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Low Carbon Development & Poverty: Exploring poverty alleviating mitigation action in developing countries

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Low carbon development and poverty

Exploring poverty alleviating mitigation action in developing countries

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Abstract

Climate change and poverty generally fall into the adaptation category in current research literature and policymaking. If we acknowledge current findings of poverty research, we find that this separation between mitigation and adaptation does not hold anymore. Recent research suggests that poverty demographics have changed between 1990 and 2010. The majority of the poor nowadays live in middle-income countries - certainly not only in low-income countries. As emissions in middle-income countries increase, their governments need to reduce emissions in the long term without jeopardising socio-economic development.

The paper examines the current literature on the linkages between low-carbon development, mitigation and poverty in middle-income countries. Most such countries pursue carbon-intensive development paths and will need to mitigate emissions towards low-carbon development paths. An explorative analysis of mitigation actions in five middle-income countries shows that mitigation has moved on the political agendas over the past five years. Yet, these efforts are not necessarily linked with poverty alleviation instruments. Most mitigation action can have positive and negative poverty effects: their impacts depend on an adequate pro-poor policy mix as the way they are designed and implemented.

Keywords: low-carbon development, mitigation actions, poverty alleviation, developing countries, millennium development goals

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Abbreviations and acronyms

BAU	Business As Usual
BRT	Bus Rapid Transport
CC	Climate Change
CDM	Clean Development Mechanism
FDI	Foreign Direct Investment
GNI	Gross National Income
HDR	Human Development Report
HDI	Human Development Index
IBRD	International Bank of Reconstruction and Development
LCD	Low-Carbon Development
LCE	Low-Carbon Economy
LDC	Least Developed Countries
LIC	Low-Income Countries
MA	Mitigation Actions
MAPS	Mitigation Actions, Plans and Scenarios
MDG	Millennium Development Goals
MIC	Middle Income Countries
MRV	Measurement, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Actions
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
PAMA	Poverty Alleviating Mitigation Actions
REDD	Reducing Emissions from Deforestation and Degradation
SARI	South African Renewables Initiative
UNCSD	United Nations Conference on Sustainable Development
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
WCED	World Commission on Environment and Development

1. Introduction

Slowing climate change and promoting socio-economic development creates a dual challenge for developing countries. Economic development is associated with reducing poverty and inequalities, but development processes usually involve increasing emissions unless development paths change in emissions intensity. Low-carbon development (LCD) is a concept that embraces the challenge to reduce carbon emissions while advancing socially and economically. It is a way of conceptualising the objective of the United Nations Framework Convention on Climate Change (UNFCCC), which aims to stabilise concentrations of greenhouse gases in the atmosphere, while allowing developing countries to proceed in a sustainable manner (UNFCCC 1992).

Developing countries have commitments to reducing emissions, but these mitigation targets have been qualitative under Article 4.1, while developed countries – with greater responsibility given their historical polluting development paths and current fossil fuel-based economies that are the main contributors to the problem – have agreed to take the lead and are supposed to make quantified emission reduction commitments. The urgency and scale of the mitigation challenges, however, will require all countries to reduce emissions. Developing countries are expected to increase the level of ambition of their nationally appropriate mitigation actions (NAMAs) and make these quantifiable (or measurable, reportable and verifiable, in the language of the negotiations) (UNFCCC 2007). At the same time, aligned with the ‘common but differentiated responsibilities’ principle, developed countries are expected to provide finance support for adaptation and mitigation actions in developing countries to further reduce emissions worldwide, in addition to their quantified emission reduction commitments.

The trade-off between mitigating climate change and the right to socio-economic development has long been recognised as a key issue in the climate change negotiations between the developed and developing countries, with the Convention affirming in 1992 that climate change responses must take ‘into full account the legitimate priority needs of developing countries for the achievement of sustained economic growth and the eradication of poverty’ (UNFCCC 1992: Preamble). Developing countries deal with this challenge of growing economies in a carbon conscious environment in very different ways. Some developing countries need to reduce emissions and get onto carbon-intensive developing paths, whereas others try to remain low-carbon while advancing socio-economically.

The sharp distinction between developed and developing countries that characterised earlier decades in the international climate change negotiation has blurred. The template of a two-category world “is ‘out of sync’ with other components of the current global economic and trade regime” (Saran 2010). The spectrum of developing countries embraces least developed countries (LDCs) and low-income countries (LICs) as well as the middle-income countries (MICs) such as China, India, Brazil, Colombia, Chile, Peru, Argentina and South Africa.¹

¹ According to the World Bank classification, India is a lower middle-income country, whereas Brazil, Chile, Peru, South Africa, Argentina and Colombia are high middle-income countries (<http://data.worldbank.org/about/country-classifications>).

Poverty demographics have changed. Whereas in 1990, approximately 93% of the poor lived in LICs, in 2007 almost two thirds lived in MICs (Sumner 2010).² The fact that the majority of the world's poor live in MICs nowadays, and not just in LICs, requires a different approach to climate change and poverty. This new approach needs to integrate adaptation and mitigation.

This paper unpacks the linkages between mitigation and poverty in MICs. Mitigation action is particularly relevant in such countries, where reducing intensity of emissions is of immediate necessity. Mitigation in LICs is also important, but the challenge is of more pre-emptive nature: it is about avoiding emissions in the first place and remaining low-carbon. In both country groups, potentials of pro-poor mitigation activities have been weakly explored.

In this paper, we argue that climate change presents a threefold policy challenge for MICs: They need to i) design mitigation actions such that they contribute to alleviating poverty; ii) reduce emissions, helping to slow global warming in a way that does not compromise the competitiveness of their economies, because without collective action by all, the costs of inaction will be borne mostly by the poor; and iii) prepare to adapt to the unavoidable consequences of climate change.

So far, the literature on poverty and climate change focuses mostly on adaptation (Beg et al. 2002; Schipper 2007; Mertz et al. 2009; UNDP 2010; Anderson 2011; Eriksen et al. 2011). The literature on mitigation, in turn, barely recognises poverty as a problem (Mocarquer & Rudnick 2011); others concentrate mostly on emission reductions in a wider sustainable development context (Halsnaes & Shukla 2008; Halsnaes et al. 2008), but not on poverty alleviation specifically.

We argue that the strong bias towards adaptation in the literature on poverty and climate change derives from the underlying assumption that the majority of the poor live in LICs and that such countries barely contribute to the global emissions. Therefore they do not need to reduce emissions and much rather need to adapt to the consequences of climate change. This assumption has led support for adaptation to focus mostly on helping the poorest countries. We recognise that this approach is valuable and necessary. The links between adaptation and poverty are not difficult to understand conceptually. Impacts of climate change will affect the poor the most, and their adaptive capacity is the lowest.

A focus on mitigation provides a different perspective to addressing poverty and climate change. Mitigation is one way of addressing poverty that is necessary in MICs if we acknowledge the changing global distribution of poverty. The majority of the world's poor people live in relatively economically and politically stable middle-income countries, where industrialisation based on fossil fuels advances, and the climate change versus development trade-off is a pressing reality.

² These estimates depend on the poverty measures that will be explored in more detail in section 2.2.

The paper consists of two parts. The first presents a review of the existing research literature on LCD, climate change and poverty. The literature is assessed from two perspectives: of poverty and climate change respectively.

The second part presents an initial conceptual framework for poverty-alleviating mitigation action (PAMA) and its application in five country studies on mitigation action through the poverty perspective in Brazil, Colombia, Peru, Chile and South Africa. These five countries are collaborating in a process on long-term mitigation scenarios and actions, the so-called MAPS programme.³

³ MAPS is a four-year programme supporting a collaboration between developing countries to produce mitigation action plans and scenarios (MAPS). In-country work engages stakeholders from all sectors in a participatory process, partnering with the best indigenous and international research. MAPS is supported by the team that led the technical work on South Africa's Long-Term Mitigation Scenarios (LTMS). MAPS is a South-South collaboration platform that shares lessons, builds best practice research and unlocks the opportunities for a low-carbon future. It supports the development of climate compatible development plans. It is characterised by raised levels of mitigation ambition in the context of sustainable development. The aim of MAPS is to directly promote policy steps driving emissions reductions at scale over the long-term using a solid evidence-based approach. MAPS supports in-country driven mitigation scenario planning processes based on research and modelling, together with stakeholder processes. MAPS also records an evolving best practice through knowledge management and strengthened South-South collaboration.

2. Low carbon development, mitigation and poverty alleviation: a literature review

Combating poverty while preventing harm to the environment is not a new concern in international and domestic politics. In 1992, the Rio Earth Summit brought the concept of ‘sustainable development’ to the international development agenda. This concept has been with us for the last twenty five years (WCED 1987), as a principle to manage human development in a socially, economically and environmentally sustainable way. On the lead-up to the Rio +20 summit in 2012, the concept is still relevant. In the year 2000 the UN Millennium Development Goals were formulated, goals 1 and 7 articulating poverty eradication and environmental protection as crucial. The challenges of novel environmentally friendly human development paths remain. Although these problems are more pressing than ever, they remain unresolved.

The literature contains abundant definitions and concepts on economic development and environmental protection. However, these concepts are generally poorly defined in the literature, with the risk of turning into ‘buzz words’ that confuse actors and constrain precise action. The role of mitigation remains unclear in most of the literature on sustainable development, green growth, green economy and even LCD.

2.1 Definitions and concepts: Low carbon development and poverty

This chapter presents the existing concepts for development and environmental protection, followed by the existing poverty definitions and measurements. The oldest concept of ‘sustainable development’ addresses the trade-off between three dimensions: i) economic development (resource intensive development, competitiveness); ii) social development, poverty alleviation; and iii) environmental conservation. The literature on climate change mitigation and poverty does not address all three dimensions equally. The mitigation literature focuses mostly on the environmental and economic dimensions. The poverty and climate change literature focuses on the social and environmental dimensions. Furthermore, the interpretations of the ‘green economy’ and ‘low-carbon development’ depend on the underlying economic theory. All forms of green economics have underlying economic assumptions either from the classical or neoclassical schools or from alternative approaches. Many authors fail to reveal their theoretical basis in the literature, as we will exemplify later.

2.1.1 Differentiating between ‘sustainable development’, the ‘green economy’ and ‘low carbon development’

Many concepts try to capture the challenge of economic development and environmental protection. As mentioned above, the discourse on ‘sustainable development’ dominated the literature throughout the 1990s (Daly 1990; Pearce et al. 1990; Sharachchandra 1991; Stern 1996). ‘Sustainable development’ and ‘green economy’ have their origins in the 1980s and 1990s, whereas

the LCD discourse is recent (Skea & Nishioka 2008). This section outlines brief definitions of the three concepts.

2.1.2 Sustainable development

Sustainable development is a term widely used with many different associations and multiple definitions (Pezzoli 1997; Guha & Martinez-Alier 1997; Robinson 2004). The concept emerged from concerns about a sustainable society and the management of renewable resources (Brown 1981). In forestry, the notion emerged of using no more resources from a forest than would allow it to grow back without depleting the forest. Early debates on 'green issues' focused on preservation (Nash 1982; Wilson 1989). Conservation of natural resources and developed concepts such as maximum sustained yield. Another strand of the debate focused on 'brown issues' such as pollution, population growth and the limits of resources (Ehrlich 1968; Meadows, Meadows et al. 1972). Questions were raised about the limits to growth, and sustainability was conceived by some as keeping society within ecological limits. In the 1980s, the concept of sustainable development emerged in attempts to link concerns about ecological limits with those about poverty and development (IUCN, UNEP et al. 1980; WCED 1987). The Brundtland Commission set forth this concept in 1987 (Brundtland 1987). It became the most recognised paradigm for international, national and local development under the Agenda 21. At the core of the concept is a triangle that suggests that development processes are only sustainable if their sustainability can be proved in all three dimensions: social, environmental and economic.

2.1.3 Green economy

The 'green economy' has a narrower focus on economic development. David Pearce was among the first to set forth the concept in 1989 (Pearce et al. 1989). He identifies three features – 'constraining human greed, sustainability and decoupling emissions from economic growth' – that are common to all forms of green economics. Pearce defines the green economy as 'one that has the capability of replicating itself on a sustainable basis' that is 'consistent with non-declining human welfare and with the sustainable use of resources' (Pearce 1992). Milani (2000) develops the concept of the green economy further, setting forth the idea of economies of quality rather than economies of quantity. Quantitative economic development suggests that economic advance generally seeks quantitative wealth through industrial production. Industrial production is environmentally destructive. Qualitative economics, in turn, suggest an idea of qualitative wealth that derives from ecologically efficient production. This requires an overall strategy for social change that is driven by individual behaviour under the assumption that symbiosis between humanity and nature is possible. Both authors exemplify the different underlying economic approaches within the writings on the green economy. Pearce sees a 'greedy', self-interested economic actor, whose behaviour needs to be constrained or incentivised, acknowledging human greed. This thinking is in line with neoclassical assumptions of rational cost-maximising economic actors. Milani, in turn, suggests that individuals drive social change towards a possible symbiosis with the environment. Milani's conception has a more holistic approach to the green economy, arguing for social change strategies that use the potentials that the green economy offers for all aspects of human development.

None of these authors make an explicit argument about poverty and inequality. Milani recognises the need for the transition to be inclusive. Pearce does not address socio-economic inequalities in his 'blueprint for a green economy'. The different approaches of the two authors reflect well the two main problems of the green economy literature.

First, the writings reflect the authors' underlying understanding of economics. Pearce's (and others) thoughts on the green economy build on neoclassical economic thinking with the rational and cost-maximising actor at its core. In the world of neoclassical thought, quantitative wealth maximisation drives everyone's behaviour. There is no room for values beyond wealth that might motivate economic behaviour, so the role of policy and regulation is to constrain this behaviour through prices and taxes. Milani, in turn, acknowledges the quantitative drive in conventional economics and argues that green economics involve a transition towards more qualitative economics. This idea of qualitative wealth rests on the assumption that people can change behaviour according to their values; for example, reputation is an incentive for firms to make their production more efficient, even though energy costs might be low and wasteful behaviour is unconstrained. Consumers can influence these production patterns through their choices, which do not only depend on quantity and price, but also on values, quality and awareness.

The different approaches to actors' behaviour dominates the debate in economic theory between classical, neoclassical and evolutionary approaches. These approaches also differ in their explanations of economic development. Evolutionary economics takes into account regional, geographic and cultural factors that influence economic development. This means that not only capital, labour and their respective prices determine a country's wealth as classical economic thinking suggests. These differences in economic theory are crucial when it comes to making policy, as each theory has different policy implications. Neoclassical theory assumes that markets regulate themselves and therefore the state only needs to intervene in the case of market failure. In neoclassical green economics, market failure manifests through greedy actors that then would have to be constrained through incentives and regulation. Evolutionary economics, in turn, assumes that there is no market equilibrium anyway and market failures are infinite. Geography, history and demographics matter and therefore policy needs to focus on solving articulated problems.

Second, most papers on green economics do not recognise the debate between evolutionary and neoclassical economic thinking when addressing green economies. This is problematic, because the lack of clarity in underlying assumptions on economic theory prevents the authors from formulating clear instruments and measures for green economic policy. This leads to fuzzy and blurring understanding of green economics and confusion about the way forward. 'There is a fuzzy concept of green economy and the near- to medium-term implications for developing countries and least-developed countries to transition to a green economy,' Tariq Ahmad Karim, Bangladesh's High Commissioner in India, stated at the recent meeting organised by the UN Conference on Sustainable Development (UNCSD) and India's Ministry of Environment and Forests in New Delhi (Padma 2011).

The more recent literature on the green economy (UNEP 2011) builds on Pearce et al. (1989), although the authors have failed to address poverty explicitly.

2.1.4 Low carbon development

We have seen that the green economy is a more general concept that applies to all countries independently of their stage of development; it has no explicit focus on developing countries. 'Green economy' and 'sustainable development' are more about linking the opposing poles of environmental protection versus economic growth in general, whereas LCD is a more recent concept that focuses on mitigation, reducing carbon intensity; although of course again there are different interpretations, narrow and broad ones. LCD is more focused on reducing carbon emissions, the green economy concept is wider.

We work with the concept of LCD for this paper because it captures best the process of socio-economic development while reducing emissions. We understand LCD as the process towards a low carbon economy (LCE), which represents a final state. The literature on LCE is very narrowly focused on economic activity (OECD 2010). LCE is also widely used in developed countries and refers to a transition from an already developed economy to a less emissions-intensive trajectory. In developing countries, in turn, the transition to an LCE needs to be part of the developing process. This requires a holistic understanding as a process of socio-economic and human development. Therefore, we leave out the simplistic growth-driven approaches to LCD (Elliset al. 2009; Project Catalyst 2009; GGGI 2011). These growth-driven approaches occasionally hide under the LCD umbrella as well, as Urban (2010) points out in the case of the British government's definitions.

Definition of low carbon development

In the view of the authors, LCD is the process of socio-economic and human progress, which minimises the output of GHGs. This process requires the participation of capable, free individuals in the society as a whole. Individual freedom and capability depend on political, economic and social arrangements. The process cannot be left to the belief in self-regulating markets or government as a provider of public goods. Poverty alleviation is not a natural side effect of LCD, because its benefits are not equally distributed among the society. Individuals cannot access and participate equally, because opportunities are uneven. Therefore, LCD needs the will of the powerful as well as political interventions that addresses both market and system failures to ensure a more equal distribution and access to the opportunities and benefits of low-carbon development. Access, freedom and inclusion for poor communities to the low-carbon economy are key to poverty alleviation.

Other definitions fall short in clarifying the underlying assumptions for economic development that are necessary to understand their model of two messages from the OECD definition and the Danish DIIS study. The OECD report on the transition to low-carbon society rightly indicates that it is a process that requires the participation of the society as a whole (OECD 2010). The DIIS study states:

“Low-carbon development refers to an economic development process which minimises the output of GHG emissions into the atmosphere. In addition to such a development process, there may then be a number of positive effects on poverty alleviation, although importantly it should not be assumed that these come automatically from a low-carbon development process (Funder, Fjalland et al. 2009).”

In its analysis, the DIIS study focuses on least developed countries, although the absolute share of the poor is in the densely populated countries – India, China, Brazil, Nigeria and Indonesia. The question of creating inclusive LCD paths that contribute to poverty is equally relevant in other developing countries, too. The transitions in these countries might be even more difficult because energy intensive industries have become established over decades. Economic development has historically been energy-consumptive and emission-intensive, as demonstrated by the development paths of the European, US and Japanese economies.

We chose to work with the concept of LCD for two reasons. Firstly, we think that the LCD approach captures best the environmental and economic development challenge in developing countries, including mitigation. Yet, there is a lot of overlap between all three of them. Some authors have published work on all three concepts (Pearce et al. 1990; Pearce 1989; Barbier 2005). Secondly, LCD is the concept that best accommodates mitigation as a major part in the challenge between carbon emissions reductions and continuous development.

Our definition goes beyond the DIIS by making the point about access to the low-carbon economy rather than distribution. Access to the LCE is crucial in combating poverty, because only if the poor can become economic actors, can they unfold entrepreneurial opportunities as vocal citizens with equal rights and equal access to education and knowledge. Poor communities need to be at the centre of LCD as actors who shape the process together with the rest of the society, which means empowering the poor, as opposed to passive behaviour and exclusion at the receiving end that creates unfortunate dependencies. This point links to a multi-dimensional poverty definition, one that goes beyond determining poverty by income alone and also includes access to education, energy, health services that the next section will present.

Overall, few papers in the climate change literature address poverty explicitly. Urban makes a strong point for the benefits of mitigation for the poor in the LDCs (Urban 2010). Other authors mostly concentrate on poverty as one aspect of a wider sustainable development concept (Halsnaes & Shukla 2008; Winkler et al. 2008) and/or linked to the international cooperation mechanisms (Michaelowa & Michaelowa 2007; Olsen 2007) rather than focusing on the link between domestic poverty and mitigation action in developing countries.

2.1.5 Poverty

Alleviating poverty is a primary challenge of the 21st century and central to the Millennium Development Goals (MDGs). Poverty and its appearance on the agenda of the international aid community has many facets. Poverty is a complex socio-economic phenomenon which is described

from many different angles: from the social construct of poverty to the calculation of international average values of money required to sustain a minimum standard of living. To inform action on poverty, benchmarks and definitions are helpful in quantifying the problem and relating it to other domains – notably LCD.

Currently poverty lines, the UN's three-dimensional Human Development Index (HDI) and the recent Multidimensional Poverty Index (MPI), are the dominant measurements in the international arena.⁴ Poverty lines describe poverty as a lack of income or expenditure. Relative and absolute poverty lines are used. The United Nations Development Program defined international poverty lines at one dollar and two dollars per day. The purchasing power parity exchange rates were used for the conversion of existing national poverty line values into a dollar value (UNDP 2007). Such lines give no information about how far households are from reaching them (UNDP 2007). Income poverty lines are still very common, as in the World Bank's differentiation of countries into low-, middle- and high-income which we also use in this paper.

The Human Development Index provides some more insights. It brings income, health and education together and is seen as suitable for in-depth analysis of constraints and relationships which need to be overcome for the achievement of the internationally accepted development goals (MDGs). While also starting with the three dimensions (living standard, health and education), the MPI looks deeper. Ten additional indicators allow for much more detailed data collection and analysis. The dimension of health is subdivided into nutrition and child mortality, education into years of schooling and school attendance; when analysing living standards, cooking fuel, sanitation, water, electricity, floor and assets are looked at (Alkire & Santos 2010).

Income inequality is a major problem in middle-income countries where poverty remains despite carbon-intensive economic growth. Recent research suggests a U-shaped relationship between inequality and CO₂ emissions. This means that for highly unequal countries, inequality reductions result in reducing emissions, whereas in more equal societies reductions in inequality produce higher emissions (Grunewald et al. 2011). Inequality and poverty are closely related. Inequality is a relative measure for the difference between distribution of income in an economy. The same study found that inequality and the consumption of carbon intensive goods correlate in a negative relationship. This means that higher inequalities reduce the access of poor communities to goods that proxy carbon intensity (Grunewald et al. 2011).

Inequality is an important additional measure to poverty, especially if poverty is measured as income poverty. Poverty lines determine a group of people as poor, depending on the measure. Inequality measures then additionally provide information of how much the rich and the poor diverge. Inequality is an important additional poverty index. Both poverty and inequality show negative relationships with emissions per capita.

⁴ The United Nations Development Program publishes the Human Development Report yearly to measure changes in human development based on the HDI. Oxford University supported the UNDP in developing an MPI.

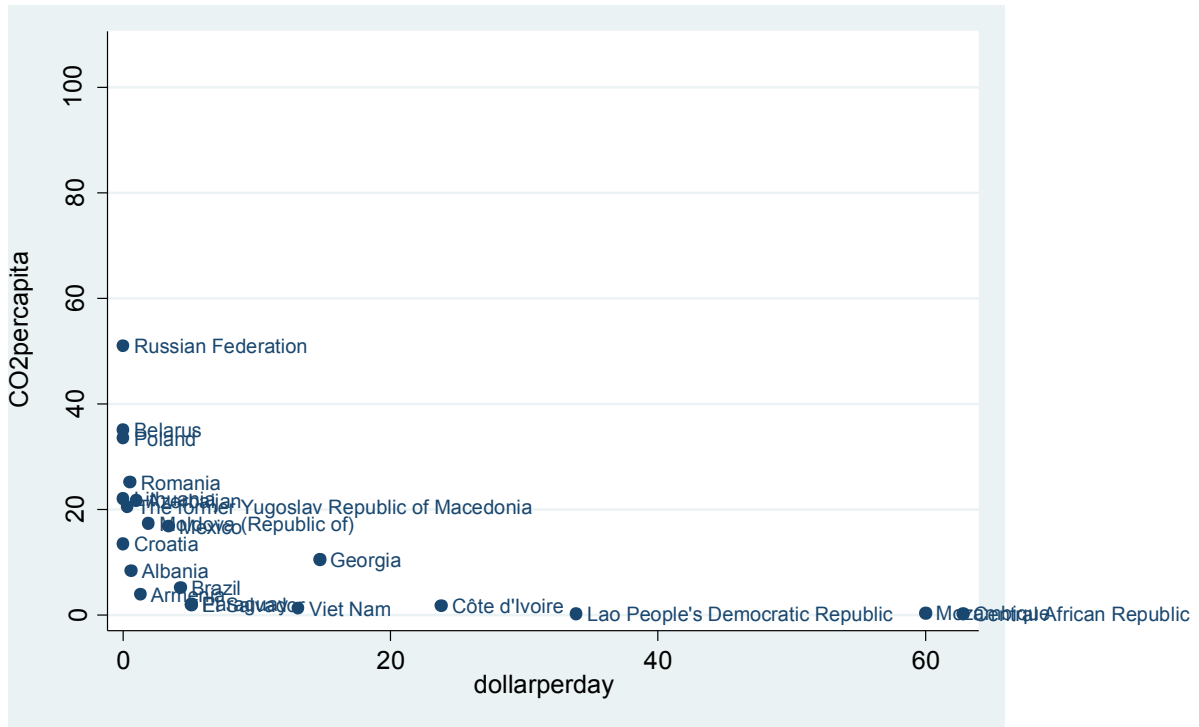


Figure 1: Emissions and poverty (> 1US\$ per day)

Source: own compilation based on World Development Indicators, Human Development Indicators

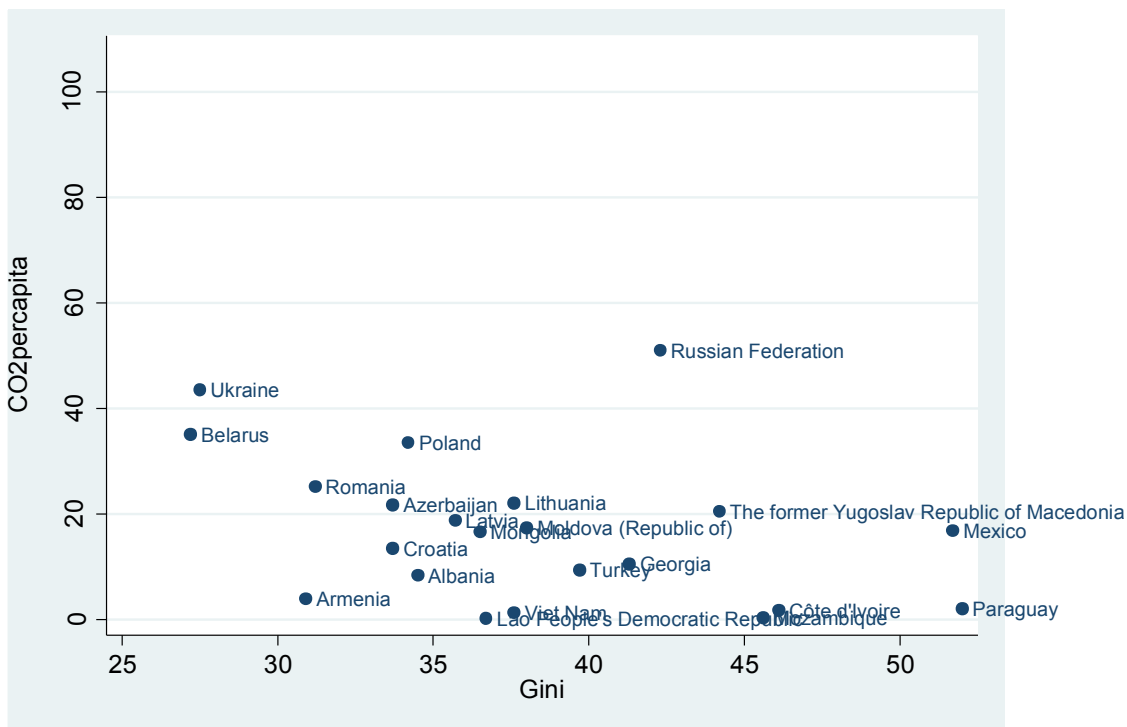


Figure 2: Emissions and Inequality (measured as Gini Index)

Source: own compilation based on World Development Indicators, Human Development Indicators

The Millennium Development Goals, as the presently most comprehensive compilation of developmental goals (UNDP 2007), play a central role in this paper. They are seen as a general policy framework, beyond which further efforts are required in order to meet global development objectives including equity and sustainability (UNDP 2011a). Such efforts are outlined in the latest HDI report and discussed in the following section. The MDGs include eight goals and define a set of quantitative targets under each goal.

Table 1: Overview of the Millennium Development Goals

Goal 1: Eradicate extreme poverty and hunger
Goal 2: Achieve universal primary education
Goal 3: Promote gender equality and empower women
Goal 4: Reduce child mortality
Goal 5: Improve maternal health
Goal 6: Combat HIV/AIDS, malaria and other diseases
Goal 7: Ensure environmental sustainability
Goal 8: Develop a global partnership for development

Source: UN MDG 2000

We need to keep in mind that single measurement, like the MDGs, has its limits in capturing poverty and its geographical distribution. For the LCD debate besides poverty also inequality measures matter. In developing countries with high inequality figures like the MICs, relatively high poverty levels continue to prevail despite economic advance. Economic development is still energy-consuming and carbon-based. Therefore, measures for reducing emissions are often perceived as harmful to economic development, growth and employment by these countries.

The MDGs target poverty eradication (MDG 1) as well as environmental sustainability (MDG 7). One of the main challenges for MICs is to link their efforts in poverty eradication with strategies for less carbon-intensive economic development, as the next section will demonstrate.

2.2 Poverty and climate change

To address the dual challenge of poverty and climate change, adaptation and mitigation efforts need to be aligned, and international goals such as the MDGs need to support national development goals, aligning and making use of synergies as much as possible. The following section summarises strategies from the literature, mainly through international environmental and developmental organisations.

Potential interactions for benefits and risks need to be studied and well understood in order to allow policy-makers to make informed decisions. Currently there is not enough knowledge available on how poverty and mitigation can be linked efficiently (CDKN 2011).

The international community has in the past engaged, and is presently engaging, with mitigation and adaptation efforts with varying success. While adaptation, as earlier mentioned, is widely accepted for having a strong developmental contribution, mitigation only recently emerged in the literature as a serious issue for development. With a rapidly growing body of literature as which is covered in this paper, certain theoretical assumptions manifest when it comes to the identification of synergies between mitigation and development policies.

The notion is growing that development advances need to be decoupled from fossil fuel to prevent increasing emissions (Germanwatch 2010; UNEP 2011a; Christian Aid 2011). Some argue that energy access is the most crucial issue to tackle in this context. The provision of clean, safe, reliable and affordable energy services to the poor is on the one hand fundamental for the achievement of the MDGs and on the other a great opportunity for LCD if drawn upon renewable resources (REN21 2005; OECD/EIA 2010; GNESD 2007; Christian Aid 2011).

In the grey 'donor' literature, the idea of triple-win situations appeared. The Human Development Report (2011) lists global winning strategies including 'off-grid renewable energy provision for poor households, expanding reproductive choice including access to reproductive health services, community forest management designed and implemented in a participatory and gender-sensitive manner, equitable and adaptive disaster responses including community-based risk mapping, innovative social protection schemes' (UNDP 2011a).

Michaelowa and Michaelowa (2007) argue in the same direction. In their opinion linkages between climate change activities and MDGs can be found for almost every goal. While goal 7 (ensure environmental sustainability) is directly linked to climate change activities, attention is paid more to adaptation which is viewed as the more immediate link between climate change and poverty alleviation. Mitigation through improvement of indoor air quality and therefore respiratory health, through mainly the CDM, remains in their view the most prominent measure. The authors, however, appreciate that emerging economies are more likely to attract funding for projects whereby other developing countries require specific attention through official development aid (ODA) (Michaelowa & Michaelowa 2007).

MICs might attract more funding. Given the absolute number of poor people living in MICs, these countries will continue to need foreign assistance through ODA. Michaelowa and Michaelowa state that despite the general idea that HDI and GHG are not correlated strongly for least developed countries, the progress made towards the achievement of the MDGs in India and China is beyond the 'tipping point' UNDP 2011a) and came with increased emissions.

Current research literature suggests linkages (compiled in Table 3 below) according to the ways they contribute to achieving the MDGs. We compiled the key findings from the DFID and the

Germanwatch reports (Germanwatch 2010; DFID 2011) in relation to their contribution to the Millennium Development Goals. These linkages will be further explored in selected mitigation activities in five middle-income countries in the following section.

Table 2: Importance of LCD to the achievement of the Millennium Development Goals

Potential of LCD to contribute to the achievement of the Millennium Development Goals		
MDG	Steps towards goal	Contribution of low carbon development measures to MDGs
1. Cutting extreme poverty and hunger	Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day. Achieve full and productive employment and decent work for all, including women and young people. Halve, between 1990 and 2015, the proportion of people who suffer from hunger.	Job creation/enterprise development utilising locally available resources, decentralised renewable energy solutions, manufacturing industry in low-carbon economy, biofuel and land management, sustainable agriculture, fisheries and forest management including REDD. Income poverty/energy access and security through clean energy services (lighting, cooking, heating, mechanical power), energy expenditure saving energy-efficiency technologies, carbon revenues.
2. Universal primary education	Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.	Improved learning conditions/access to low carbon light and heat sources. Further contribution through curricula and campaigns including climate change, renewable energy and mitigation content.
3. Gender equality and women's empowerment	Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education, no later than 2015.	Women's empowerment/women as agents of change for mitigation efforts. Further contribution through transfer of lessons learnt from mainstreaming gender issues into design of gender-sensitive climate change and mitigation measures.

<p>4., 5., 6. Health</p>	<p>Reduce child mortality. Reduce by two thirds, between 1990 and 2015, the mortality rate of children under five.</p> <p>Improve maternal health. Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio.</p> <p>Achieve, by 2015, universal access to reproductive health.</p> <p>Combat HIV/AIDS, malaria and other disease.</p> <p>Halt and begin to reverse, by 2015, the spread of HIV/AIDS.</p> <p>Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it.</p> <p>Halt and begin to reverse, by 2015, the incidence of malaria and other major disease.</p>	<p>Child mortality, maternal health/reduction of indoor air pollution through improved access to clean energy services in poor households, especially through improved cook stoves, prevention of low birth weight and early infant deaths through same measures.</p> <p>Malaria and other diseases/global emission reductions preventing temperature increase benefits efforts to combat malaria and other diseases.</p> <p>Further contribution through improved indoor air quality reduces eye infections, improved cook stoves decrease fuel wood consumption which has potential to reduce associated orthopaedic health issues and gender specific risks (abuse, rape, crime), improved health situation from reduced GHG emissions increases human capacity worldwide to implement further mitigation efforts.</p>
<p>7. Environmental sustainability</p>	<p>Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.</p> <p>Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss.</p> <p>Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation.</p> <p>Achieve, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.</p>	<p>Environmental resources, ecosystems and biodiversity/sustainable land management, agriculture, fisheries and forestry, avoided deforestation.</p> <p>Greenhouse gas emissions/mitigation of greenhouse gas emissions, sustainable fuel wood management and harvesting, reduction in erosion and desertification, benefits from reduced impact of climate change.</p> <p>Water access/less water-intense electricity generation relieves stress on water resources, renewable energy opportunities for water pumping and purification in rural areas.</p> <p>Urban settlements/improved thermal performance, alternative designs and materials in buildings, increased access to clean energy services through decentralised systems</p>



8. Global partnership	<p>Further Develop an open, rule-based, predictable, non-discriminatory trading and financial system.</p> <p>Address the special needs of least developed countries, landlocked countries and small island developing states.</p> <p>Deal comprehensively with developing countries' debt.</p> <p>In cooperation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries.</p> <p>In cooperation with the private sector, make available benefits of new technologies, especially ICT.</p>	<p>Global partnership/carbon market including sustainable, pro-poor CDM.</p> <p>Financial system/global reallocation of wealth.</p> <p>Least developed countries, landlocked countries and small island developing states/decentralised renewable energy solutions for increased access to clean energy services.</p>
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Sources: Own analysis, based on data from DFID (2011), Germanwatch (2010)

Furthermore, the Human Development Report (UNDP 2011a) identifies five countries outstanding when it comes to achievements to promote equity, raising/increasing their HDI, reducing household indoor air pollution and increasing access to clean water while performing well in terms of environmental sustainability (UNDP 2011a). Such detailed and concrete analysis is, however, rare in the literature at this stage. The recommendations given by organisations in the field on how to tackle the dual challenge of poverty and climate change are rather general. For example, they call for funding for analysis of impacts and implementation of strategies through facilities, which are monitored and verified and for the consideration of the national context taking into account a country's political reality, emission reduction potential, developmental challenges and available financial means when assessing policy choices (CDKN 2011).

CDKN on the other hands risks a recommendation to prioritise development over mitigation by stating that 'where climate change threatens development, mitigation actions should only be pursued where there are clear adaptation and poverty reduction co-benefits' (CDKN 2010). Other initiatives, like the low-emission climate-resilient development strategies try to identify combinations of mitigation and adaptation and development (UNDP 2011a).

In sum, the literature gives some ideas of how low-carbon development measures can contribute to poverty alleviation in the wider context of the MDGs. Yet it lacks concrete studies on mitigation actions and its impacts on poverty from a bottom-up perspective. Anderson (2011) rightly indicates that this connection requires a future research agenda. This paper aims to contribute to this research agenda with initial thinking towards a conceptual framework and the analysis of mitigation actions in five countries: Chile, Brazil, Columbia, Peru and South Africa.

3. Poverty-alleviating mitigation action: a typology

This section develops a typology for the analysis of poverty-alleviating mitigation actions (PAMAs). The concept of PAMAs provides a lens through which to look at mitigation actions from a poverty perspective. This should not be understood as a suggestion for PAMAs to become a separate category in the international climate negotiations.

The typology for PAMAs presented below serves as a framework for the analysis of mitigation actions. Table 4 presents four types of mitigation actions and measures for poverty alleviation placed in a two-by-two matrix with high and low potential for alleviating poverty on the one axis, and reducing emission on the other.

Table 3: Ideal types of mitigation actions and measures for poverty alleviation

TYPOLOGY		Poverty alleviation potential	
		High	Low
GHG reduction potential	High	<p>Type 1: Poverty-alleviating mitigation action.</p> <p>Poverty-driven mitigation action?</p>	<p>Type 2: Conventional mitigation action, with no explicit focus on poverty (and possible opportunity cost).</p> <p>Climate-driven mitigation action?</p>
	Low	<p>Type 3: Conventional action for poverty alleviation, with no explicit focus on reducing emissions (and possible increase in emissions).</p> <p>Non-climate-driven poverty action?</p>	<p>Type 4: Failed/low impact mitigation action, failed poverty action, conventional industrial/economic/environmental policy without explicit focus on mitigation and poverty (this will surely partly depend on the scale and cost of the action in terms of what impact it can achieve)</p>

Source: Own compilation

The main purpose of mitigation action is to reduce emissions, but how can it also contribute to development and poverty alleviation? Mitigation actions (MAs) can be defined as activities that contribute to emission reductions, comprising policies, strategies, scenarios, targets, voluntary agreements, regulation, standards, economic instruments, financial mechanisms, subsidies, programmes, projects, pilots, market activities, capacity development, information generation, innovation, institution-building, centres of excellence, partnerships, training, skills development and more. These activities and statements are very diverse (Tyler et al. 2013).

Type 1: *Poverty-alleviating mitigation actions* are those interventions that have the objective to reduce emissions and address poverty at the same time. These interventions may use the same technologies as other types, but they are implemented in a pro-poor way (e.g. participative waste management, household biogas, low-cost housing with efficiency and solar water heating).

Type 2: *Conventional mitigation actions* focus on reducing and avoiding emissions without considering poverty reduction. Examples for type 2 interventions are energy efficiency measures in industry, large-scale biogas, expensive public transport, REDD (if exclusive), safe carbon capture and storage, carbon tax (if revenues are not reallocated for poverty-related issues), cap-and trade systems.

Type 3: *Conventional actions for poverty alleviation* focus primarily on poverty reduction and do not have significant mitigation potential. Emissions reductions might be a side effect. Examples here are sustainable forest management, social housing, and electrification in centralised energy systems that do not explore the potential of job creation that renewable energy sources have. These are based on centralised coal and nuclear power sources that create labour for a few specialised workers, sustainable farming, biofuels depending on their implementation.

Type 4: *Failed (mitigation) action* without an explicit focus on poverty and limited mitigation effects. Examples are unsafe carbon capture and storage, projects reducing emissions of fluorinated gases, mainstream industrial incentives that do not consider poverty or mitigation.

Many mitigation actions can have poverty-alleviating effects. The concept of PAMAs is not intended as a separate category (certainly not for the negotiations) to NAMAs, but rather as a tool to analyse mitigation actions for poverty-alleviating potential. Other dimensions of development are also 'nationally appropriate', but poverty does have a particular place as an overriding priority of developing countries. Indeed, it makes the meaning of 'development' in developing countries different to its meaning in developed countries. The existence, or magnitude, of these effects will depend, in part, in most cases on the implementation of the action. A carbon tax, for example, can reduce emissions by putting a price on carbon. If the revenue generated is made available for example for training, skills development, research and development as well as small industrial development for (renewable) energy technology, the mitigation action creates jobs that relieve many families from poverty.

Obviously, there is more than one way in which to implement poverty-alleviating measures. Development models that work in one place might fail in another. The poverty-alleviating effects of MA cannot be taken for granted. Developing climate policy is in itself a challenging task, let alone integrating poverty reduction objectives into these policies. A critical element to be anticipated is the relevance of national circumstances. Therefore, the classification of actions according to this typology requires a profound analysis of the national context including the approach to development, economic growth and capabilities of the state.

The conventional mitigation action type, focused on mitigation, seems to clearly dominate current climate policy. As the literature review shows, mitigation has been conceived in the past as the affair of industrialised countries.

The emerging debate around NAMAs is an illustration of this argument. The term emerged from the desire to scale-up mitigation action in developing countries beyond project-based actions. Countries agreed in the context of the negotiations that mitigation action in these countries must be understood in the context of sustainable development. The 'appropriate' element in the NAMA concept is an indication for aligning mitigation efforts to the national priorities.

Countries have started developing NAMAs. From the emerging pilot NAMAs the diversity of desired and planned actions becomes clear. Co-benefits in NAMAs are also treated differently from country to country, especially the extent to which these need to be integrated, measured and reported. Some countries prefer to talk about integral benefits of NAMAs rather than co-benefits. In existing pilot NAMAs, poverty alleviation is not often cited, but if so it is referred to very generally with terms like sustainable development, job creation or economic growth.

Another important element to take into account is the fact that the impacts of mitigation actions on reducing emissions in developing countries are not always obvious or easy to measure. Internationally-driven actions may certainly require a monitoring, reporting and verification system. When this rationale is applied to possible PAMAs, new challenges, as well as controversy, may arise when accounting for the poverty-alleviation element. Benefits from such an accounting should carefully be analysed. This necessary assessment is outside the scope of this research, and further work would be needed.

4. LCD, mitigation and poverty alleviation in the MAPS countries

A commonality between countries is the fact that they are building their mitigation action on non-climate-driven policies that were already in place or under development. Chilean plans for development of NAMAs in the energy sector is a good example of this: pursuing more efficient use of energy and penetration of non-conventional renewable energies sources in the energy matrix of the country. Brazil's focus on avoided deforestation is another example. Peru is prioritising NAMAs which can be successfully and effectively implemented. In practice, this means that actions with a well-established regulatory and institutional framework are prioritised. In all these cases, climate finance is seen as an opportunity to cover incremental costs or to reinforce existing regulation, for instance by putting in place support actions that overcome traditional implementation barriers.

Brazil, Chile and Peru clearly have a sectoral approach towards mitigation. Such an approach allows for aligning the interests of each of the relevant ministries with the climate objective (Sanhueza 2011). Colombia and South Africa also have a hand in national planning and defining nationwide mitigation strategy. The different approaches would have advantages and disadvantages with regards to integrating poverty, and it is anticipated that they would vary from country to country.

Summing up, all five countries share similar poverty profiles and comparable challenges in terms of pursuing development, equality and poverty eradication and decoupling the economic growth from the GHG emissions; but their mitigation vision and motivation varies. All five countries have paid greater attention to mitigation in recent years. Yet the mitigation approach barely recognises poverty as a problem or concentrates mostly on general alignment with a set of national priorities.

From a bottom-up perspective, the set of analysed MAs holds a number of overlaps between mitigation and poverty efforts. Most of these overlaps exist in a theoretical sphere. Thus, the poverty-alleviating potential is not a given but would depend on the comprehensive design of the mitigation initiative, from concept to implementation. Some of the selected actions are highly likely to generate positive impacts on poverty: improvement of potato crops (Colombia), increased mini-hydraulic, biomass and wind capacities (Chile), selective promotion of credit access for farmers (Brazil), or the National Sustainable Settlements Facility (South Africa). Poverty alleviation is not, however, perceived as the principal driver. On the other hand, we found actions which lack, on the first look, a direct impact on poverty reduction at micro-level, such as promoting electric vehicles or energy efficiency in the industrial sector. Again, a pro-poor design could change this. Notwithstanding, it is important to note that any of the MAs could have negative impacts on poverty. Design and implementation are indispensable elements to determine the actual impacts. In this micro-perspective assessment no irreparable competition or tension between mitigation and poverty objectives has been identified.

Table 7 attempts to classify the MAs according to the typology discussed above. Judgements are based on the interpretations of drivers steering the mitigation actions, as found in the review of the

MAPS case study reports. These are not judgements on the actual impacts – impact analysis requires further research as the impact differs depending on the design of the MAs.

Table 4: Categorisation of analysed MA according to the PAMA typology

TYPOLOGY		Poverty Alleviation	
		High	Low
Emissions reduction	High	Chile - Renewable energy program: increase mini hydraulic, biomass and wind capacities Colombia - Potato crops Brazil - Reduced deforestation South Africa - Renewable initiative	South Africa - Carbon tax Colombia - Electric vehicles Chile - Energy efficiency for transport Chile - Energy efficiency in copper mining Chile - Geothermal energy
	Low	Peru - Efficient Lighting NAMA South Africa - National Sustainable Settlements Facility South Africa – Cape Town Rapid Bus Transport Chile - Promotion of forestation of soils Brazil - Access to credit for sustainable farming	Chile - Promotion of zero-emissions vehicles Chile - Integral improvement of transit management

5. Conclusion and further research

This paper reviewed the emerging body of literature for concepts, definitions and policy recommendations regarding the inclusion of poverty alleviation objectives and measures in LCD and, in particular in this regard, mitigation activities.

Mitigation action is necessary in all countries, just as LCD needs to be on the political agendas in both developed and developing countries. Yet, the realities and policy problems differ amongst these groups of countries. Poverty and inequality remain the most pressing problems in the developing world and will further increase through the impacts of climate change. We argue that the changing demographics in regional distribution of poverty in the world need to be acknowledged to effectively address the dual challenge of poverty and climate change. Mitigation is a significant task for developing countries, too. It could also provide an opportunity to combat poverty, but this has not been recognised as such.

The paper presents a preview of preliminary desktop research applying an initial conceptual framework including a typology and so-called PAMAs to the MAPS countries. The exercise of applying the typology with the selected mitigation actions corroborates the anticipated complexity to understand potential implications for poverty alleviation, even at micro-level. Features of poverty-alleviating mitigation measures cannot be deduced from this practical assessment. A macro-level perspective would need an additional conceptual framework.

The findings of this pilot study indicate, however, that few of the MAs described in the MAPS country study reports are perceived to be embedded in poverty alleviation efforts. Theoretical potential for integrating poverty reduction benefits is found in all the cases. Moreover, recent national approaches towards mitigation appear to be more consistent with existing policies and contextualised in a context of national development and objectives.

This exploratory work needs, however, to be extended in order to allow for robust results. The mitigation actions presented in section 5 need to be carefully assessed regarding the risks and potential benefits for poverty; synergies and trade-offs need to be identified and decided upon. The macroeconomic perspective of the impact of LCD paths on poverty also needs to be researched.

Such refinement of the study needs to be informed by the countries themselves, in the MAPS context, by the MAPS country researchers. Elements like the implementation design of mitigation actions is crucial, as the most promising proposal can lose its poverty-alleviating potential, depending on the implementation. On the other hand, the most straightforward mitigation action can carry socio-economic benefits if its implementation is designed with care and knowledge.

Mitigation has become a national task in developing countries. There is an urgent need to deepen understanding of the opportunities and risks that LCD and mitigation activities raise in terms of fighting poverty.

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