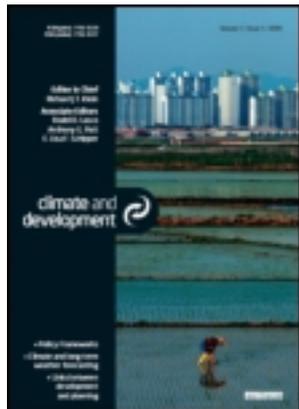


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Introduction: SD-PAM and the potential of promoting climate action through development policies

Mikael Román^a

^a Stockholm Environment Institute, Kräftriket 2B, SE-106 91, Stockholm, Sweden

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VIEWPOINT

Introduction: SD-PAM and the potential of promoting climate action through development policies

Mikael Román*

Stockholm Environment Institute, Kräftriket 2B, SE-106 91 Stockholm, Sweden

This viewpoint introduces the broader purpose and conceptual premises of the larger research project that makes up this special issue. It starts off from two emerging strands in the international climate policy debate – i.e. (1) the notion that climate change action may be driven by other development priorities; and (2) the growing skepticism regarding the UN system's capacity to deliver effective climate policies – and raises the broader question as to whether development-driven climate action could be incentivized through an internationally agreed upon mechanism within UNFCCC. The concrete objective of the project is to identify the opportunities and challenges of a future Sustainable Development – Policies and Measures (SD-PAM) mechanism, the latter being a precursor for National Appropriate Mitigation Actions (NAMA). To achieve this objective the project holds the following traits. First, it introduces intervention theory as the guiding theoretical framework for all empirical studies. Second, it combines an analysis of the suggested SD-PAM mechanism with selected case studies of potential national SD-PAM projects in Brazil (bio-energy), China (transportation and biogas production) and Mozambique (agriculture). The broader ambition is to identify the circumstances under which development policies may serve as a vehicle for effective climate change mitigation and adaptation.

Keywords: SD-PAM; side effects; policy integration; socio-technical systems; intervention theory; value chain; case studies; development; climate change

1. Introduction

The present special issue places itself in the middle of a changing international climate policy debate, largely following the perceived failure of the United Nations Climate Change Conference (COP-15) in Copenhagen 2009, where there is: (1) an increasing recognition that climate change action may be driven by other development priorities; and (2) a growing concern that the UN system may not have the capacity to deliver effective climate policies.

While COP-15 has been widely categorized as a failure, there was in fact one clear message arising from the Conference. At the end of the negotiations, all parties prioritized their respective development ambitions before any concerted action to meet the challenges of climate change. This has then called many observers to question and even write off the UN track as a means to effectively respond to climate change (Bodansky, 2010; Helm, 2008; Kopp, 2011; Prins et al., 2010). Despite many years of preparation and strong scientific data stressing the need for immediate action, the UN Framework Convention on Climate Change (UNFCCC) had not been able to deliver sufficiently strong commitments to mitigate greenhouse gases (GHG) and facilitate adaptation to climate change. Instead,

GHG emissions are currently growing at an accelerating pace while the discussions on adaptation progresses are painstakingly slow.

At the centre of the political debate is a continuous rift between industrialized and developing countries regarding the relationship between climate and development priorities that largely explain limited progress. In view of the rapidly growing energy demand, principally among developing countries (International Energy Agency, 2007), industrialized countries are currently demanding that rapidly growing emerging economies, like China and India, also take on commitments to reduce GHG emissions. This has raised objections among developing countries that on their part emphasize their right to a level of socio-economic development on par with that of the industrialized world. The assumption going into this debate is that economic development is not possible in combination with mandatory GHG reduction targets, wherefore 'climate concerns' and 'development' emerge as two competing policy priorities.

Adding to the complexity, the environmental and practical challenges are daunting. Scientific data indicate that the current pathway of 'national mitigation limits' is not enough to meet the challenges of global warming.

*Email: mikael.roman@sei.se

Instead, to avoid the development of dangerous climate change global GHG emissions have to peak before 2015 and subsequently be reduced by 50–85% by 2050 compared to 1990 levels (IPCC, 2007). This is a gigantic leap from the 5.2% global reduction established for the first commitment period of the Kyoto Protocol (UNFCCC, 1997) and will require major changes in societal development paths and production. In most cases this implies breaking up highly intertwined economic, administrative, institutional and technological structures, and thereby challenge the different interests involved. Particularly the latter constitute yet another tremendous political ordeal.

The current discrepancy between required measures and political commitments has also caused several observers to question the global process in which climate policies are currently negotiated. The authors behind the so-called Hartwell paper argue, for example, that policies to avoid climate risk are better pursued outside the UN system and involve other measures than traditional carbon mitigation policies. Instead, they emphasize the need to invest in energy access for all, the safeguarding central functions of the Earth system, along with adaptation to climate risks (Prins et al., 2010). Another position, put forth by the former Bush administration, is that the challenges following from global warming are best confronted via market forces and by stimulating private-sector initiatives, mainly by bi-lateral agreements technology investments (Román, 2004). Despite their differences, both of these approaches depart from the notion that climate and development are, in fact, not exclusive entities.

The present special issue takes its starting point in these two emerging strands in the international climate policy debate, i.e.: (1) the notion that climate change action may be driven by other development priorities; and (2) the growing skepticism regarding the UN system's capacity to deliver effective climate policies. Instead, the question guiding the upcoming articles is whether development-driven climate action approach can be incentivized through an internationally agreed mechanism within UNFCCC.

2. Three emerging perspectives

In the light of these challenges, three trends are particularly notable with respect to how the climate issue *de facto* has been approached in contemporary policy making. Jointly, they provide complementing perspectives on the relationship between climate change and development.

2.1. Climate action as a side effect of other policies

One is the growing awareness that climate mitigation and adaptation efforts more often emerge as side effects of policies not explicitly related to global warming. The Brazilian Ethanol Program, for example, which is arguably one of the

largest mitigation efforts in the world, was originally instigated to achieve national energy security (Maroun & Schaeffer, 2012). Similarly, considerable mitigation gains have also been achieved through transportation policies and the ambition to improve air quality (Aunan et al., 2004; Ribeiro & Abreu, 2008). Yet, the notion of climate action as a side effect of other policies extends potentially into most policy areas and, as such, it is also applicable at all levels of society, from particular industry sectors to city, state and national policies across the world.

The recognition of a similar side effect dynamic related to climate change has major implications for policy making. Most fundamentally, it alters patterns of causality in the political context, while indicating that certain climate activities, instead of being objectives themselves, in practice often serve as means to achieve other activities. The principal point here is that the drivers for action among individuals thereby may be different than anticipated and individual policy interventions may therefore require new and additional policy incentives to actually take effect. The question that emerges is, instead, under what circumstances climate mitigation and adaptation are more successfully achieved through the explicit ambition to promote some form of development policies.

The increasing appreciation for this side effect dynamic has created a vivid policy discussion regarding 'co-benefits' and climate change (Gan & Yu, 2008; Halsnaes & Garg, 2006; Perch, 2010). Yet, although the latter concept is intuitively equivalent to side effects, it is for analytical reasons important to distinguish the two. A first observation is that co-benefits, with their implicit positive outcome, are only one subcategory of side effects that occasionally are also of negative nature. This distinction between negative and positive, as well as anticipated and unanticipated, outcomes is critical for a further understanding of how this side effect dynamic operates in practice. A second issue is what the observed phenomenon is a side effect, or co-benefit, of. Efforts have been made, for quite some time, to define additional benefits of pursuing climate policies (Aunan et al., 2004; Bollen et al., 2009; Singh, 2008). This notion of 'climate co-benefits' is not what is at stake here. Instead, the question is under what circumstance climate action takes place as a 'development co-benefit'.

2.2. Climate action through policy integration

A second trend is the tendency among policy makers to integrate climate change considerations with other socio-economic development policies. This is the result of an increasing conviction that climate change can only be effectively dealt with in conjunction with other policies. Fundamentally, policy integration builds thereby on the idea of synergies and administrative overlaps. Perhaps more important, though, it makes possible for multiple

interest to participate in the policy process, thereby creating opportunities for new alliances and other political openings (Halsnæs & Garg, 2006; Linnér, 2006; Metz & Kok, 2008; Mickwitz et al., 2009).

The phenomenon is witnessed at all levels of society (Kok et al., 2008). One recent example of policy integration in the global context is the decision to make Green Economy one of two official themes at the UN Conference on Sustainable Development (UNCSD) in Rio de Janeiro 2012 (United Nations, 2010). Another is President Obama's attempt in early 2009 to overcome the US economic crisis through what has been described as a Green New Deal (Román & Carson, 2009). Similarly, states and cities all over the world are currently trying to meet the challenges of climate and socio-economic growth development through integrated policies and networks for collaboration (Kern & Bulkeley, 2009; Schreurs, 2008). What is particularly compelling with the idea of policy integration is that it potentially provides opportunities for both mitigation and adaptation to climate change (OECD, 2009, 2011; Persson & Klein, 2009). Also, only through the integration of multiple policies will it be possible to achieve the systemic changes of the kind required to meet the challenges of global warming (Mickwitz et al., 2009).

2.3. *Climate action in large socio-technical systems*

The final trend concerns the appropriate target of climate policies. Over the years, there has been a gradual shift from relatively limited interventions, focusing on specific technologies within existent socio-economic structures, to a general awareness that the impact of global warming requires fundamental and system-wide changes to make entire sectors more environmentally sustainable (Berkhout, 2008). This puts our attention to 'socio-technical systems' as the principal unit for change. The term itself, which refers to the interaction between society's complex infrastructures and human behaviour, specifies the interlinked combination of institutions, actors, technologies and socio-ecological premises that surround a certain energy technology, either in production, distribution or use (Berkhout, 2002; Geels, 2004; Kemp, 1994; Lovio et al., 2011; Smith, 2003).

The critical point here is that socio-technical systems, once in place, create pathways that are exceedingly hard to alter. This is particularly true for the type of 'carbon lock-in' that comes out of energy systems but the conceptual approach applies also to other production systems (Unruh, 2000). The complexity resides in the fact that the systems depend just as much on physical, institutional and technological structures as well as cognition and incentives among individuals. Consequently, any change of a socio-technical system will necessarily require a combination of multiple interventions at various levels and in a certain consecutive order. More than anything else, it will

also require a common purpose around which most actors can identify themselves. Development might just be the one.

3. **The emerging policy issue: institutions and mechanisms for synergies**

The previous trends together provide insights that question the traditional views on the relationship between climate and development. In doing so, they also raise new perspectives on the possibility of creating institutions and mechanisms for synergies between the two. But, to what extent are these alternative views at all recognized in the current international climate process?

The UNFCCC, it seems, provide ample opportunities to link climate and development policies in practice. In fact, the relationship between the two is addressed and emphasized as complementary objectives in both the UNFCCC and the Kyoto Protocol. Article 2 of the Convention states that the

stabilization of greenhouse gas concentrations in the atmosphere ... should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner (UNFCCC, 1992).

This right to sustainable development is further emphasized in Article 3.4, which specifies that all '[p]olicies and measures to protect the climate system ... should be integrated with national development programmes', all in accordance with the notion of 'common but differentiated responsibilities' acknowledged in Article 3.1 (UNFCCC, 1992). In effect, the Convention provides thereby a legal basis for countries to use different approaches to mitigate GHGs – including those built on alternative development paths – in order to comply with their commitments under the UNFCCC.

Yet, despite these opportunities to broaden the participation in different mitigation efforts, there has been little practical progress on the issue. One limiting factor is the UNFCCC negotiations themselves that up to this point mainly have proceeded in a top-down manner, with an overarching focus on quantified reduction targets, mainly among industrialized countries and some key major emitters. The cited articles imply, however, that there is an alternative and complementary approach to participation, based on a bottom-up approach that would allow countries to participate on the basis of individual pledges in accordance with their responsibility, capacity and potential to mitigate. These pledges could in theory be either quantified emission targets, as in the Kyoto process, or be more qualitative in nature. The critical point, though, is that they would focus on implementing policies and measures for

sustainable development, rather than setting emission targets, with GHG reductions emerging as a side effect.

3.1. National Appropriate Mitigation Actions by developing countries (NAMA) and Sustainable Development – Policies and Measures (SD-PAM)

The one setting where the clash between development priorities and climate mitigation and adaptation is most obvious is in developing countries. Consequently, this is also where the ambition to use development policies as a vehicle to address climate change has gained most attention within the UNFCCC so far. One notable outcome in this respect is the NAMA that was first introduced as a new mechanism in the Bali Action Plan 2007 (UNFCCC, 2007). The principal idea of NAMA is to recognize individual country commitments in the form of nationally appropriate mitigation actions, defined on the basis of economic and social development needs, and thereby make them eligible for international support in the form of capacity building, technology and financial assistance. This would also involve a process where these policies and measures are recorded in a registry and subject to international measurement, reporting and verification.

NAMA is interesting insofar that it constitutes an incipient institutional mechanism intended to capture a side effect dynamic where development priorities become a vehicle to address climate change. Yet, while NAMA as an international mechanism within the UNFCCC is still under negotiation many of its details and practical implications remain uncertain. Instead, to understand more in detail what a similar arrangement would entail in practice it is more useful to discuss one of the precursors to NAMA, the South African proposal regarding SD-PAM, presented in 2006 as a possible mechanism under the UNFCCC (2006).

The South African SD-PAM proposal, which was first introduced in a Working Paper at the Convention Dialogue of the UNFCCC in November 2006, was one of the first attempts to find an institutional mechanism that linked climate change objectives with policies for sustainable development (UNFCCC, 2006). More concretely, SD-PAM takes an explicit stance in Articles 3.1 and 3.4 of the UNFCCC and outlines thereafter a pledge-driven process under which individual countries could mitigate GHGs through the primary pursuit of other development objectives, such as infrastructure investments, housing projects and energy policies. What makes SD-PAM particularly compelling, though, is that, unlike project-based efforts such as the Clean Development Mechanism (CDM), it could thereby target entire socio-technical systems (Bradley & Baumert, 2005; Ellis et al., 2007; Román, 2008; Winkler et al., 2002). From the analytical perspective, SD-PAM thereby provides important insights to the overall effort of designing institutional mechanisms

intended to capture co-benefits between climate and development. The details of the proposal will be further elaborated in article two of the present volume (Linnér et al., 2012).

4. Our research question

In the light of these broader changes, the present special issue makes an explicit effort to discuss the potential efficiency of international institutional mechanisms intended to capture co-benefits between climate and development. While using a case study approach, the specific question it seeks to answer is: *What are the opportunities and challenges of a future SD-PAM mechanism?* The articles themselves are the result of an international research project, financed by the Swedish Energy Agency (with additional funding from the Swedish Research Program Clipore), involving a team of researchers composed by engineers, geographers, economists, sociologists and political scientists situated at four continents. Jointly, they constitute a concerted and coordinated effort that combine an analysis of the suggested SD-PAM mechanism with selected case studies of potential national SD-PAM projects, using intervention theory as a joint analytical framework.

The special issue serves thereby several general and specific objectives. First, it puts an additional perspective on SD-PAM by framing it as a policy intervention. Second, it provides concrete insights on both the mechanism itself as well as the different country cases. Third, it contributes to the larger discussion on the role of international mechanisms, like SD-PAM, in supporting the alteration of national socio-technological systems. Fourth, it provides new perspectives on the UNFCCC as a venue for practical solutions to meet the challenges of global warming. Finally, the special issue also makes a methodological contribution by introducing intervention theory into the realm of climate policy. In doing so, it becomes a second objective of the project *to explore the viability of intervention theories for the analysis of not yet adopted proposals to global negotiations*. This latter effort is commented by leading expert in the field, Professor Evert Vedung, in a separate article.

5. Intervention theory as an analytical lens

The intended research effort poses several methodological challenges. First, since the SD-PAM mechanism does not exist in practice we are effectively pursuing an *ex-ante* assessment of an evolving and ‘not-yet-defined’ policy instrument. Second, if put in place the mechanism will out of necessity operate at various levels; it constitutes, on the one hand, an international mechanism within the UNFCCC but is, at the same time, made up by various national SD-PAM projects applied in different economic sectors. Hence, to fully grasp how SD-PAM operates we

need a heuristic analytical framework that allows for both vertical and horizontal comparisons. Finally, in order to grasp the implications of changing socio-technological systems with the ambition to mitigate climate change we need a truly interdisciplinary approach.

To meet these challenges, this special issue introduces intervention theory, a popular approach in contemporary policy evaluation, as the theoretical framework guiding all empirical studies. The essence of this theoretical model is that it focuses on the policy intervention itself and identifies a number of components that, in one way or the other, may affect the subsequent implementation of policies. It provides thereby a heuristic tool that allows us to describe, compare and explain a diverse set of empirical policy processes. This choice of analytical approximation is itself a novel perspective on international climate policy, and as such a separate methodological contribution of this special issue. More concretely, throughout the volume we use a theoretical apparatus, based on a particular intervention model presented by Huey-tysh Chen, which consists of three components. First, the *change model* that specifies the assumptions about how change can be achieved by focusing on goals and outcomes as well as different leverage mechanisms. Second, the *action model* that concerns assumptions regarding the institutions, resources and other support mechanisms necessary for an intervention to reach its target population. Finally, *context* that influences both the causal premises of an intervention (the change model) as well as its implementation (the action model) (Chen, 2005). Also, to better understand exactly where specific interventions take place in a socio-technical system, and how various policies interact, the special issues introduce the notion of *value-chains* as an additional analytical tool to specify various activities in any given industrial production (Kaplinsky & Morris, 2001; Porter, 1998). The combination of these two theoretical concepts provides an analytical framework, presented in Figure 1

below, that allows us to outline the potential leverage points of a future SD-PAM mechanism and also to identify possible bottlenecks and gaps in the process of its implementation. Again, it should be noted that the categories in the present figure are generic and could be further elaborated for each situation.

6. Case study method as an organizing principle

The core of the analysis is thereafter built around a set of case studies operating at two distinct levels. It starts off with a discussion regarding the international mechanism suggested in the original SD-PAM proposal. This is followed by empirical studies from Brazil, China and Mozambique, focusing on a set of possible national SD-PAM projects.

The latter, which are intended to discuss the practical implications of SD-PAM, have been selected to allow for comparisons regarding the main emitting sectors, socio-economic conditions, policy priorities, as well as regulatory and institutional settings. Hence, they are similar insofar that they concern governmental policies in developing countries with potential for additional GHG mitigation effects. The only exception is the final case study ('Exploring the link between development policies and climate change adaptation: the case of rice production in Mozambique') that, instead, looks ahead and discusses the opportunities and challenges of also applying the NAMA instrument into the area of adaptation. Yet, the cases also differ on several dimensions. One is regional scope, where the ambition has been to cover policy environments on three different continents (South America, Asia and Africa). Moreover, the cases also represent different economic structures; ranging from the large open market-based economy (Brazil), over the large transition economy (China), to the traditional 'least developed country' (Mozambique). Finally, they also focus on different socio-economic activities, i.e. bio-energy production (Brazil), transportation (China), biogas

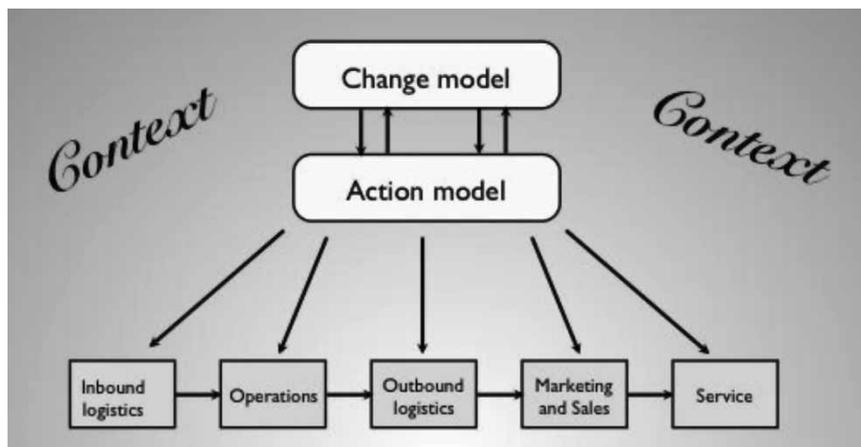


Figure 1. Integrated conceptual framework.

production (China) and agriculture (Mozambique). This latter diversification of cases is, arguably, a contribution to the debate on climate co-benefits that so far has focused primarily on the energy sector (Bradley & Baumert, 2005; Winkler et al., 2007).

Finally, apart from these more descriptive criteria the cases are also selected from temporal considerations. The Brazilian case, for example, illustrates the experiences of trying to emulate a previous success story (the Brazilian Ethanol Program) into a new policy area (the National Biodiesel Program), while the subsequent article on biogas production in China discusses the possibility to learn from 30 years' relative implementation failure. These experiences in hindsight can then be contrasted with the third article, regarding electric cars in China, which describes the implications of introducing a new technology where there are no previous policy experiences. Finally, the last two articles, which focus on rice production in Mozambique, discuss the prospects of climate policies in a context where acute development needs make the reduction of GHG a remote concern. Under similar circumstances, the links between food production, poverty reduction and climate change are in every respect the most relevant. Jointly, these two latter articles also add another dimension to the discussion as the authors approach the same government programme from the perspective of mitigation and adaptation, respectively. This allows for a final reflection on whether the notion of side effects, as well as institutional instruments like NAMA, is similarly relevant also for adaptation (Perch, 2010).

7. Outline of the special issue

Our discussion will unfold in the following way.

The first article, 'Reducing greenhouse gas emissions through development policies: a framework for analysing policy interventions', by Linnér, Mickwitz and Román, serves two purposes. First, it introduces and elaborates on the theoretical framework that will guide the analysis in all case studies. In introducing intervention theory for this type of analyses it makes, as noted, a contribution to the climate debate more broadly. Second, it analyses thereafter the suggested international SD-PAM mechanism and concludes that it holds three alternative leverage mechanisms, i.e. financing, technology transfer and tradable emission credits. The basis for those to take effect, however, is that recognition could be acquired through an international register of pledges and that a corresponding reporting mechanism would be created. At this point, though, the proposals leave the national implementation largely as a black box (Linnér et al., 2012).

It is the latter theme that is the focus of the subsequent national case studies.

In the second article, 'Emulating new policy goals into past successes: greenhouse gas emissions mitigation as a

side-effect of biofuels programs in Brazil', Maroun and Schaeffer provide an example from the Brazilian context, when they compare the effort to emulate the past successes of the national ethanol programme (PROÁLCOOL) in the recent National Program for Production and Use of Biodiesel (PNPB). Their analysis provides several findings. First, the example of PROÁLCOOL underscores that you can indeed alter socio-technical systems. Second, it emphasizes the need for a systemic approach and the combination of multiple instruments to address different subsystems within the overall socio-technological system. Third, the relative failure of PNPB illustrates the potential for perverse effects and the potential role that a future SD-PAM mechanism could have in securing the sustainability dimension (Maroun & Schaeffer, 2012).

An additional example from past experiences is thereafter provided in the third article, 'Learning from previous failures: Scaling up biogas production on the Chinese countryside', by Hallding, Ying and Lan. Their analysis of the relative failure of Chinese biogas policies over the last 30 years provide new perspectives on the SD-PAM mechanism by implying that it could have an additional role in targeting the implementation of policies. Similarly, the article also provides important insights regarding the need to consider economy of scale when deciding about how to best apply an SD-PAM mechanism. Finally, the article puts SD-PAM in a broader context, by illustrating how any decisions regarding the instrument may be influenced by geopolitical and other concerns (Hallding et al., 2012).

The fourth article, 'Chinese electric car and SD-PAM: a case study' by Wang Jin, takes a different perspective than the previous articles insofar that it discusses the introduction of a new technology in an environment where there are no previous policies. Some of the critical messages here are the challenges of establishing baseline criteria and time scales for GHG mitigation as well as a definition of additionality. Similarly, the article illustrates the problems of finding external support for a technology transfer that effectively helps the Chinese to leap frog many development steps to effectively create a gigantic and competitive market. Finally, it provides insights to some particular implementation problems in the Chinese context related to appointment and budgeting (Wang, 2012).

The fifth article, 'Climate and development: the potential for climate co-benefits in the Mozambican rice sector' by Román and Hoffmaister, brings in turn the discussion about SD-PAM to the LDC context. With this comes a series of new and additional observations. The first concerns the importance of context and the need for a systemic perspective. The pressing needs and general need of capacity implies that, under these circumstances, the principal contribution of SD-PAM is to assist different support functions and provide a platform for institutional learning. Second, this emphasizes the development component of the mechanism itself and stresses as such the need for appropriate criteria

on this variable. GHG mitigation in the LDC context is not about reducing emissions but, rather, to change the development path (Román & Hoffmaister, 2012).

The role of SD-PAM in the LDC context is subsequently given an additional perspective in the article, 'Pursuing the link between development and climate change adaptation: The case of rice production in Mozambique' by Hoffmaister and Román, which uses the same empirical data as the previous article to discuss its implication on climate change adaptation. The latter is, arguably, the most important aspect of global warming for LDCs and also highly related to development. Up to this point, however, it has not been discussed in the context of SD-PAM. The article concludes that there is a potential for SD-PAM to increase adaptive capacity and implement adaptation measures, particularly if used in conjunction with the NAPA. Jointly, these two instruments allow for a systemic overview of assumptions, interventions and overlaps between development and climate policies (Hoffmaister & Román, 2012).

Before concluding, we have also invited Professor Evert Vedung to comment on the use and potential usefulness of intervention theory for the analysis of international climate policies. In the article, 'The extended intervention theory approach as a tool for climate action', he provides a generally positive account of the suggested analytical approach, showing also that the discussion is highly commensurate with established literature in social sciences. For example, he suggests that the ambition to achieve different climate goals through development policies is well in line with the doctrine of ecological modernization. In addition, Professor Vedung also provides several suggestions on possible forward, indicating, for example, the need to discuss also the limitations and problems with a similar development approach.

To round off, the findings of the project are summarized in the concluding article, 'Development policies as a vehicle for addressing climate change' by Román, Linnér and Mickwitz, that also discusses the implications for the future (Román et al., 2012). The main conclusions are that an international push in the form of a SD-PAM type of mechanism, further stimulating national sustainable development policies and measure, may be important for three reasons: (1) the magnitude of the policies contribution to a change of socio-technical systems; (2) to create incentives for countries in the form of recognition as well as support; and (3) to expose negative externalities for sustainable development in other parts of the world. Mostly, it could provide a leverage mechanism by providing recognition for national activities that are otherwise not viewed as climate policies. This could, in turn, generate: (1) new commitments; (2) additional direct funding; (3) indirect financing in the form of tradable permits; and (4) different forms of technology transfer. This, however, raises particular challenges regarding systems for measurement, reporting and verification, where one would

have to establish: (1) baseline criteria for GHG reductions; (2) the appropriate time scales for mitigation; (3) a definition of what constitutes additionality; and (4) criteria for assessing sustainability. In addition, it suggests a complex policy process, involving various political and administrative environments with distinct interests and conditions. To further understand the various opportunities and challenges in this endeavour, our experiences in using intervention theory suggest that it provides a useful framework of analysis.

References

- Aunan, K., Fang, J., Vennemo, H., Oye, K.A., & Seip, H.M. (2004). Co-benefits of climate policy – lessons learned from a study in Shanxi, China. *Energy Policy*, 32(4), 567–581, doi:10.1016/S0301.
- Berkhout, F. (2002). Technological regimes, path dependency and the environment. *Global Environmental Change*, 1(1), 1–4.
- Berkhout, F. (2008). Innovation theory and socio-technical transitions. In J.C.J.M. van den Berg & F.R. Bruinsma (Eds.), *Managing the transition to renewable energy: Theory and practice from local, regional and macro perspectives* (pp. 129–147). Cheltenham: Edward Elgar.
- Bodansky, D. (2010). *The international climate change regime: The road from Copenhagen* (Policy Brief). Cambridge, MA: Harvard Project on International Climate Agreements, Belfer Center for Science and International Affairs, Harvard Kennedy School.
- Bollen, J.C., Brink, C.J., Eerens, H.C., & Manders, A.J.G. (2009). *Co-benefits of climate policy*. Bilthoven: PBL.
- Bradley, R., & Baumert, K.A. (Eds.). (2005). *Growing in the greenhouse: Protecting the climate by putting development first*. Washington, DC: World Resources Institute.
- Chen, H.-T. (2005). *Practical program evaluation: Assessing and improving planning, implementation, and effectiveness*. Thousand Oaks, CA: Sage.
- Ellis, J., Baron, R., et al. (2007). *SD-PAMs: What, where, when and how?* (p. 35). Paris: OECD/IEA.
- Gan, L., & Yu, J. (2008). Bioenergy transition in rural China: Policy options and co-benefits. *Energy Policy*, 36(2), 531–540.
- Geels, F.W. (2004). From sectoral systems of innovation to socio-technical systems Insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33, 897–920, doi:10.1016/j.respol.2004.01.015.
- Hallding, K., Olsson, M., Atteridge, A., Vihma, A., Carson, M., & Román, M. (2012). Learning from previous failures: Scaling up biogas production on the Chinese countryside. *Climate and Development* (forthcoming).
- Halsnæs, K., & Garg, A. (Eds.). (2006). *Sustainable development, energy and climate: Exploring synergies and tradeoffs*. Roskilde, Denmark: UNEP Risø Centre on Energy, Climate and Sustainable Development.
- Helm, D. (2008). Climate-change policy: Why has so little been achieved? *Oxford Review of Economic Policy*, 24(2), 211–238, doi:10.1093/oxrep/grn014.
- Hoffmaister, J.P., & Román, M. (2012). Pursuing the link between development and climate change adaptation: The case of rice production in Mozambique. *Climate and Development*, doi:10.1080/17565529.2012.698591.
- International Energy Agency (2007). *World energy outlook: China and India insights*. Paris: OECD/IEA.

- IPCC (2007). *Climate change 2007: Synthesis report*. Contribution of working groups I, II and III to the fourth assessment report of the intergovernmental panel on climate change [Core Writing Team, Pachauri, R.K. & Reisinger, A. (eds.)]. Geneva, Switzerland: IPCC.
- Kaplinsky, R., & Morris, M. (2001). *A handbook for value chain research*. Brighton, UK: Institute of Development Studies.
- Kemp, R. (1994). Technology and the transition to environmental sustainability. *Futures*, 26(10), 1023–1046.
- Kern, K., & Bulkeley, H. (2009). Cities, Europeanization and multi-level governance: Governing climate change through transnational municipal networks. *Journal of Common Market Studies*, 47(2), 309–332.
- Kok, M., Metz, B., Verhagen, J., & Van Rooijen, S. (2008). Integrating development and climate policies: National and international benefits. *Climate Policy*, 8(2), 103–118.
- Kopp, R.J. (2011). *The Climate has changed – so must policy*. March 2011, Issue Brief 11-03, Washington, DC: Resources for the Future.
- Linnér, B.-O. (2006). Authority through synergism: The roles of climate change linkages. *European Environment*, 16, 278–289, doi:10.1002/eet.423.
- Linnér, B.-O., Mickwitz, P., & Román, M. (2012). Reducing greenhouse gas emissions through development policies: a framework for analysing policy interventions. *Climate and Development*, doi:10.1080/17565529.2012.698587.
- Lovio, R., Mickwitz, P., & Heiskanen, E. (2011). Path dependence, path creation and creative destruction in the evolution of energy systems (to be published, accepted). *Handbook of Research on Energy Entrepreneurship*. Cheltenham: Edward Elgar Publishing.
- Maroun, C., & Schaeffer, R. (2012). Emulating new policy goals into past successes: Greenhouse gas emissions mitigation as a side-effect of biofuels programs in Brazil. *Climate and Development*, doi:10.1080/17565529.2012.668849.
- Metz, B., & Kok, M. (2008). Integrating development and climate policies. *Climate Policy*, 8, 99–102, doi:10.3763/cpol.2008.0523.
- Mickwitz, P., Aix, F., Beck, S., Carss, D., Ferrand, N., Görg, C., Jensen, A., Kivimaa, P., Kuhlicke, C., Kuindersma, W., Máñez, M., Melanen, M., Monni, S., Branth Pedersen, A., Reinert, H., & van Bommel, S. (2009). *Climate policy integration, coherence and governance* (PEER Report No. 2). Helsinki: Partnership for European Environmental Research.
- OECD (2009). *Policy guidance on integrating climate change adaptation into development co-operation*. Paris: OECD.
- OECD (2011). *Green growth strategy synthesis report*. Paris: OECD.
- Perch, L. (2010). *Maximizing co-benefits: Exploring opportunities to strengthen equality and poverty reduction through adaptation to climate change* (Working Paper). Brasilia, DF: International Policy Centre for Inclusive Growth.
- Persson, Å., & Klein, R.J.T. (2009). Mainstreaming adaptation to climate change into official development assistance: Challenges to foreign policy integration. In P. Harris (Ed.), *Climate change and foreign policy: Case studies from east to west* (pp. 162–177). London: Routledge.
- Porter, M.E. (1998). *On competition*. Boston, MA: Harvard Business School Press.
- Prins, G., Galiana, I., Green, C., Grundmann, R., Korhola, A., Laird, F., Nordhaus, T., Pielke Jr, R., Rayner, S., Sarewitz, D., Shellenberger, M., Stehr, N., & Tezuko, H. (2010). *The Hartwell paper: A new direction for climate policy after the crash of 2009*. Oxford, London, UK: Institute for Science, Innovation & Society, University of Oxford and LSE Mackinder Programme, London School of Economics and Political Science.
- Ribeiro, S.K., & Abreu, A.A.D. (2008). Brazilian transport initiatives with GHG reductions as a co-benefit. *Climate Policy*, 8(2), 220–240, doi:10.3763/cpol.2007.0431.
- Román, M. (2004). *The United Stances of America: Opportunities in US climate change policies* (NV Report 5481). Stockholm, Swedish Environmental Protection Agency.
- Román, M. (2008). *From side effect to co-benefit: The opportunities and challenges of SD-PAM*. Report for the Swedish Energy Agency. Stockholm: Stockholm Environment Institute.
- Román, M., & Carson, M. (2009). *Sea change: US climate policy prospects under the Obama administration*. Stockholm: Commission on Sustainable Development, Government of Sweden.
- Román, M., & Hoffmaister, J.P. (2012). Climate and development: the potential for climate co-benefits in the Mozambican rice sector. *Climate and Development*, doi:10.1080/17565529.2012.698591.
- Román, M., Linnér, B.-O., et al. (2012). Development policies as a vehicle for addressing climate change. *Climate and Development*, doi:10.1080/17565529.2012.698590.
- Schreurs, M.A. (2008). From the bottom up: Local and subnational climate change politics. *The Journal of Environment Development*, 17(4), 343–355, doi:10.1177/1070496508326432.
- Singh, A. (2008). *Climate co-benefit policies in India: Domestic drivers and north–south cooperation*. Cambridge, UK: Climate Strategies.
- Smith, A. (2003). Transforming technological regimes for sustainable development: A role for alternative technology niches? *Science and Public Policy*, 30(2), 127–135.
- UNFCCC (1992). *United Nations Framework Convention on Climate Change*. New York: United Nations.
- UNFCCC (1997). *Kyoto protocol to the United Nations framework convention on climate change*. Bonn, Germany: UNFCCC Secretariat.
- UNFCCC (2006). *Submission from South Africa* (Dialogue Working Paper 18). Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention, Second workshop. Nairobi: UNFCCC.
- UNFCCC (2007). *Bali action plan [Decision 1/CP.13]*. Bonn: UNFCCC.
- United Nations (2010). *Progress to date and remaining gaps in the implementation of the outcomes of the major summits in the area of sustainable development, as well as an analysis of the themes of the Conference*. Report of the Secretary-General (A/CONF.216/PC/2). United Nations: New York.
- Unruh, G.C. (2000). Understanding carbon lock-in. *Energy Policy*, 28, 817–830.
- Wang, J. (2012). Chinese electric car and SD-PAM: a case study. *Climate and Development*, doi:10.1080/17565529.2012.698588.
- Winkler, H., Howells, M., & Baumert, K.A. (2007). Sustainable development policies and measures: Institutional issues and electrical efficiency in South Africa. *Climate Policy*, 7, 212–229.
- Winkler, H., Spalding-Fecher, R., Mwakasonda, S., & Davidson, O. (2002). Sustainable development policies and measures: Starting from development to tackle climate change. In K.A. Baumert, O. Blanchard, S. Llosa, & J.F. Perkaus (Eds.), *Building on the Kyoto protocol: Options for protecting the climate* (pp. 61–87). Washington, DC: World Resources Institute.