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► To cite this version:

Christophe Rynikiewicz, Anne Chetaille. Poverty reduction, climate change mitigation and adaptation: the need for intermediate public policies harnessing technology appropriation. The future of science, technology and innovation: 40th anniversary conference, SPRU, 11-13 septembre 2006, Sep 2006, United Kingdom. halshs-00096512v2

HAL Id: halshs-00096512

<https://shs.hal.science/halshs-00096512v2>

Submitted on 10 Oct 2006

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**Poverty reduction, climate change mitigation and adaptation :
the need for intermediate public policies harnessing
technology appropriation**

Communication à *The Future of Science, Technology and Innovation Policy*, SPRU
40th Anniversary Conference, Brighton, September 11-13, 2006

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Juillet 2006

Poverty reduction, climate change mitigation and adaptation : the need for intermediate public policies harnessing technology appropriation

Version August 15th 2006 (~5,000 words required)

presented at *SPRU 40th Anniversary Conference - The Future of Science, Technology and Innovation Policy*, September 11 - 13, 2006

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Abstract

A growing attention is given to identify workable approaches, bringing together both goals of climate change mitigation and adaptation and poverty alleviation. Challenges are numerous. Developing countries vulnerability to climate change is high. While access to energy is considered as a key priority for developing countries needs, the climate change constraint would appeal for development paths to be less intensive in greenhouse gases.

In this paper, we question the science and technology contribution to resilience in current international policy debate on poverty reduction and sustainable development. Secondly, key principles are defined to ensure an effective contribution of technology to addressing the challenges of leapfrogging. In particular, the ability to associate the stakeholders, define basic needs is fundamental in any technological transitions. Thirdly, we present the IMPACT Network's methodology and case studies that provide an original framework to design intermediate public policies, integrating multiple priorities in local and national strategies. This approach may help creating the enabling environments for technology development.

Keywords:

Climate vulnerability, inequalities alleviation, appropriate technologies, intermediate public policies, participation

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1 INTRODUCTION

Momentum is growing globally such that action to reduce greenhouse gases (GhG) emissions in developing countries may be required. Since the seminal contributions (Jacoby *et al.*, 1998 ; Shukla, 1998 ; Agarwal and Narain, 1991), huge literature focuses on equity in the allocation of quotas. However, until recent time, much attention had polarised on the details of the allocation rules, leaving backward vulnerability, development or “*écodéveloppement*” (Sachs, 1972) concerns and research of climate/development synergies. Propositions are emerging in the literature on how to reconcile the Gordian knot of development and climate (Hourcade, 2002 ; Mathy *et al.* 2005 ; IPCC, 2007). The InterAgency report (2003) identified a matrix of climate change impacts and the development goals. The challenge is to turn the conceptual links into a workable approach as any climate architecture will need solutions that work.

In section 1, we present the challenge for developing countries when dealing with climate change vulnerability, resilience, development and greenhouse gases (GhG) mitigation. The renewal of the debate on S&T may contribute to see how the needed technological transitions could enable systems innovation.

In section 2, we deal with the leapfrogging challenge at the heart of projects and public policies. Further research is needed in particular on questions such as the contribution of appropriate technologies and on how to ensure the enabling environment for technology transfer and development both for effective limitation of climate vulnerability and implementation of Millennium Development Goals (MDG).

In section 3, we propose to investigate inequality alleviation in the sustainable livelihood (SL) approach. The IMPACT methodology recommend building intermediate public policies to tackle climate change vulnerability, energy and poverty alleviation.

2 DEVELOPMENT AND CLIMATE CHANGE : PRIORITISING THE VOICES FROM THE SOUTH

2.1 Poverty and vulnerability to climate change

Poverty is admittedly multidimensional, involving income, living conditions or social relationships. Another fundamental cause of poverty is limited and insecure access to the natural resources that would enable to generate income, capacities, self reliance and security.

This used not to be obvious in the conventional thinking on poverty and environment. Since the United Nations Development Programme -European Commission Poverty and Environment Initiative, many more donors, NGOs and policy-makers are shifting policies or advocating an alternative “environmental entitlements” approach to understanding poverty-environment linkages (UNDP-EC, 2002). The emphasis has shifted from questions of resource availability to access, control and management, highlighting the role of formal and informal institutions in shaping people’s resource endowments and entitlements.

In particular, IPCC assessment shows that developing countries are likely to suffer the negative impacts of climate change. Poor countries and poor people will be most vulnerable to climate change as they largely depend on natural resources. Climate change could cause water stress, reduce food security, increase impacts from extreme weather events, millions of “climate refugees”, and could have potential severe impacts on health with increase distribution of vector-borne diseases (IPCC TAR, 2001). Observers have stressed the weak adaptive capacity of developing countries and the fact that the implications of climate change could undermine the efforts to reach the MDGs or even cancel progresses made.

Attention is growing towards pro-poor policy that should then reduce vulnerability to natural hazards and changes in average climatic conditions. At the community level, class, gender, ethnicity, age, level of education and access to resources all determine vulnerability (Blaike, 1994, IPCC, 2001, Warrick & Rahman, 1992, Adger & Kelly, 2001). The relationship between development policies and climate change vulnerability has been recently addressed by a number of multilateral agencies (InterAgency report 2003; VARG², 2005).

However, those reports fail to indicate that re-defining goals and fundamental shifts in wealth, industrial organisation or behaviour may be needed (Adams, 2001 ; Skair, 2001). As critics ask to reconsider development objectives and policies (NEF, 2004) to face new challenges, alternative theories of economic growth and development provide a useful framework for understanding linkages with climate change (Halsnaes *et al.*, 2002). Indeed, attention should be given to the understanding of development dynamics as there is high asymmetry of information, market are fragmented and not perfect, prices do not reflect production prices. Indeed, the socio-economic dynamics in the developing countries differ from those in the industrialised world at least for three reasons : presence of a *dual economy*, the importance of *informal economy* and *subservient interests* (Shukla, 2002). The dualistic theory of development was successful in describing the evolution of the traditional rural sector and migration to cities and emphasizing the need to focus on the living conditions of people.

Differences between urban and rural have to be kept in mind when looking at sectoral priorities.

2.2 Sectoral priorities and development needs

In developing countries, demand for infrastructure and higher standards of living imply that emissions would rise, but not necessary proportionally to GDP growth.

However, if current government policies and private investment do not change, over two-thirds of the projected increase in emissions will come from developing countries, which will remain big users of coal – the most carbon-intensive of fuels. According the analysis of IEA (2004), achieving a truly sustainable energy system will likely call for technological breakthroughs that radically alter how to produce and use energy.

In parallel to the adaptation challenge to climate change through land and water management systems or disaster management, main challenges in DCs countries are :

- to limit the rural exodus by improving living conditions
- to design sustainable urban planning that integrates poverty and inequalities alleviation.

² www.climatevarg.org

Davidson *et al.* (2003) present the development and climate nexus in sub-Saharan Africa. The « Development First » project (2002) identified energy and food/water sectors as key components in a country's adaptive capacity to climate change and key drivers in the GhG emissions. Authors also stressed their importance in terms of macroeconomic stability, income generation. These sectors highlight the need to focus on establishing and reinforcing the capabilities and empowerment of people.

The past five years have seen growing recognition of the importance of energy in development by the international community such as the World Bank (2000), UNDP (2000), DFID (2002). The 9th Commission on Sustainable Development³ (2002) stressed the central role of energy for achieving the goals of sustainable development "to implement the Millennium Development Goals (MDGs).. access to affordable energy is a prerequisite".

Most lifestyles above the poverty line are associated with a certain minimum level of energy consumption. Attention is progressively moving from lack of energy to access and more generally to vulnerability. Energy services such as heating, cooking, motive power, mechanical power, lighting, transport and telecommunications are essential for socio-economic development. The issue is then to join up the provision of energy services with health, education and other development goals as explained by ITDG (Intermediate Technology Development Group) in "powering poverty reduction strategies" (2002) or implemented by the World Bank energy for rural transformation initiative in Uganda.

Large amount of financial resources needs to be mobilised for expanding energy investments and services in developing countries. As stated in the last UN-Energy paper (2005) "the energy challenge for achieving the Millennium Development Goals", : "these investments account for a much larger share of gross domestic product compared to OECD countries and public sector will remain crucial for investing in energy service delivery for the poor, due to the private sector's limited appetite for risk in emerging markets".

2.3 The challenge of building SD PAMs

Winkler *et al.* (2002) propose to start from each country's unique situation and its development needs to tackle climate change. The concept has been widespread internationally and welcomed as a promising option under the name SD-PAMs, standing for Sustainable Development policies and measures. This approach is one of the most promising forms of participation of developing countries in the effort against global warming after 2012.

The SD-PAMs approach is a backcast from desired future state of development and long term goals which can be achieved either by tightening existing measures and policies, or by implementing more sustainable new ones that would also start "bending the curve" (Raskin *et al.* 1998) of the emission trajectory.

Literature of the IPCC WG III has already focused (and will grow in the fourth report (IPCC, 2007)) on climate mitigation in the context of "development, equity and sustainability". The choice of development path "immediately reveals that countries differ in ways that have dramatic implications for scenario baselines and the range of mitigation options that can be considered" (Banuri & Weyant, 2001, p.76). The challenge is to turn the conceptual links we identified into a workable approach and build a greening or "Decarbonisation path" (CAN, 2003). The energy sector as well as agriculture, buildings or urban planning, local resources use (materials, energy) and land-use planning would be targeted by those public policies.

However, the optimism is tempered by the difficulty to establish effective national sustainable development strategies in developing countries (and industrialised countries) since the Rio Summit. National Sustainable Development Strategies (NSDS) promoted by OECD and UNDP (2002) may provide a mechanism to integrate and coordinate responses. For example, in 1995, Uganda started a process of developing a comprehensive sustainable development strategy with an overall objective of poverty alleviation in its Poverty Reduction Strategy Paper (PRSP).

It seems that development can then be shaped in such a way to achieve the MDGs and at the same time reduce vulnerability to climate change (Davidson *et al.*, 2003). The question is presently how to move from pilot or small scale good practices to large scale implementation. Particular public policies are needed. The key challenge is to design alternative development paths to the older industrialised countries' GhG intensive one.

2.4 The Science & Technology contribution

Technology could be seen as the entry point of more radical shift in the socio-technological regime (Berkhout, 2002). Science and technology for sustainable development gained attention (WSSD, 2002 ; ICSU, 2002) but should be orientated to change significantly unsustainable modes of production AND consumption (Agenda 21). Particular public policies are needed to accelerate the rate of technical change and help defining the direction of technological trajectories that work for the poor (Leach and Scoones, 2006) and promote environmentally sound technology for adaptation increasing resilience of communities. In this context, the role of local knowledge practices and systems (Parajuli, 2001), traditional or indigenous knowledge are still underexplored.

Recent years have seen the re-emergence of debate about S&T in development – at a much high profile (Commission for Africa, Millennium project, NEPAD, UK : parliamentary enquiry on the role of S&T in international development preparing the DFID White Paper) but the purely technical treatment of science and technology misses the political and cultural aspects of its development (Leach & Scoones, 2006 ; Leach *et al.*, 2005). Moreover, the governance of existing and emerging technologies along SD and poverty reduction principles has to be reinforced. The ability to associate the stakeholders, define basic needs is a key challenge and fundamental in any technological transitions. Leach and Scoones advocate a slow race to citizens' solutions, informed by participatory approaches to development : "Rather than being viewed as passive beneficiaries of trickle-down development or technology transfer, in this race, citizens are seen as knowledgeable, active and centrally involved in both the 'upstream' choice and design of technologies, and their 'downstream' delivery and regulation."

Such an approach means reconceptualising innovation to involve a 'systems approach' which engages multiple actors and rethinks the cultural and social relationships that will enable a technology to work and impact on poverty reduction. This approach requires interdisciplinary research and 'bottom-up' problem definitions.

In the next section, we detail key principles to ensure an effective contribution of technology to addressing the challenges.

³ 9th session, Agenda item 4. Decision. Energy for Sustainable Development section 6.22 (2001)

3 KEY PRINCIPLES IN ADDRESSING THE CHALLENGES

It is essential to develop programmes and evidence-based policies that take into account the links between climate vulnerability, energy and poverty. Since the popularisation of the term by Goldemberg *et al.* (1998), leapfrogging strategies should be at the heart of policies and highlight the important contribution of technologies and appropriate technologies.

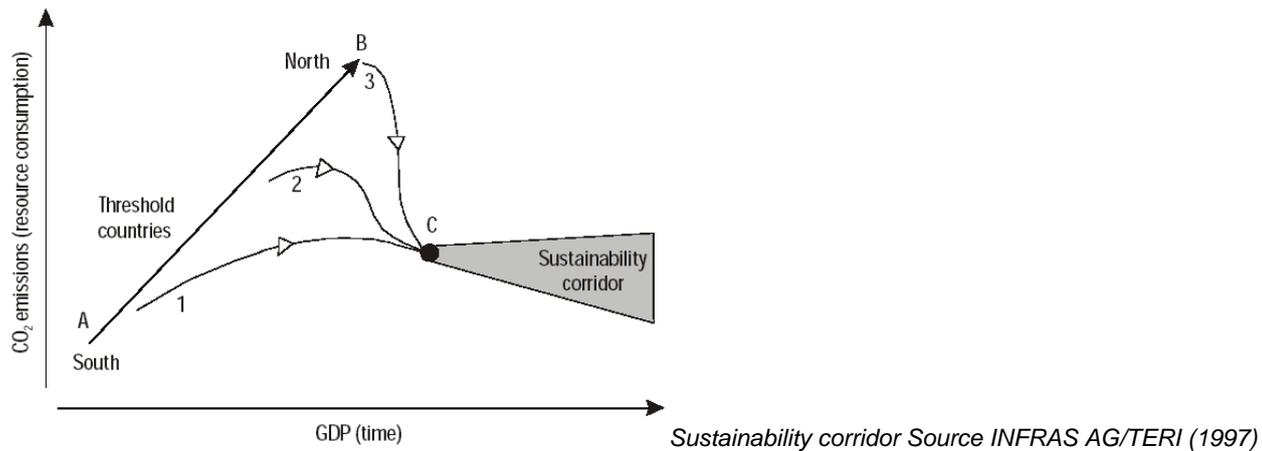
3.1 Catching up and leapfrogging

Many contributions on the industrial transformation of countries suggest a linear progression along the same path of development. However,

“As long as technology is understood as a cumulative unidirectional process, development will be seen as a race along a fixed track, where catching up will be merely a question of relative speed. Speed is no doubt a relevant aspect, but history is full of examples of how successful overtaking has been primarily based on running in a new direction” (Perez & Soete, 1988, p 460).

Leapfrogging relates mainly to the speed at which catching up is done. However the transition to sustainability entails a qualitative shift in the character and composition of productivity.

The global climate change scenario could then be alleviated through leapfrogging i.e. introducing clean technologies to energy intensive industries of developing countries or the upcoming ones. The challenge is there to apply “*leapfrogging*” as a development strategy for industrialising countries without following the GhG intensive path, as experienced in the past. In particular, cleaner production rather than “*end-of-pipe*” solutions (EOP) should be favoured.



The need for “*leapfrogging*” was first quoted in the energy sector (Goldemberg, 1998 ; UNDP 1999). It also exemplifies the difficulties when establishing leapfrogging policies in a “*strategic*” sector and moreover without defining goals.

Perkins (2003) reviewed critically the existing approaches to leapfrogging and called for a better understanding of the technological and policy requirements of cleaner industrialisation.

Suggestions are detailed to advance existing approaches to leapfrogging :

- defining more specific targets of leapfrogging,
- targeting priority sectors of investment,
- supporting for the development of leapfrogging capabilities and technologies,
- promoting cooperation between key actors.

Even if the question remains to know if leapfrogging exists by itself without public policies, particular public policies are needed to accelerate the rate of technical change and help defining the direction of technological trajectories.

Other components and policy reforms are needed for effective leapfrogging. Firstly, the need for a strong incentive regime echoes the question of fiscal reform, which is addressed in poverty reduction papers. However this theme goes beyond our paper. In parallel, capabilities will be required to select, absorb and innovate technologies that lie outside the conventional (GhG intensive) technology paradigm.

3.2 Enhancing technological capabilities and social stakeholders participation

Juma *et al.*, (2001) point that radical leapfrogging strategies will be viable if developing countries become autonomous agents in the generation of technologies and call for national systems of innovation in DCs. Given that accumulating the capabilities needed is a lengthy process, cooperation on those issues need ongoing stakeholders appropriation and policy support. It is far from clear that technologies, even cleaner ones, developed in industrialised countries are always suited to the requirements of users in DCs (WCED, 1987 ; Rajagopal, 1992).

Across the late 1960s and early 70s, interest grew rapidly on the concept of “*appropriate technology*” (AT), following the writing and activities of Fritz Schumacher. The debate renewed in the 80’s about the contribution of appropriate technologies (Emmanuel, 1981) to development in the developing countries. The current concern of some southern countries on Sustainable Policies and Measures to some extent echoes this debate (Najam, Huq, Sokona, 2003). Appropriate technology can be defined as « *a technology which is suited to the environment in which it is used* », environment being here considered in a broad sense (cultural, social, economic, physical, etc.) (Atkinson, 2004). Organic agriculture and renewable energy may open a new era. In all cases, (appropriate) technologies should help improving the efficiency and productivity of biomass use, for cooking/heating and through small scale, low cost, off-grid electricity supply. Bringing the issue of appropriate technology in the arena of technology cooperation is still at stake (Atkinson, 2004).

Past experiences in technology transfer (Kammen, 2002) indicate that technologies cannot succeed without the local infrastructures and know-how to support them (Ross, 1991 ; Lall, 2002). As emphasised by the IMPACT Network, to be realistic and effective, public policies must be designed in collaboration with social stakeholders. As underlined above, communities, poor and not so poor, need energy services for many different activities and for different sectors within the community. Therefore to ensure that technologies deliver the expected development benefits for poor people, they must be developed in a participatory manner. Projects and intermediate public policies would then have to foster green empowerment, local leadership, self sufficiency.

Intermediary organisations maximising cultural acceptance and poverty-reducing effects of S&T would built on capabilities to identify technology's potential benefits and adapt new tech to the country's needs AND constraints (Scott, 2001).

Institutional capacity needs also to be reinforced (OECD/IEA, 2003). In general terms, capacity can be defined as "*the ability to perform functions, solve problems, and set and achieve objectives*" (Fukuda-Parr *et al.*, 2002). In this paper, we do not go into details in the differences between capacities and "*capabilities*", as defined by Amartya Sen. Today, institutional capacity often implies "*a broader focus on empowerment, social capital, and an enabling environment, as well as culture, values and power relations that influences us*" (Segnestam *et al.*, 2002). OECD distinguishes climate relevant and climate specific capacities (OECD/IEA, 2003). Yohe (2001) also shows that vulnerability is a function of adaptive capacity or capacity to cope and that the mirror image of adaptive capacity could be defined as mitigative capacity on the emissions side of climate problem.

To our knowledge, no or very few field studies have tested both adaptive, mitigative and poverty alleviation capacity. Further research on the contribution of the notion of "*capabilities*" is needed on this question. Moreover, research and implementation have to provide more insight into how to design robust strategies at the local and national level to achieve development and climate goals at the same time. One can ask if particular projects could help to support the transitions via "*niche management*" (Kemp *et al.*, 1998) and transfer and development of technology.

3.3 Replicability : case study of "niche management" and SD-PAMs in South Africa

The Kuyasa project (Splading-Flecher *et al.*, 2003), which is a project of the SouthSouthNorth consortium, is very emblematic. It is promoted as an example that the Clean Development Mechanism (CDM) can address poverty by improving affordability of energy services, appropriate technologies and creating employment on the demand side. Kuyasa low cost housing upgrade consisted in the establishment of mechanisms to allow for the installation of solar water heaters, ceilings and ceiling insulation, and energy efficient lamps in 2309 low cost houses in Kuyasa, Khayelitsha, Cape Town. The projects builds on the poor as efficient managers of energy services within the constraints of the fuel and appliances they have access to. There is space for replicability via SD-PAMs at least in South Africa, as 1 million new low-cost houses have been built since 1994, most built without insulated ceilings or water heaters.

There are a number of reasons to consider the CDM as an important engine of sustainable development. Indeed, the (CDM) was designed as a potential source for financing sustainable development in developing countries. In particular, CDM has long been seen as an important cost effective way for carbon emissions to be reduced. However, Parties have by-and-large not used the above to shift the development paradigm in applying sustainable development requirements through the Designated National Authorities who say that stringent SD should not be a barrier to foreign direct investments (Thorne, 2005). Examples of projects applying a "*Gold Standard*" to "good" projects via sustainable development matrix (Thorne and La Rovere, 1997) are limited for the moment (IISD, 2005). The CDM rules explicitly allow for baselines that account for emission "*above current levels due to specific circumstances of host country*". Recent work have enable to design baselines that take into account the suppressed demand for energy services as a result of energy poverty and lack of energy infrastructure. Suppressed demand baselines is promoted as a way to reconcile CDM projects with poverty alleviation (Winkler & Thorne, 2002).

The Clean Development Mechanism (CDM) could help in initiating transitions, if designed properly (Pearson & Loong, 2003). Recent studies on how to make the development dividend work (Cosbey *et al.*, 2005) and propositions on policy or sectoral CDM (Figueres, 2005) show the interest of policy makers. Future methodologies could be linked with poverty alleviation approaches.

The methodology we present is a tentative to define basic needs, specifically in rural and urban areas, reducing the vulnerability of the poor in the land use sector and applying development strategies with a low GhG emission intensity. The challenge is to integrate multiple priorities.

4 SUSTAINABLE LIVELIHOOD AND INEQUALITY ALLEVIATION STRATEGIES

Sustainable livelihood approach (SL) provides one if not the only comprehensive framework to address the issues of vulnerability and development (DFID, 1999). Tangible assets (natural, productive, physical, and livestock and other forms of stock), intangible assets (social capital and non-market institutions allowing access or control of assets or resources), and capabilities (human and cultural capital, and life cycle characteristics) shape livelihood strategies (Conway and Chambers, 1992).

Although poverty alleviation is a generally accepted priority, it is grounds for controversy as the reality of its implementation highlights any ambiguities within its objective.

While it is generally agreed that poverty reduction strategies cannot succeed if they are not accompanied by policies to sustain rapid growth and improve income distribution, it is precisely the content and nature of those policies that are at the heart of the debate. The SL approach puts emphasis on governance issues that helps addressing inequalities.

Based on the results of a working group co-ordinated by GRET and IRD and the support of the French Ministry of Foreign Affairs, the IMPACT Network⁴ has been set up to understand the linkages between policies and practices related to poverty alleviation and inequalities reduction. Its aims are : to understand economic and social dynamics and the role of the stakeholders, rather than focusing solely on analysing poverty; to propose new approaches to public policies; to break down the barriers between different skills areas and to promote the emergence of a collective intelligence. More precisely, it proposes a methodological grid for analysis and design of public policies on alleviating poverty and reducing inequalities.

⁴ IMPACT Network : www.reseau-impact.org

4.1 Originality of the IMPACT approach : tackling inequalities

According to the IMPACT Network “impoverishment bars access to the resources that generate income and social bonds: education, skills, information, credit, land capital and the status inherent to members of society, etc”.

Access to these resources is the arena of social competitions, inescapably unequal. Without adequate regulations addressing these competitions, “structural” inequalities (of access to resources) increase, as well as poverty they breed. Impoverishment is therefore a form of “desocialisation”. Poverty is much a social and political relationship as an economic one. It goes hand in hand with inequality, marginality and vulnerability. Strong inequalities may be an obstacle to economic growth and may also continue with positive economic growth (Levy, 2002). This possible disconnection is mainly linked to public policies, to new forms of enrichment, of production conditions and of marketing.

The originality of the IMPACT Network on poverty alleviation is to emphasise the need to address the causes of structural inequalities and not their repercussions. Poverty alleviation and inequalities reduction are therefore linked.

4.2 “Intermediate public policies”

“Intermediate public policies”, designed with social stakeholders are essential to address structural inequalities, which generate poverty and exclusions. They must correct the way access to strategic resources (land, training, health care, credit, etc.) is distributed and not simply redistribute benefits of economic productivity.

The poor are not statistical groups of anonymous individuals, supposedly without social ties. They need to be reinstated in social relationships that give them access to income- and capacity- generating resources. Thus, poverty alleviation and inequalities reduction must be inclusive. It is the work of individuals, poor and not so poor, who, by taking an active part on collective organisations, obtain broader access to one or several strategic resources (land, credit, health care, status, etc.). They become social stakeholders, capable of influencing the choices and the corresponding actions.

However, the action of civil-society collective organisations cannot be reinforced without a government that effectively administers the country, makes use of the available leeway, exercises its regulatory functions, is accountable for the country’s long-term interests, is responsible for the consistency and effectiveness of policies, though without monopolising “public affairs”, accepts being held accountable.

The effort to alleviate poverty and reduce inequalities must translate into sector-based and local development policies, drawn up and implemented with the participation of the social stakeholders concerned by the area under consideration (farming, health care, education, etc.). It should seek in particular, collective organisations, which gather those who, up until now and in the majority of cases, have largely been excluded from the development and possible benefits of these policies.

Targeting policies that are both public (i.e. the outcome of a negotiations between the government and the social stakeholders) and intermediate (limited neither to occasional operations nor to macro-economic and financial control). This approach allows the various stakeholders concerned, to gather information, assess the conflicts of interest at stake and accept the necessary compromises among the various scales of action under consideration.

It is a dual process. On the one hand, the organised social stakeholders and the government are involved in a contractual commitment. On the other hand, the process ensures consistency between local actions and structural reforms, governed by macro-economic and international constraints.

4.3 Methodology

“Public intermediate policies” on poverty and inequalities alleviation can be designed in four steps:

1. 1st step: Identifying structural inequalities, their stakes, social stakeholders involved: to which structural inequalities corresponds the impoverishment process (access to capital, natural resources, land, etc.) and to which extent these inequalities generate distinctions, conflicts and reconciliation between social stakeholders.
2. 2nd step: Characterising the diversity and complexity of social stakeholders behaviour: to access to productive resources or to defend their positions, social stakeholders and groups implement diverse practices that correspond to various norms or “codes of conduct”. Analysing relationships between stakeholders, is needed to understand the social, economic and politic dynamics at work (balance of power, conflicts, alliances, etc.).
3. 3rd step: Identifying social stakeholders groups who may take on collective interest functions : stakeholders groups (farmer’s organisations, water management committees, etc.) may take on functions, potentially linked to poverty alleviation, by implementing other norms/practices than those of the co-operation agencies, public authorities, dominating groups, etc. Relying on stakeholder groups to design intermediate public policies, reflects this demand of a wider civil society involvement. To identify relevant groups, it might be needed to evaluate which groups take into consideration disadvantaged populations, may be able to negotiate, and to collaborate with public authorities, in particular local one’s. These groups represent the lever of changes upon which intermediate public policies will be based, while supporting and accompanying them in this new *role of recognised collective stakeholder*.
4. 4th step: Building contractual negotiation and regulation bodies between the state and stakeholders groups: if they are to be effective and realistic, public policies can not be an exclusively government-led domain. To change from government to public control, policies must gradually be constructed as a compromise between social stakeholders concerned, with the government continuing to play a pivotal role. Intermediate public policies seek to involve public authorities (central and local, officials and elected representatives) in bodies where negotiations take place with various stakeholders. Such negotiation and regulation bodies allow stakeholders groups to contribute to decision making and to local management. The status of these bodies will depend on the national institutional and political context and may evolve upon time.

However, it is a gradual and long term process for social stakeholders representing the most disadvantaged populations to merge, consolidate and shoulder responsibility. Therefore, actions with more immediate impact and more direct involvement of the government, the business sector, international partners and co-operation agencies are also needed.

4.4 Case studies

The IMPACT Network methodology has been tested on several sector-based policies: health care, education, land and rural development, micro-finance, urban water management, micro-enterprises, agricultural systems of production and consumption. The results of this work is synthesised and published (Levy, 2002).

Applied to the energy sector and climate change mitigation, this methodological grid could help addressing both issues of climate change vulnerability and of poverty alleviation and inequalities reduction. It would help understanding social and political issues at stake, relationships between the different stakeholders, social stakeholders groups that could be able to collaborate and negotiate intermediate public policies with public authorities (national, local). Assessment of the conditions of technology receptivity of climate friendly technologies is underway. The analytical framework will build on previous work on technology for SL (Scott, 1996, UNDP, 1999) and test hypothesis.

5 CONCLUSION

This paper showed that methodologies are needed takes into account the links between climate vulnerability, development and poverty and that it is essential to develop evidence-based policy.

The design of second generation of poverty reduction strategies will have to integrate multiple priorities ; clearly defined sustainable development priorities are definitely needed. Applying technological leapfrogging strategies to poverty alleviation and inequalities methodologies, such as SL or IMPACT approach is at the heart of the work to perform in the mean time. Implementation of projects and “*intermediate public policies*” will require the collaboration off all “*social stakeholders*”, public authorities, and particularly strong support from local authorities.

Given the actuality of the debates and the challenge to avoid technological lock-in in developing countries, more research would be needed. In our planned research, the case studies will provide insights on the conditions of robustness of social-ecological systems from an institutional perspective (Anderies *et al.*, 2004).

6 ACKNOWLEDGEMENTS

The authors acknowledge the input and support of other members from the GRET, in particular René Massé, Jacques Monvois, Yves Le Bars, as well as Marc Levy (IMPACT), Helene Connor from HELIO International, Steve Thorne, (SouthsouthNorth consortium) and Sandrine Mathy (CIRED).

Officials and representatives of various Designed National Authorities (DNAs) and NGOs in Latin America provided useful help during the year 2002. We also thank the CAN-France and CAN-Europe teams for technical discussions and the possibility to assist the UNFCCC conferences since 2000.

All responsibility for the content rests with the authors.

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