

# CLIMATE CHANGE ADAPTATION, MITIGATION AND SUSTAINABLE DEVELOPMENT: OPPORTUNITIES FOR INTEGRATING RESEARCH INTO POLICIES

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**ABSTRACT:** Exploring linkages between climate change and sustainable development to propose 'win – win' solutions is currently one of the priorities of the Intergovernmental Panel on Climate Change (IPCC). Although current approaches tend to view adaptation and mitigation as two separated fields, it is becoming increasingly recognized that climate change mitigation could have adaptation benefits and vice-versa. In addition, adaptation and mitigation responses to climate change, taking into account principles of sustainable development, could improve long-term development planning initiatives. However, linking sustainable development with responses to climate change may pose significant demands on both researchers and policy-makers. This paper demonstrates that there is a considerable interests both from the researchers' and practitioners' community to explore synergies between adaptation and mitigation when the focus is on addressing local sustainable development challenges that frames responses to climate change and creates opportunities to involve local-specific value-based participatory approaches.

**Keywords:** climate change adaptation, climate change mitigation, sustainable development

## 1. Introduction

Climate change related events including hurricanes, droughts and floods have brought the attention of the public and policy-makers towards climate change impacts, and the need for adaptation and mitigation action. Unfortunately, this emerging focus would appear to have placed sustainable development issues into the background. In reality, climate change and development issues/goals are inseparable, and interact in a circular fashion (Downing, 2003; Yamin *et al.*, 2006). Climate change vulnerability and impacts will influence prospects for development, and in turn, alternative development paths will not only determine greenhouse gas (GHG) emission levels that affect future climate change, but also influence future capacity to adapt and to mitigate climate change (Kane and Shorgen, 2000; Downing, 2003; Dang *et al.*, 2003; Wilbanks *et al.*, 2003).

Hence, there is a growing recognition of the complex, overlapping concerns that link sustainable development (societal development paths) and climate change mitigation and adaptation policy. At the same time, the complexity of the sustainability/climate change planning and decision-making processes are challenging policy-makers. On one hand, climate change mitigation and adaptation policy can be viewed as one among several sustainable development

concerns. On the other hand, climate change mitigation and adaptation can be viewed as the focus of primary concern in developing long-term societal developmental paths. These contrasting views on the primacy of sustainability/climate change policy drivers can become polemic, delaying action on either front.

Despite increasing attention among researchers focused on linkages between climate change adaptation, mitigation and sustainable development (herein AMSD), there are still a lack of case studies that can provide examples of mutually reinforcing policies (Swart *et al.*, 2003; Wilbanks, 2005; IPCC, 2007). In this paper we report on six brainstorming sessions which involved both researchers and practitioners working on a diversity of fields to elicit their needs as producers and users of AMSD research and case studies. The brainstorming sessions aimed at exploring the linkages between climate change adaptation and mitigation within the context of sustainable development. The general question we explored through these brainstorming sessions was how to connect these policy domains, which operate on diverse scales and involve a diversity of values and institutional frameworks, in a way that could lead to converging policies.

In the following section, we begin by discussing the two contrasting views on the role and importance of climate change mitigation and adaptation within sustainable development. Next, we describe the results of our brainstorming sessions with regards to three particular questions posed to participants. We finish by discussing the implication of our results for AMSD research and policy-making.

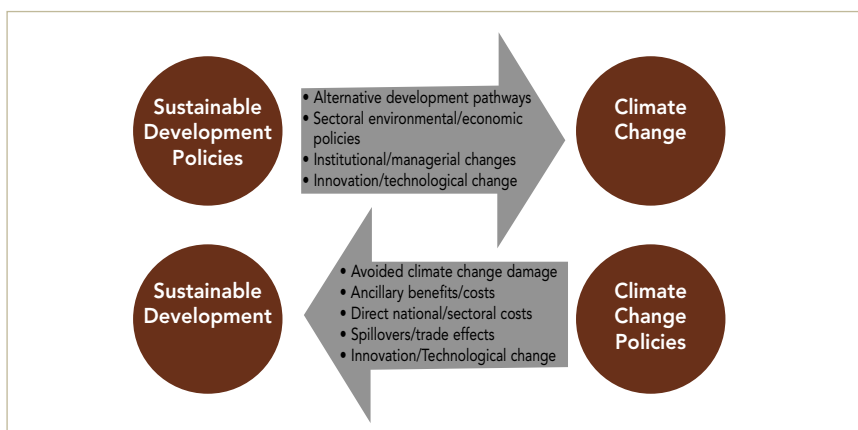
## **2. Linkages between climate change and sustainable development**

In general, sustainable development can be defined as a balanced perspective of three closely related elements; the economic, social and environmental dimensions of development (Burland (ed.), 1987). The concept incorporates the notion that for continued human progress, development must find pathways that both achieve economic goals while at the same time find a sustainable balance with the physical environment and social well-being (Wilbanks, 2003).

Linking the concept of sustainable development to climate change provides an opportunity to explore long-term balanced societal responses with global environmental change. There are two distinct approaches in addressing the

linkages between climate change and sustainability (Figure 1). The first approach sees opportunities to pursue sustainability as a consequence of climate policies (seeing sustainability through a climate change lens) and the second approach sees climate change mitigation and adaptation as the consequence of different socioeconomic and technological development paths (seeing climate change through a sustainability lens (Robinson *et al.*, 2006; Swart *et al.*, 2003).

With respect to the first approach, the underlying assumption is that by promoting climate change policies sustainable development issues can be addressed simultaneously mainly as co-benefactors. This type of response may include promoting 'end-off pipe' policies, renewable energy use, recycling and the use of hybrid vehicles, and redefining codes for infrastructure, among others. In terms of the second approach, sustainable development policies are thought to be an effective tool to address climate change responses based on the underlying evidence of the emissions scenarios of the IPCC special report on emissions scenarios (SREs). For example, the B2 storyline and scenario family led to the lowest level of CO<sub>2</sub> concentrations and the highest level of adaptive capacity. Consequently, this scenario led to less vulnerability compared to the rest of the scenarios (Swart *et al.*, 2003). Beyond listed examples for the first approach, promoting climate change within sustainable development should also challenge societal patterns including the current level of energy production, use of public transport, waste production and urban development.



**FIGURE 1**

Linkages between climate change and sustainable development and their policy implications. Source: Swart *et al.*, 2003

Linkages between climate change and sustainable development have been recognized at the international level since the IPCC Third assessment report was published in 2001 (Swart *et al.*, 2003; Metz *et al.*, 2002; Wilbanks *et al.*, 2003; Markandya and Haelnaes, 2002; Winkler *et al.*, 2007). For instance, the IPCC Fourth assessment report paid special attention to the specific linkages between climate change adaptation and mitigation in the development context introducing them as cross-cutting themes to be integrated into and across Working Group II and III reports (IPCC, 2005). However, the Working Group II report noted knowledge limitations regarding the linkages between climate change adaptation/mitigation and sustainable development, as well as significant methodological shortcomings. For example, the IPCC (2007) noted that there was a lack of information on the relationship between mitigation and vulnerability, and limited information on projected impacts within scenarios of adaptation action. Furthermore, the report calls for case studies both at the national and local scale, in order to better inform global-scale assessments.

However, when global processes and local actions interact across very different domains, the associated driving forces, changes, and consequences are difficult to predict or to understand (Wilbanks and Kates, 1999). Weaknesses in appreciating the interaction of processes moving at different time scales and to different extents, underlie a great deal of the current scientific interest in complexity and the search for order amid seeming chaos (Wilbanks and Kates, 1999). Despite the complexity of the scalar issues involved, regional impacts and responses are likely to drive the need for international climate policy. At a minimum they highlight the close interaction between socio-economic development and vulnerability to climate change suggesting a potential link between the distinct policy areas of development and climate (Corfee-Morlot and Hohne, 2003; Jager *et al.*, 2007).

Hence, there is growing interest in exploring linkages between adaptation and mitigation in order to maximize synergies, minimize trade-offs, increase the effectiveness of allocated resources and actual policies also by accounting for local and regional scales, where the actual impacts are encountered, capacities are built, and responses are implemented (Wilbanks, 2005; Dang *et al.*, 2003). But it should be noted that there are important differences in the development of responses to these different policy domains: temporal and spatial scales, groups of beneficiaries versus those who bear the costs of policies, and differences between the decision-makers involved in the adopting these measures (Klein *et al.*, 2004; Burton *et al.*, 2002; Clark *et al.*, 2001). Our research would suggest that the involvement of decision-makers, planners and local

practitioners is a crucial element of this type of research, because it promotes social learning and creates development options and climate change responses that can be more effectively integrated into existing institutional systems.

### **3. Researchers and practitioners' views on local studies targeting climate change and sustainable development**

During brainstorming sessions with select groups, we have explored three central research questions. These questions redress the need to downscale the current top-down research paradigm, incorporate differences in perspective from locally-focused studies, and to improve our understanding of local capacities in order to promote integrated responses to climate change in the context of sustainable development:

1. When linkages between adaptation and mitigation are addressed, from which perspective (climate change or sustainable development) should the local study be approached?
2. What are the synergies and trade-offs between adaptation and mitigation measures including institutional, economic, social and decision-making determinants—at the local level?
3. Can adaptation and mitigation synergies linked to development priorities be designed in a policy-relevant manner through institutional frameworks at the local scale?

In the following sections we report on the questions we posed to the participants of the workshops.

#### **3.1 Where should we start – from climate change or sustainable development perspective?**

Based on discussions with both researchers and practitioners, climate change was perceived as one of the important issues in society. It was stressed that local development decisions including infrastructure, urban development and changes in land-use play a key role in tackling impacts and reducing GHG emissions. Similarly to Gupta and Van Asselt (2006), both groups of participants thought that climate change was as an important question to broach within development-planning processes. In general, practitioners believed in the primacy of promoting long-term responses to climate change in such a way as to encourage changing the current development paradigm.

From researchers' point of view, the importance of incorporating climate change into sustainable development policies was recognized as an interdisciplinary

research challenge. For researchers focusing on climate change, the interest was driven by curiosity to provide holistic understanding of climate change impacts that can foster informed development decisions. For researchers from disciplines such as forestry, water resources management, and urban development, the focus was on the need to include climate change impacts and sometimes potential responses to make their research questions and results more relevant to practitioners. For example forestry researchers clearly have seen a need to incorporate climate change into models applying different reforestation options, management alternatives and evaluating the effectiveness of sustainable forest management practices. Similarly, researchers working on urban development considered it important to conduct research that can inform practitioners about development decisions including transportation, infrastructure and coastal development in a way that includes climate change.

When addressing future development issues, both researchers and practitioners agreed that climate change is only one of the threats. Similarly to Cohen *et al.* (1998), Swart *et al.* (2003) O'Brien and Leichenko (2000), Wilbanks *et al.* (2003), and Wilbanks (2005), participants emphasized that to be effective in addressing climate change the focus should be on promoting sustainable development as a development paradigm addressing many pressing issues such as natural resources depletion, community disintegration, inequalities and poverty. From the practitioners' point of view, adaptation and mitigation were seen as just small issues on the sustainable development agenda and if the development has a more sustainable course in the future, the issues related to adaptation and mitigation will not necessarily be the most important in the development context. On the other hand, if our development path is more sustainable, we may not have to struggle with the climate change issues. Similarly to current arguments in promoting sustainable development first (Cohen *et al.*, 1998; Swart *et al.*, 2003; Wilbanks *et al.*, 2003; Wilbanks, 2005), both researchers and practitioners stressed that sustainable development brings an important dimension, which enables us to 'close the circle' by using sustainable development as a challenge to re-think our development path.

### **3.2 Climate change synergies and trade-offs in the context of sustainable development**

Practitioners reported that there is a lack of information about the impact of climate change on resource availability. Therefore, there is a need for an estimation of biophysical impacts of climate change at the local level. Moreover, the practitioners were aware that local as well as regional and national, social, political and economic factors (for example size and structure of the agricultural

sector, the regulation of energy, water and transport infrastructures, organization of public policy-making on a national and local level and related institutional structures, Berkhout *et al.*, 2002) have an important influence on vulnerability, capacities and prospects for adaptation and mitigation to climate change. Based on the experiences of involved practitioners, within local development issues selecting adaptation and creating linkages with a diversity of mitigation options requires both getting information about impacts and identifying societal preferences and capacities to implement identified responses. The potential for linking climate change research to local scale issues is understood as a way to provide locally specific information about the impacts of climate change.

From the perspective of researchers, providing downscaled climate change data such as temperature and precipitation and translating them into changes in resource base relevant to the local scale was recognized as a challenge. Moreover, with current limitations of downscaled climate change data, researchers stressed that this information can only broadly frame actual adaptation decisions and linking downscaled data to local concerns is necessary to foster local actions. Similarly based on available studies (Berkhout *et al.*, 2002; UK CIP, 2000; Turnpenny *et al.*, 2005), designing participatory integrated assessments that explore future socio-economic development and include climate change impacts turned out to be the most fruitful approach in addressing concerns of local practitioners and in fostering responses to climate change. Researchers also mentioned the challenge they face in defining such studies. As Berkhout *et al.* (2002) pointed out: "we may never be able to develop models of future long-term social and economic change equivalent in power to those now being developed in the natural sciences."

Practitioners also emphasized the importance of linking the selection of potential responses to climate change to development priorities at the local level. However, options defined at the national level and examples applied in other parts of the world can provide a guideline to identify specific adaptation and mitigation options. It was interesting to see that practitioners and researchers argued to 'up-scale' adaptation but in contrast to be more locally specific with respect to mitigation. That is, mitigation was identified as locally-specific action that needs to bridge local development priorities, public preferences and anticipated local climate change impacts. However, it was also identified that creating future sustainable development scenarios could provide mitigation options without explicitly searching or adding them. In case of adaptation, both practitioners and researchers argued for a national or even an international adaptation framework or inventory of adaptation opportunities to guide local

efforts and to create a pressure on governments to proceed with adaptation in a focused manner.

A major pitfall in linking climate change adaptation and mitigation and sustainable development is that adaptation and mitigation are just small issues on the sustainable development agenda. However, practitioners identified that they have already encountered options in which they needed to address climate change. This includes local forest restoration programs, transportation infrastructure development, replacement of pipelines after their lifetime, expansion of energy utilities and coastal development.

Although practitioners reported that these linkages between climate change responses should be considered at the local scale, actions were deterred due to narrowly defined mandates at that scale. Practitioners stated that the linkages were addressed through informal discussions with experts and implemented to the extent allowed by their mandates. Both researchers and practitioners thought that the linkages between adaptation and mitigation should be considered during the planning process of development priorities. At an early stage of planning, there are likely to be opportunities for institutional partnerships to promote development decisions based on principles of sustainability (i.e. green building, multifunctional agriculture, reforestation and bioenergy production).

Hence, there are a number of barriers to implement complex adaptation and mitigation responses to climate change within the context of sustainable development including availability of resources, standards for planners and engineers, legal and management instruments. However, when the practitioners, who understand “barriers on the ground,” are involved in the early stages of the planning process, some of the obstacles can be overcome or addressed gradually during the process of implementation. According to Robinson and Tansey (2006) this requires providing opportunities for interaction with local practitioners in shaping research agendas and the results of the analyses.

### **3.3 Could we move from research to policies addressing AMSD?**

Both researchers and practitioners agreed that promoting linkages between adaptation and mitigation does not necessarily add another level of complexity to the decision-making process in addressing climate change. The major challenge for local practitioners is that including and evaluating linkages and trade-offs requires a systems perspective and integrated approaches downscaled to local level to support decisions.



Researchers and practitioners also agreed that addressing climate change and sustainable development requires a participatory interdisciplinary research initiative conducted in close collaboration with stakeholders. This research should link integrated assessment approaches with an inclusion of climate change impacts and qualitative scenario research to elaborate on sustainable development scenarios. However, there are many crucial steps in the process of conducting such research that can foster or destroy the studies' legitimacy and relevance: the selection criteria for selecting practitioners, proper communication during the research process, the presentation of results and finally keeping contact with the community after completion of the project. The selection of practitioners should be carefully considered to ensure that at least some of the participants have direct access to and are mandated to foster implementation of policies, in this way increasing the potential to implement actual policies as an outcome of the collaborative process. It was also mentioned that during this selection process researchers should pay special attention to building upon existing networks of practitioners (including chambers, councils and professional unions) and in this way strengthen institutional networks and partnerships that may provide a valuable basis for future policies involving different sectors (similarly to Klopregge and van der Sluijs, 2006).

On a different note, practitioners were aware that if development is not considered in the medium or even longer time scale than those decisions could make society and the next generations vulnerable to the impacts of progressing climate change. It could lock them into certain development pattern that may not enable them to respond to mitigation policies imposed from a higher level of governance. Consequently, participants put forward as a priority long-term thinking about development priorities that could provide sufficient time horizons to account for climate change impacts.

Furthermore, to move to actual policies, identified responses and alternatives need to be addressed in a language that speaks to the target audience and consequently promotes actions from the decision-making perspective. In addition, the integration of promoted policies needs to fit into current mandate and activities of decision-making entities (Hajer *et al.*, 2003; Innes and Booher, 2004). This process however faces a number of challenges during the integrated assessment research including facilitation skills of the researchers, the character of developed tools and alternatives, time and funding constraints (Moser and Dilling, 2004; Klopregge and van der Sluijs, 2006; Kerkhof van de and Wiczorek, 2005).

The researchers emphasized that in many cases the adequate communication of the results and follow-up activities can form a basis for a new project with more practical 'on the ground' impact. Particularly challenging are follow-up activities such as providing information when new scientific and local information are produced, even though doing so may help to ensure that scientifically identified priorities are matching 'reality on the ground'. Haas (2004) describes examples of experiences in social learning on sustainable development and climate change, noting the importance of sustaining the learning process over the long term. Both researchers and practitioners agreed that this is the weakest part of integrated disciplinary initiatives that involves practitioners and it usually happens in the form of informal consultation within created networks.

Finally, not all localized climate change/sustainable development assessments will be fruitful, but similarly to Wilbanks *et al.* (2003) both researchers and practitioners agreed that local-specific case studies are a promising way to make meaningful progress in identifying connections between sustainable development, in reducing climate change impacts and in stimulating actions. Local studies focused on AMSD could capture the opportunity to use climate change as a "precautionary tale" in promoting sustainable development in addressing local issues based on close interaction with local stakeholders including business, local governments and civil society to foster a small set of decisions involved in 'a big story'.

#### **4. Integration and Conclusion**

This paper demonstrates that there is a considerable interest both from the researchers' and practitioners' community to explore synergies between adaptation and mitigation when the focus is on addressing local sustainable development challenges that frame responses to climate changes and create opportunities to involve local-specific value-based participatory approaches. Furthermore, it presents opportunities identified by the practitioners' community for incorporating climate change adaptation and mitigation responses into development decisions to promote actions in addressing pressing local challenges.

In general, experiences of researchers and practitioners were positive about conducting studies focused on climate change adaptation, mitigation and sustainable development mainly due to practical needs encountered by practitioners in pursuing their planning decisions and due to the interests of researchers to conduct problem-based integrated assessments that promote

interdisciplinary research and can address concerns on the ground through stakeholder participation. However, beyond only calling for inclusion of climate change into development priorities per se, approaching local studies from the sustainability perspective provides an opportunity for researchers to re-think underlying assumptions of narrowly disciplinary studies, usually designed without regards to social or economic relevance. As in the case of applying the principles of sustainable forest management, and similarly transportation, urban sprawl expansion, and energy production research, expanding beyond one-dimensional assessments can help to identify and promote sustainable means of development directly to local practitioners.

These needs identified by researchers call for usable science that combines knowledge-driven, applied and interactive science to balance between what we need to know to understand complex problems and what stakeholders perceive to be their immediate needs for making decisions (Lemos and Morehouse, 2005). This also recognizes the new dimension of climate change research that tries to address climate change placed into a multidimensional context of societal changes to promote targeted policies involving a range of stakeholders (Pielke, 2006). This way of approaching development and climate change also mirrors current evolution of a second “wave” of global scenarios launched in the context of the sustainability challenge (Swart *et al.*, 2003). Some scenarios were model-based, and focused on one issue such as climate change (Rotmans *et al.*, 1994), but also broader efforts were undertaken to develop new integrated studies on such themes as climate change, water scarcity, public health, and land-use with consideration to the societal context (Rayner, 2002; Berhout *et al.*, 2002).

However, despite significant research efforts in climate change and its linkages to development, there will be no improvement in the development process, if the local communities are not ready to address the challenges and make use of collaborative initiatives. Linking local values as well as building up new institutions that produce new knowledge and approaches to local priorities should be a crucial part of these initiatives (cf. Rose, 2003). Experiences from UK (UK CIP, 2000) in addressing responses to climate change showed that placing greater responsibility on planning bodies, working with the government officers and stakeholders, to resolve planning issues promoted greater local ownership of policies and increased commitment to their implementation. Along this line, practitioners involved in our research emphasized that arguments for climate change adaptation and mitigation need to be articulated in a way that attracts the attention of councilors and provides arguments to support decisions. Similarly to Rose (2003) and Hajer and Wagenaar (2003), participants argued that

research must be transformed into knowledge that is linked to meaning and power—binding governments to a particular view or course of action. In the case of climate change, the interests of local governments can be magnified by focusing on negative experiences with extreme weather events, thereby amplifying a sense of urgency for action. Such examples were seen after floods in Europe, droughts in British Columbia (Canada) and hurricanes in the US (Cohen and Neale, 2007; Penning-Rowsell *et al.*, 2006; O'Brien, 2005).

To sum up, both researchers and practitioners shared the notion that promoting sustainable development is a priority and that it should include climate change policy. Addressing AMSD, however, needs to be done in a way that will promote a long-term, holistic perspective on how best to achieve a balance between local, regional development goals and climate change adaptation and mitigation. Both practitioners and researchers agreed that to be effective in linking climate change and sustainability, planning and policy documents should articulate local development issues in a way that will envision sustainable future within the context of local needs and aspirations. Notwithstanding the complexities involved in AMSD, the urgency of addressing local development issues can bring local practitioners together with researchers and policy-makers to focus on moving towards planning questions on the ground.

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