in energy, less in industry, transport and waste. Forestry with some overlap between agriculture and environment, creating some conflicts of competence. This, together with a poorly structured civil service regime, high personnel rotation and relatively low salaries conspire against stability and follow up of proposals	Capacity will need to grow at city government while better combining with central government capacity
Planning, policy and regulatory context;	Planning done by ministries with input from technical bodies operating within sectoral legislation	Administrative and incentive control measures deployed by MinEnv. as well as MINAg and strong links with planning. Reliability on market, links to private sector and engagement with cities (transport)	Free market in energy, and several supervisory and regulatory in the forestry sector, lacking institutional definition	National mitigation guidelines available (consulted at regional level). Variations on implementation within sectors, with several levels and agencies of government participating	Included within national planning and city planning documents, with limited stakeholder consultation. Indirect instruments based upon existing institutions

(Continued)

Table 1. Continued.

	Brazil	Colombia	Chile	Peru	South Africa
Technical capacity to design MAs	Already designed; implementation through national fora; new MAs in course of being agreed; direct and indirect policy mitigation instruments and vehicles	Available in energy, transport, forestry, biofuels, and agriculture	Available in energy; less in forestry and last transport; but latter capable with support from environment	Most currently developed through public private partnerships. Some capacity in ministry of energy, but additional support required in other sectors	Existing both within different levels of government and civil society. However, some of it (e.g. at city level) might need to be expanded. Strong design capacity in central government (finance and energy) but potential opposition from strong entrenched vested interest
Poverty implications	Substantial in credits in agricultural case, indirect in forestry, and with impacts on urban conditions as well in the case of energy	Strong in deforestation and agricultural, indirect in transport, some in energy and biofuels	Some impacts in energy and forestry	Strong in forestry and agriculture, indirect in energy and transport	Strong and direct in urban housing project, indirect in the others
Ownership (who initiated and 'owns' the MA)	Public players, with private sector participation in implementation	Government entities (national and subnational –city governments) with some public private partnership	Initiated by government, and with Government ownership. Role for public private partnerships expected, although yet to materialize	Mix of government and consultants, with some regional government participation, particularly in REDD+	Mix of central and city government, with also strong participation by civil society and private sector, within a fluid, rich but still yet to be coordinated environment
Financing	Distinction between enforcement and legal and policy definition to support financing without compromise of national position. Flows through development Bank (BNDES), and finance blended with carbon markets and national support	Implicit private sector incentives through firm capacity charges, additional financing options possible; in transport, multiple options operative with others in design (scrappage and retrofitting), plus incentives in forestry. Additional action potentially viable through international support	In energy, some design of specific instruments (revolving funds, concessionary finance, subsidies and credits, etc.). Costs estimated for forestry and energy, but not agreed framework in case of forestry yet	Strong potential for energy infrastructure activities to be privately financed; while in efficiency activities and those in other sectors there might be a need to blending financial sources and carbon finance. Additional support for technical expertise might be required	Several self-funding and innovative financial mechanisms (e.g. settlement facility and feed in tariffs) with clear overview of total costs, and some piloting experience. Also, a well honed ability to make the most of circumstances (e.g. using the World Cup finance)
Any other issues	Strong concern over ownership and sovereignty in case of forestry sorted through MA design	Some overlapping of competences, in agriculture and forestry; none in case of alimentary security and			

Data source: Analysis by authors, based on own research and information in the studies by (Cadena Monroy et al., 2011; La Rovere et al., 2011; Sanhueza & Palma, 2011; Takahashi et al., 2011; Tyler et al., 2011).

term mitigation scenarios (Republic of South Africa (RSA), 2008), but still informally and not as a matter of negotiation. The Peruvian case emerged from a specific analysis of what it gained and lost by being more or less ambitious in a high ambition international coalition, taking into account mitigation, adaptation and impacts (Ministerio del Ambiente, 2010). Its 2010 national mitigation guidelines explicitly argued that the country would be better off in a high ambition outcome towards which it contributed much, than in one of the low ambition in which it had to little or no MA committed.

In the lead-up to COP-15 in Copenhagen, all four had followed Peru in formally announcing pledges. Chile, Colombia and Peru had exchanged views along the lines above on mitigation and on the interaction between domestic policy and the international climate regime regularly since 2006, within the Latin American Workshop to increase the scale of responses. With variations, the first three sought to respond to the lack of international action in the run up to Copenhagen and its aftermath, using domestic high ambition mitigation pledges to elicit further international collective action (Garibaldi, Araya, & Edwards, 2012). They pledged their actions after the Copenhagen COP.

Brazil and South Africa were in a different setting, and their goals differed: Brazil's 'offer' specified individual MAs, South Africa's did not. In spite of these differences, Chile and Brazil remain some of the few developing countries that have *both* an overall deviation/intensity goal, and specify that these will be achieved by specified MAs. Indeed, this is more specific than required for developed countries under the Kyoto Protocol, where the commitment is quantified overall, but policies and measures are flexible. Among the countries studied, there are two economy wide goals (South Africa, Brazil, both with quantified deviation below business-as-usual (BAU)). From the cases, it seems clear that all offers were affected by the countries' emissions profile and their respective resource endowments – an issue we return to in Section 5.

Brazil's MAs have been encoded in law and implementation decrees, covering forestry, agriculture and animal husbandry and energy. Goals were quite ambitious, reflecting proposals for 36.1 and 38.9% reduction for 2020 (La Rovere et al., 2011).

South Africa formally communicated its pledge to the UNFCCC after Copenhagen, indicating that its NAMA would enable a 34% deviation below BAU to 2020 and 42% by 2025, with the extent to which this action will be implemented dependent on support (RSA, 2010). South Africa now has a desired GHG emission trajectory, and has also specified a BAU, both described in its climate policy (RSA, 2011). MAs under consideration to achieve the deviation include both direct actions, indirect instruments and institutions – from carbon taxes and

tariff regulation and incentives to settlement funds and bus rapid transits (BRTs) – at different points in the development and design of the action, all these are described within.

Chile's goal is to reduce the growth of CO<sub>2</sub> emissions by 20% of the BAU scenario by 2020, using 2007 as a base year, provided international assistance is available (Sanhueza & Palma, 2011). Several NAMA options are described in the pledge: Five in Energy, four in transport and two more in forestry. The latter offers substantial mitigation opportunities (over 230 Mt of CO<sub>2</sub>-eq) compared to some 10 Mt in the energy sector.

Peru has put forward three major MAs in its pledge, including achieving net zero deforestation of primary natural forests by the year 2021 and stabilizing by 2017 emissions from protected areas. Another MA aims to ensure that by 2020, renewable energies (nonconventional, hydropower and biofuels) make up at least 40% of energy consumption, emissions from protected areas. The third MA involves designing and implementing measures that reduce emissions from inadequate solid waste management (Takahashi et al., 2011).

Colombia offered zero deforestation from Amazonian rainforest by 2020, 77% coming from renewables by 2020, biofuel development and expansion of carbon markets (Cadena Monroy et al., 2011). There are also additional activities in agriculture, with activities embedded within its national plan, with the environmental subsector.

#### 4.2. Stage of development of action

As described above, MAs are taken simply as those that mitigate GHG emission – whether having a climate objective or not. In arranging them, some underlying structure is being defined by all countries, even if not equally reflected in all MAs.

Brazil's MAs are at the most formal stage of development legally, encoded in a Law (12178). The implementation decree (7390) requires compiling further actions. An inter-ministerial committee consultation process with a multi-sector Brazilian Climate Change Forum was important in early stages of developing actions and is likely to remain active. The energy MAs have already been considered for a sectoral MA, and those in forestry and agriculture have specifically agreed goals. Ministries for different line functions have been required to submit plans in the first half of 2012.

Colombia in turn has advanced several sector-specific goals, with work on energy on incentives through dispatch and firm capacity credits. The forest certificates also have substantial potential, but will likely require regulatory changes to achieve goals. Colombia is probably the world's leading exporter in BRT systems, with BRTs already established in eight cities, with cutting edge

design. Further actions may be required for scrappage and modal shift measures, and biofuel development also at forefront, but with constraints likely as a goal of 15% ethanol blend appears by 2020. Colombia is developing a LCDS as an overarching framework that will frame its MAs (Cadena Monroy et al., 2011).

Peru has a variety of actions in different stages. Their current suite of actions covers the energy, industry, transport, forestry and agriculture and waste sectors, with a specific lighting NAMA described (Takahashi et al., 2011). In the energy sector, these include renewable auctions, gas introduction for domestic use and transport, clean technologies in power generation, measures for smart driving, fleet and vehicle renewal and fuel improvements. Forestry also includes several regulatory and incentive instruments, while waste will see the construction of various landfills. The specific NAMA in lighting is currently being designed and analysed, together with a transport one. The intention is do further research as part of a stakeholder process, and then to move those less advanced into an implementation phase (Takahashi et al., 2011).

In contrast, Chile's and South Africa's are mostly in the design stage, with the MA in Chile mostly identified and now being designed in the energy and transport sectors, with preliminary work in forestry. In South Africa, most individual MAs are in design stage, with some advances on the BRT, a pilot in the settlement facility for housing. Tariff support would work within capacity licensing regime, and the tax support within the overall tax regime. South Africa's climate policy mandates the development of carbon budget for major sectors by 2013. MAs for each sector will need to be defined more clearly, as sectors (and some major entities) consider how to remain with the identified budgets.

### 4.3. *Institutional capacity*

The term 'institutions' is sometimes taken as the rules of the game, and in other sense it may mean agents and organization set up to enforce them. The term is used here in both senses, with differences noted as required. Institutional capacity is a key determinant for implementing MAs, and a country's mitigative capacity (Winkler, Baumert, Blanchard, Burch, & Robinson, 2007).

In all the cases, there are MAs linked to a country's policy and national objectives and goals, but more detailed MAs and actions seem to be linked to the enhanced enforcement, coordination and planning capacity. Several of these have considered how to articulate activities based both on the origins of the funding and the country's capacity to implement them. Likewise, existing planning and policy deployment capacity also seems to be a key to both the creation of MAs coordination and consultation, as well as their being implemented or not. In fact, the variation of capacity across sectoral institutions' is presented in

the five country studies as a determinant of which are more likely to be implemented. This highlights that capacity development is a more significant matter than its relatively low status in negotiations might suggest.

The impact of institutional settings is felt in many different ways. In Brazil, MAs were collected and implemented by decentralized bodies. Implementation is in charge on national entities, with law enforcement and policy setting in Brazilian hands. Brazil has created new financial institutional capacity for its largest MA, the Amazon Fund to support reducing deforestation. The fund has received \$1 billion of foreign funds and is housed within Brazil's Development Bank (BNDES), a major financial institution (see country study; La Rovere et al., 2011). The role of subnational governments is particularly relevant in deforestation and agriculture, with the subnational government, for instance, involved in policy implementation.

In Colombia, the country also has a well-organized business chamber structure, with coordinated research bodies and strong links with planning. Their ideas are included within national planning document and city planning documents; which are developed by central government, with some participation from development banks, policy research and input from private sector, civil society and private research. Institutions in the energy sector have enough capacity to design, implement and supervise MAs. For overall low-carbon development planning, there is significant capacity in the Environmental Ministry and Planning Department. There is also significant capacity in the forestry sector, but these require institutional learning to address the inherent difficulties in analysing and implementing MAs in deforestation. Colombia also has well-structured schemes in biofuels, regulated by the MoA, and with close links with regional research bodies in agriculture. A general feature of the institutional landscape in Colombia is that it is market-oriented, with regulation or planning needing to have a light touch in order not to be seen to distort markets. Another is a near-term focus, typically for 4 years of a Presidential term. This is a challenge in relation to climate change, due to its long-term nature, and for implementing responses to a market failure.

In Chile, the Ministry of Energy has dedicated agencies and expertise, which are not present in the Transport and Forestry sectors. However, the latter have long-standing technical expertise. Forestry (under Agriculture) has the capacity to define and design NAMAS, while transport can do so with the support of the Ministry of Environment. In Peru, there are variations on implementation within sectors, with energy the most comprehensive, including centralized bodies for planning, regulation and oversight, and with a current referential plan for efficiency. In forestry and transport, there are also several levels and agencies of government participating. This, together with high

personnel rotation and low salaries conspire against stability and follow-up of proposals. Capacity is stronger in the energy sector, and less so in industry, transport and waste. Forestry had some overlap with Agriculture and Environment, creating some conflicts of jurisdiction. In South Africa, Capacity will need to grow at city government, to combine with that of central government.

#### 4.4. *Planning and regulatory concept*

The strength of the planning and policy institutional setting and its regulatory environment affect the scope and character of MAs. All five countries have open market economies with regulatory and planning bodies set up to ensure market operation. Within this broadly similar context, there are different emphases. Some countries – for instance, South Africa or Brazil – have MA buttressed by institutional support within planning cycle, while others, such as Colombia, have these planning institutions, but rely for their implementation primarily on market institutions and interventions via price mechanisms – although these are indirect, they have the potential to powerfully affect MAs. Finally, others, such as Peru or Chile, rely primarily on markets and related regulation, rather than planning. Conversely, discussions on economic instruments can make a non-negligible effect on how planning is implemented – for example, South Africa’s Treasury considers a carbon tax, which is taken into account in electricity planning.

In terms of how to bring consensus, Brazil has a permanent forum to consult actions, Peru has another committee, albeit more recent, with Colombia currently setting up one, while South Africa had extensive consultation in defining scenarios and then formal climate policy.

While all countries rely on regulation to some degree, Brazil, Colombia and South Africa seem to rely more on planning; Peru and Chile have had more of a free market-orientated structure.

From the articles, it is clear that there are, however, subtle but important differences among these planning bodies; as a result, planning does not mean the same thing in all countries. In Brazil, planning is done by ministries with input from technical bodies (in energy and forestry/agriculture), operating within sectoral legislation. Examples include energy auctions and tenders, forest code and credit eligibility requirements.

Colombia also has a strong planning and regulatory structure, with a planning department and regulatory commissions for specific issues. Information from all sectors is analysed by the National Planning Department (DNP), which coordinates across sectors and submits planning documents for the Presidential 4–5-year national plan. Given the mandate at the highest political level, the plan is widely respected. These plans run side by side with longer 10-year term prospective scenarios. DNP can also

apply reliability charges within a free wholesale market – thus, planning is linked to the market incentive structure. In other areas, transport and BRT in turn have a close relation with local governments.

In the case of Chile, there is a free market operating in the energy sector, in contrast to several supervisory and regulatory mechanisms in forestry. There is no definition yet, however, on the composition and institutional standing of potential NAMAs within the forestry sector. Peru, like Chile, also has more of a pure market structure, with less of a planning structure, and a more indicative planning structure, advanced through CEPLAN (the Acronym for the National Planning Centre, in Spanish), under the purview of the Prime Minister of the President’s Cabinet. While recently it is improving the capacity in the public sector, the country has in the last few decades relied extensively on the private sector to produce plans. In Climate Change, mitigation proposals included were generated by consultants using national mitigation guidelines, then consulted regionally and collected in national mitigation and adaptation plan.

#### 4.5. *Technical capacity to design MAs*

In discussing these, the capacity to design MAs can be taken in two senses. The first would be to use existing government policy and sectoral planning capacity to design policy, which was addressed in the previous section. The second would be dedicated capacity, established specifically to address climate change.

An example of the latter from South Africa would be the capacity to design low-cost housing that provides in parallel lower emissions and also saves money for households and improves indoor air quality. Further work was then carried out to design a much larger MA, in the form of a facility that would replicate from the scale of a single Clean Development Mechanism (CDM) project to the scale of the whole housing programme. There is a detailed design of a National Sustainable Settlement Facility (G:enesis, 2008), but it is yet to be established. More generally, long-term coordinated action is affected by the prospective and planning horizons, the policy cycles and enforcement capacity and the stability of interaction among key agents.

Brazil probably has the most varied number of them: they are already designed, and are being implemented through national fora, with new MAs in course of being agreed and with direct and indirect policy mitigation instruments and vehicles.

There is also a strong record on flexible instrument implementation and regulation – interest in maintaining it. For example, in Chile and Colombia interest persists in the CDM, particularly relating to financing and ways to measure the aggregation of activities, as well as on financing. These created related MA activities. Chile, for



instance, has created finance institutions that support investment with a mitigation impact, including through support by Chile's Production Development Corporation (CORFO, for its Spanish acronym), or aggregated activities around clean production.

Colombia has produced substantial mitigation innovation, for instance, in terms of Bus Rapid transit Systems, which affect both urban and mitigation policy, while there is on-going research in Forestry, biofuels and agriculture which is being translated into mitigation activities in those sectors.

In Peru, these are mostly currently developed from a coordinated mix of public, civil and private options through public private partnerships. These follow a strategic program approach with a rather innovative NAMA structure, combining carbon markets and self-financed action, and developed in consultation with the private sector and called there a PRONAMI, from their Spanish acronym. The case for a lighting NAMA, also described in Takahashi et al. (2011) is another good example.

#### **4.6. Technical capacity to MRV, the implementation of actions**

Measuring, reporting and verifying (MRV) the implementation of nationally appropriate MAs is an important new requirement of transparency at the international level (UNFCCC, 2007, 2011). In spite of the fact that MAs without MRV are still happening independently of multilateral negotiations, MRV provides transparency internationally on how developing countries are implementing NAMAs. In this section, our primarily domestic focus on MAs is supplemented by this consideration – reflected also in the nomenclature of NAMAs as distinct from MAs.

From the studies by researchers in the five countries, it appears that the capacity for MRV begins with understanding on how to articulate a NAMA, and to attract international support. Technical capacity to MRV would relate to the availability, uniformity and character of data. There is greater experience and more certain data for energy-related NAMAs, with experience in the CDM having built technical capacity that is relevant to MRV. Even in this sector, there is great diversity of actions, with MRV of supply-side being directly measurable, whereas demand-side measures require a counter-factual. Likewise, the availability of Methodologies: the development of specific ones for transport, and the CDM were a good way of moving forward the process when BRT systems were established. Brazil in turn has established extensive measurement systems and data on deforestation. This is institutionalised in the National Institute for Space Research (INPE, in the Portuguese acronym) and provides a solid technical capacity that could be applied to MRV of reducing emissions from deforestation and degradation (REDD) in Brazil and possibly other Amazonian countries.

Measurement is almost invariably done domestically, and reporting in the context of MRV is a communication by the country to the UNFCCC. Both are therefore firmly grounded in domestic activities. Crucial to transparency is the role of independent third-party data to verify what has been measured and reported. Technical capacity for verification would have an international component, but should also include the training of independent verifiers in developing countries.

Analysed from a sectoral perspective, the MRV in energy appears to be more straightforward, except for the choice of counterfactual for energy efficiency and demand-side management. The capacities identified in Sections 4.3, 4.4. and 4.5 for the five countries indicate that MRV for energy should be possible, although work remains to be done.

MRV in forestry would seem to be more complex. One issue is forest density, as satellite imagery provides good estimate of deforested areas. Such capacity is strong in Brazil, but less in Peru and Colombia. There is, however, a good potential for regional cooperation.

#### **4.7. Poverty and development**

In Brazil, there is a substantial use of credits in agricultural case, indirect in forestry, and with impacts on urban conditions, as well in the case of energy. In Colombia, there are strong implications in the deforestation and agricultural policies, and some indirect in transport, and some in energy and biofuels. Likewise, in Peru, there are strong implications in forestry and agriculture, indirect in energy and transport. In South Africa, there are strong and direct implications in the urban housing project, indirect in the others. In Chile, there are some impacts in energy and forestry.

Climate policy is about multiple objectives, both development and climate. Developmental objectives are themselves numerous, but across all five countries, alleviating poverty remains a high priority. Brazil and South Africa exhibit high levels of inequality. Climate is receiving more priority, but in the past it had not been at the top of the policy agenda in developing countries (Baumert & Winkler, 2005; Dubash & Bradley, 2005; La Rovere et al., 2007).

MAs that can show that they alleviate poverty, reduce inequality, contribute to socio-economic development and are much like those that gather broader societal and necessary political support (Rennkamp & Wlokas, 2012; Wlokas et al., 2012). While large segments of population remain in poverty, the key question will remain how to get out of it? This implies a discussion around development and changing from high- to low-carbon development pathways (Sathaye et al., 2009; Winkler & Marquard, 2009). It suggests that the concept of development needs to be redefined in relation to what it means to lead a good life and

whether new concepts of growth and prosperity are required.

The link between mitigation and poverty poses analytical and methodological questions, as well as policy ones. A response is affected by various existing policies – notably not only agriculture and forestry but also food, water, housing, social policy, transport and energy. Moreover, such a response is solely not only an issue of trickling down growth but also of considering the role of dedicated policy: social and social inclusion policy, as well as that of deploying new forms of infrastructure, and lifestyles, and of preserving traditional and low carbon lifestyles and assets.

Can we imagine a future with radically new developments, or new combination between sectors rather than only derivation from those we have now? Are there overall development paths for countries that meet basic human needs (make poverty history) but with lower emissions than a fossil-intensive/high deforestation path? One way to address this is to forecast into the future based on existing trends and comparing results with back-casting from a future that meets developmental and poverty goals to the present. This would not be prescriptive – it is more an issue of how to fill in the blanks when imagining the future, and analysing multiple potential scenarios. Nevertheless, there are already several policies in place from where.

#### 4.8. Ownership

Which actors or agencies conceptualise, design, plan and implement MAs? The ‘ownership’ of MAs will influence many aspects.

In Brazil, MAs are primarily initiated by public players, with private sector participation in implementation. In Colombia, government entities (national and subnational) are central, with some public–private partnership. In Chile, work on MAs was initiated by government, and strong government ownership is expected to continue, against possibly linking up in partnerships with private sector actors. In Peru, MAs are ‘owned’ by a mix of government and consultants, with some regional government participation. In South Africa, a mix of central and city government tends to develop on MAs, but there is also strong participation by civil society and private sector. The ownership of MAs is a fluid, rich, but still, yet to be coordinated environment.

#### 4.9. Finance

In Colombia, there are implicit private sector incentives through firm capacity charges, additional financing options possible; in transport, multiple options operative with others in design (scrappage and retrofitting), plus incentives in forestry. There is potential additional action

through international support. In Chile, in energy, there are some design issues around specific instruments (revolving funds, concessionary finance, subsidies and credits, etc.). Costs are estimated for forestry and energy, but there is not an agreed framework in the case of forestry yet. In Peru, there is strong potential for energy infrastructure activities to be privately financed; while in efficiency activities and those in other sectors, there might be a need to blending financial sources and carbon finance. Additional support for technical expertise might be required. Finally, in South Africa, there are several self-funded and innovative financial mechanisms (e.g. settlement facility and feed in tariffs) with clear overview of total costs, and some piloting experience. A particularly striking example of policy creating an enabling environment is the Brazilian Amazon Fund. The creation of the fund was made possible by the interaction between policy, legal implementation and the required resources to implement. International finance flows through BNDES and was blended with carbon markets and national support.

The consideration in the five studies on finance indicates no frequently blended single dominant source, but several. Various types of finance and financial agents participated in finding finance for MAs, including public, multilateral and private and domestic and international. In all countries, specific financial vehicles and implicit incentives were used (revolving funds secondary guarantees, private and public energy service company as agents etc.), as well as indirect and implicit incentives (capacity credits, interconnections, transmission, forest certificates, etc.).

### 5. A comparative table

Having described in some detail the concept of MAs in each of the five countries, stage of development, various capacities (institutional, regulatory/planning, technical design, MRV), issues of poverty and development, ownership and finance, the comparative analysis is synthesized in Table 1.

The table below compares the results. It uses the categories advanced above to organize information. Some remarks as to its character are worthwhile in this context. It is worth noting that MAs are not independent of the countries’ resource base, and arise as an imaginative, political and economic response to it. Central in this is the development path and socio-economic characteristics influencing them. These can cover a whole suite of issues: gross domestic product (GDP), both in terms of growth rates and composition of GDP, levels of poverty and inequality, major economic sectors, levels of unemployment and size of population, predominant technologies, etc. Likewise, they are affected by the country resource endowments, emissions profile and scale. In terms of endowments, it is not the same to have abundant fossils than not to have them, or tropical forests than

temperate ones. The country emissions profile in turn is derived from the use of the asset composition, while scale in turn affects emissions magnitudes, level of action and external pressures and opportunities. Finally, institutional factors affect agents and their interaction – their institutional development and stability – and are influenced in turn by policy cycles and political systems, and the underlying policy and national objectives.

Some additional associated, but less obvious, issues remain when addressing the above. Time is also of consequence: an early or late action has related costs – and affects where each MA is within a timeline and how much it can advance. While not the main focus, how to frame a MA as NAMA – and its associated MRV – also affects options, including, more generally, the relation between domestic and global action, and the relation of the former with long and very long-term visions of the country's development and, finally, the design, implementation and monitoring and review and implementation debate – the nature of the barriers being addressed affects the path taken.

## 6. Areas for further work

From the discussion above, there are several promising areas for further research and analysis. An obvious first area would be broadening the analysis, in particular to include other African and Asian countries. This study has been focused mainly on Latin America and in South Africa a somewhat atypical case. The findings across regional differences would be strengthened by an extended analysis.

This article has offered some initial reflections on the role that institutions and policy and planning horizons play in the definition and implementation of MAs. This could be deepened by reviewing literatures on institutional economics and public policy. These literatures may also offer further insights on the role of assets or resource endowments in determining which MA a country develops.

This article has focused on MAs and only briefly on transparency. The brief exploration of MRV could be taken further, including examination practice and cultural factors – how things are done in different countries. The role of independent verifiers in each country might be an illuminating example.

The cases also shed some initial light on the different origins of their MA and the different reasons behind them. In the case of Colombia, Chile and Peru, they decided to pledge a number of unconditional domestic actions as a way to both enhance competitive advantages and to elicit further ambition from the international community, thus reducing impacts (Garibaldi et al., 2012). There was an early proactive link between mitigation and adaptation, in response to the developments within the international regime. Brazil and South Africa seem to

have done the same later separately within the BASIC group, but focusing mostly on mitigation. As all these pledges were deployed, additional constraints and opportunities emerged, which had to be addressed, thus creating further developments. Comparing their different origins and how these affected their development path might be an area for further research.

In these developments, the various segments of the economy countries might face different challenges, with some focusing in reducing their emissions and yet others also in terms of avoiding future emissions. Likewise, how these fit within future visions of development and societies might become central. As time goes by, other developing countries might start using long-term pledges and then back-casting to the present. The comparison of scenarios developing through both fore- and back-casting may be an interesting area for future work.

Finally, the links between poverty and mitigation are perhaps the most interesting emerging new area, in our view, for future work. Such work should focus on both the relation between poverty and the development pathway, and on the potential for MAs to reduce poverty. Such work should also engage critically with concepts of growth and prosperity.

Overall, these areas could bring further insights on the reasons underlying why MAs get implemented or not, their policy and issue linkages across the economy and their diversity. Altogether, this promises to be a fruitful research programme.

## 7. Conclusion

These conclusions seek to expand some of the insights gained from the comparison against the objectives outlined in the introduction to this study.

Comparing the analysis by researchers from five developing countries makes it very clear that there is substantial MA on-going in Brazil, Chile, Colombia, Peru and South Africa. This in itself is an important first point.

MAs are driven by both responses to the international regime and the collective and individual climate impacts they are facing, as well as through their own domestic developmental and climate objectives. These actions' character, scope, policy horizon and potential success seem closely linked to resource base, institutional and policy settings, and the developmental path of the countries. MAs that address poverty and development – or alternatively, competitiveness and diversification concerns – appear to have a better chance of being implemented, since they address issues higher on the policy agenda in developing countries. MAs may develop effectively through policy on energy, forestry, housing, transport, agriculture and through many other sectors.

Which policy linkages are established seems important in addressing sources of finance. The cases examined

suggest that finance is typically a blend. The Brazilian case of creating a fund in its development bank, with a firm policy and legal basis, is particularly striking.

Some MAs are, however, also developed more specifically in response to the opportunities and requirements of the climate negotiations. In cases where MAs seek international support, it seems that all five countries have existing capacity that can be built upon to address MRV and transparency.

A similar finding relates to the institutional capacity to plan and regulate for MAs and to design them with technical competence. Which of the MAs are chosen relates to the emissions profile and resource endowment of countries. The case studies suggest that the implementation of MAs is undertaken sector by sector. Section 4.4 outlined the role of sector-specific approaches and instruments, including legislation in the case of Brazil, that seems important in these developing countries.

Moreover, the extent and strength of agents' capacity and coordination capacity across institutions might be a key reason why some MAs planned in these countries might or might not be implemented. Some countries, such as Brazil and Colombia, have both strong planning departments, side by side with Civil Society/Government fora. This allows to build up planning and legitimacy for their actions. Others have less planning bodies, or none at all, relying instead on the latter case – on markets. This situation expands from and also at city level. In several of the countries, public–private partnerships have emerged or are being envisaged.

Nevertheless, while this paper sheds some initial light on the different origins of MA, their drivers and how these were developed, there is more research needed on why these actions emerged.

In this context, the time horizons for policy seem to have affected the scope of the planning. Significant variation can be found, from 4-year plans to 40-year scenarios. Both perspectives are important, with the short-term being appropriate to the urgency of implementing MAs, but climate change requiring a long-term perspective. In fact, the evaluation of long-term scenarios, domestic, international and comparative, seems to have been at the root of the initial proposals advanced officially by Peru and informally by South Africa, at COP-14 in Poznan. In this, as in some other areas, these developing countries rather than following trends seem to have been leading the way.

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