



Reconciling poverty eradication and quality of the environment: what are the innovative solutions?

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and Institut Veolia Environnement



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→ AFD, the Agence Française de Développement, is a public development finance institution that has worked to fight poverty and support economic growth in developing countries and the French Overseas Provinces for 70 years. AFD executes the French government's development aid policies.

→ Through offices in more than fifty countries and nine French Overseas Provinces, AFD provides financing and support for projects that improve people's living conditions, promote economic growth and protect the planet: schooling, maternal healthcare, help for farmers and small business owners, clean water supply, tropical forest preservation, and fighting climate change, among other concerns.

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→ Created in September 2001, the Veolia Environment Institute's main goal is to contribute to a fuller understanding of the transformations occurring in the field of the environment.

→ Its actions aim at detecting implications of those environmental changes on public policy, private initiatives and society in general. The Institute relies on its Foresight Committee to guide its reflections thanks to the diversity of expertise of its 7 eminent members: Helene Ahrweiler, Harvey Fineberg, Pierre Marc Johnson, Philippe Kourilsky, Rajendra K. Pachauri, Mamphela Ramphela and Amartya Sen.

→ The Veolia Environment Institute promotes foresight reflection on subjects related to the environment in partnership with universities or research organizations in order to shed light on the important issues for the upcoming decades. These investigative efforts aim to contribute to public debate on an international scale.

→ Its work relies on three kinds of activities: a research program, led in partnership with academic experts; a publication program based on two new publications: S.A.P.I.EN.S, a multidisciplinary scientific journal, and FACTS Reports dedicated to field actions. As a third initiative, it develops an international conference program.

→ The Institute has a program for a series of Future Environmental Trends Conferences internationally. Jointly organized with academic partners, these events seek to create a forum for discussion and to raise awareness on the major themes defined by the Institute among university circles, institutional organisations and civil society.

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INITIATIVE POUR LE DÉVELOPPEMENT ET LA GOUVERNANCE MONDIALE (IDGM)

→ In order to meet the challenges facing humankind, global governance now calls for a better understanding of the facts and a greater mobilisation of ideas. This dual objective was behind the creation of the Initiative for Development and Global Governance (IDGM in French).

→ The aim of the IDGM is to provide France with an independent think tank at the interface between public and private decision-makers and the academic world. Its main objectives are to observe and evaluate public policy and international cooperation mechanisms, and to organise and lead public debates and political discussions, all with the aim of generating new ideas.

→ Its creation has been supported by France and has received specific funding support from the Agence Française de Développement. The IDGM depends on two internationally known institutions, whose missions are complementary, the Ferdi (Fondation pour les études et recherches sur le développement international) and the IDDRI (Institut du développement durable et des relations internationales).

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CHAIR SOCIAL BUSINESS, ENTERPRISE AND POVERTY, HEC

The aim of the chair, launched in 2008 by HEC, with the support of Danone and Schneider Electric, is threefold:

- To educate the next generation of managers, in order for them to become more aware of societal challenges and aspire to be part of the solution.
- To develop quality research on strategic innovation in societal fields: academic research, applied research, and action research, writing case studies on themes involving social business and the ways in which business can contribute to alleviating poverty.

To carry out action research on specific initiatives for a more inclusive economy in developed countries focusing on experimentation lead by the Action Tank Enterprise and Poverty.

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PRESENTATION

Because the fight against poverty must go hand in hand with the fight for the conservation of the environment, it is crucial to understand the interactions between these two major challenges which must be met at the global level.

The Institut Veolia Environnement and the Agence Française de Développement wish to take part in this global reflection and have thus decided to organize this international symposium « Reconciling poverty eradication and quality of the environment : what are the innovative solutions ? » at the Maison de la Chimie on the 27th and 28th June together .

Numerous representatives of States, international organizations, public or private businesses, NGOs, as well as scholars and winners of the Nobel Prize will participate in this symposium, thereby helping gathering knowledge and know-how in order to fight against poverty on the long term.

These background papers have been elaborated to cover the four main themes of the symposium:

- Poverty eradication and climate change
- Poverty eradication and biodiversity
- Poverty eradication and quality of the environment in urban and peri urban areas
- Poverty eradication and quality of the environment, what is the role of the private sector?

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Biodiversity and poverty: old debates, recent evidence and emerging controversies

Pavan Sukhdev (GIST Advisory), Raphaël Billé (IDDRI), Romain Pirard (IDDRI), Kaavya Varma (GIST)

Achieving the goal of liberating half of the world's poor from their poverty by 2015 will either mark the true beginning of sustainability or the end of biodiversity at the hands of the best-intentioned policies.

Sanderson & Redford, 2003.

1. Old debates, emerging consensus

1.1. Why does biodiversity matter for poor people?

Because three quarters of the more than one billion people living on less than one dollar a day live in rural areas, the poor often depend on a wide range of natural resources and ecosystem services for their well-being, and are therefore potentially affected by their degradation. For example, over one billion people worldwide draw their living from forest-based assets. For poor people, biodiversity loss is often equivalent to the loss of biological insurance (MA, 2005). Richer groups of people are usually less affected because of their ability to purchase substitutes or to offset local losses of ecosystem services by shifting production and harvest to other regions¹. According to the Organization for Economic Cooperation and Development (OECD², in low-income countries, environment-based wealth accounts for around 25% of the total wealth (compared to less than 4% in OECD countries).

More precisely, biodiversity matters to poor people directly in four principal ways (Timmer & Juma, 2005):

→ Food security and health: Many poor people have limited access to land ownership and water and so are especially dependent on wild plants and animals for their food security. In many forest countries, bushmeat is an important source of protein. In Ghana for example, 75% of the population eat bushmeat regularly and wild animals constitute the main source of animal protein for rural households. However, in many

countries, the availability of bushmeat and wildlife is declining and this is having negative impacts on nutrition (DFID, 2002). Declining ecosystems can also have negative impacts on health, particularly on that of poor women, as they increase the burden of searching for and carrying heavy loads of water, wood or fodder.

→ Income generation and livelihoods: For the majority of poor people living in rural areas, dependence on agriculture is high. The agricultural labour force, most of it in the developing world, includes over 20% of the world's population and accounts for almost half of its total labour force (MA, 2005). This means that their livelihoods rely on several ecosystem services that are crucial to agriculture, and on the diversity of food crops available. In many climatically vulnerable regions, poor households prefer traditional varieties or so called land races of rice and other crops due to their greater resilience to climate fluctuations. For example, in Jeypore, India, cyclonic conditions, long spells of drought and very high temperatures within a crop season can result in yield stress: land races of rice have proved genetically resilient and withstand the harsh weather while so called "high yielding varieties" in nearby areas suffer irretrievably (Steele, Oviedo & McCauley, 2006).

→ Reduced vulnerability to shocks: Poor people are often highly vulnerable to shocks and stresses associated with climatic events. These shocks can be amplified by ecosystem degradation, while better ecosystem management can reduce the impact of

¹ For example, as fish stocks have been depleted in the North Atlantic, European and other commercial capture fisheries have shifted their fishing to West African seas, but this has adversely affected coastal West Africans who rely on fish as a cheap source of protein.

² http://www.oecd.org/document/0/0,2340,en_21571361_36099755_36099814_1_1_1_1,00.html. Accessed on 09/04/2011.

such events. There is growing evidence of the role of coastal vegetation (like mangroves) and natural protection (like coral reefs) in mitigating coastal storms and cyclones. Where these ecosystems are declining, poor coastal populations often become more vulnerable. In Bangladesh, the disappearing swamp forests of the haor, which have served as a natural barrier in the past against the monsoon waves, has led to much more severe erosion. As a result, poor households have been compelled to increase spending to protect their tiny homesteads every year (Steele, Oviedo & McCauley, 2006).

→ Cultural and spiritual values: For many poor people, biodiversity is inextricably linked with identity, culture and spirituality. It is therefore an integral part of their very existence. In India for example, there are over 50,000 sacred groves that play an important role in the religious and socio-cultural lives of local people (Gohkale et al., 2001). Located within wilderness areas, protection is provided to patches of forests dedicated to deities and ancestral spirits. A number of religious celebrations take place in these groves, which are an integral part of the spiritual beliefs of the communities.

1.2. A complex relationship: the biodiversity–poverty nexus

In many ways linking conservation with poverty reduction is more of an art than a science Fisher et al., 2005.

1.2.1. An unresolved debate at the general level

Biodiversity matters to the poor, but the linkages between biodiversity and poverty are much more complex and dynamic (Billé, 2006a). The intense debate on this nexus demonstrates that there are no simple causal relationships between biodiversity and poverty, although they do coincide in many ways according to an increasing body of evidence (see Hernandez-Morcillo et al., 2010). Widespread concepts such as “pro-poor conservation”, often utilized in an incantatory manner, tend to overlook such complexity (Billé & Chabason, 2007). Nevertheless, conservationists and development practitioners and policy makers often have different opinions on how—and whether—to link biodiversity conservation with poverty reduction. The growing volume of literature on the subject highlights how complex and context-specific poverty-conservation linkages are, and how subjective is their interpretation (Roe & Elliott, 2005).

In this context, attempts to find common ground often result in platitudes that fail to confront real problems faced by development projects, plans and policies (Brockington et al., 2006). This is why endeavours to

address real issues—rather than pretending they do not exist— as well as efforts to be more specific about definitions, contexts and activities when undertaking assessments, are so badly needed. As a matter of illustration: (i) natural resources broadly speaking (e.g. timber) are sometimes mistaken for biodiversity (Balmford et al., 2008 show that biomass may provide greater benefits to poor people than diversity of species), (ii) poverty indicators will never comprehensively encapsulate the thinking on poverty complexity, and (iii) conservation of biodiversity differs substantially from the sole presence of biodiversity because the former depends closely on how conservation is performed (e.g. does ecotourism lead to equitable distribution of the revenues? Does conservation mean promotion of agroforestry or exclusion of people from protected areas?).

For instance, the International Institute for Environment and Development’s (IIED) Poverty and Conservation Learning Group typically aims at addressing the real issues beyond platitudes. Among others, it has provided useful insights on a number of key hypotheses (see Box 1), all of which would deserve a whole section of this paper. However, here we shall only briefly discuss two questions that we think are particularly critical (Billé & Pirard, 2007):

→ Is biodiversity conservation a route to poverty alleviation? And/or

→ Is poverty alleviation a route to better biodiversity management?

Some have argued that biodiversity conservation is incompatible with lifting poor people out of poverty; others that the most effective intervention for biodiversity conservation is poverty reduction. Such questions are quite sensitive and may have very concrete consequences for the way development policies and projects are designed. We shall mainly introduce the debate here and underline simplifications that should be avoided—not necessarily answer these questions, which remain partly open.

1.2.2. Is biodiversity conservation a route to poverty alleviation?

Conserving biodiversity is not always favourable to the poor. Many examples have been documented worldwide where conservation activities have negatively affected poor people living nearby (Brockington, 2003; McLean & Straede, 2003). This seems to be especially true of the establishment and management of protected areas, and of related donor-funded projects. Nevertheless, the risk of further marginalizing and impoverishing poor people is clearly not specific to conservation (beside the fact that conservation takes various forms with various im-

Box 1. What do we know about conservation–poverty linkages? Accepted and contested relationships

Hypothesis 1: There is a geographical overlap between biodiversity and poverty

Conclusion: At the global level there is a geographical overlap between biodiversity and poor people but it becomes less pronounced the more ‘the South’ is disaggregated. At the national and sub-national levels the two occasionally coincide, but governance factors are generally more significant than geography in determining where biodiversity prevails, where poor people live and how the two interact.

Hypothesis 2: Poor people depend on biodiversity

Conclusion: All of humanity is dependent on biodiversity for the goods and services it provides, but the poor appear to be particularly dependent (although this is hard to quantify). In a large part this dependency is related to the role that biodiversity plays in poor people’s farming systems and the degree of resilience and adaptability to environmental change that poor people have developed.

Hypothesis 3: Poor people are responsible for biodiversity loss

Conclusion: Poverty may contribute to biodiversity loss, but it is only one of a number of factors.

Whether poor people conserve or over exploit biodiversity is dependent on specific circumstances and contexts—and particularly on the influence of external governance factors—and not a question to which a generalized answer can be given.

Hypothesis 4: Conservation activities hurt poor people

Conclusion: The impacts of conservation activities are not evenly spread. Some forms of conservation activity may have negative consequences for poor people. Others may benefit poor people or even be initiated by poor people. Governance factors appear to be critical once again.

Hypothesis 5: Poor people can undermine conservation

Conclusion: Unless different priorities for biodiversity and incentives for conservation are recognised, local people are often bound to be perceived as ‘undermining’ conservation, and indeed may proceed to do so. Local people need to be engaged to conserve aspects of biodiversity that are critically important to their livelihoods, if broader-based, long-term public support for protection of globally threatened biodiversity is also to be achieved.

Hypothesis 6: Biodiversity is irrelevant to poverty reduction

Conclusion: A lack of quantitative data—particularly at national

levels—makes it difficult to challenge the assumption that biodiversity is irrelevant for poverty reduction. In general, poverty reduction policies tend to rely on agriculture—both at the household level through supporting smallholder farmers for their subsistence and income-earning potentials, and at the national level through agriculture’s potential to drive economic growth. Making a better case for biodiversity in poverty reduction therefore means clearer articulation of the links between biodiversity and agriculture and between biodiversity and ecosystem services (those that support agriculture and those that generate other benefits)³.

Hypothesis 7: Poverty reduction activities can cause biodiversity loss

Conclusion: Historical patterns of rural development—based on primary commodity production—have not performed well for biodiversity—nor in many cases have they performed well for poor people either. Innovative approaches to poverty reduction that are founded on local knowledge, institutions and processes are critical—both to achieving the Millennium Development Goals (MDGs) and tackling biodiversity loss.

Source: Roe & Elliott, 2005.

pacts as mentioned above). It is part of the vicious circles deeply embedded in most societies that tend to make poor people poorer and rich people richer. The development of any economic activity—including conservation but also forest exploitation, handicraft, trade, tourism, infrastructure, etc.—has a tendency to reinforce these

circles (“poverty traps”) unless appropriate attention is paid to the issue. To take this one step further, in a given country, with funding from a given donor, conservation activities are usually just as democratic, participatory and pro-poor as the rest of a government and donor’s policy (Billé, 2006b). When the political context does not

³ For instance Pretty et al. (2006) demonstrate in 56 developing countries how productivity of crops was increased by almost 70% due to investments in ecosystem services and biodiversity.

take into account the needs and desires of marginalized groups of stakeholders, especially the poorest, when their access to natural resources, their right to participate in the decisions that directly affect their lives, are denied, projects and policies whose primary objective is biodiversity conservation cannot be expected to be transparent and equitable. Good governance at the national and local levels is obviously necessary for biodiversity conservation to bring expected benefits.

However, that biodiversity conservation can contribute to poverty alleviation is supported by a broad consensus—many even argue that the potential of biodiversity conservation to contribute to poverty reduction is still largely unrecognised by developing country governments and international development agencies (DFID, 2002; Koziell & McNeill, 2002). Much depends on the how: how conservation projects are designed and carried out, how poor and marginalized people are consulted, involved in and associated with the conservation objectives and activities, how poverty alleviation is mainstreamed in biodiversity projects and policies, etc. Much also depends on the alternative without conservation: does conservation take place instead of local development by local people (e.g. agriculture), or does it take place instead of biodiversity degradation as a consequence of activities undertaken by (and for the benefit of) companies unsustainably extracting natural resources (e.g. forest conversion for export-oriented oil palm production)? That said, there are many examples where biodiversity conservation has benefited poor people in developing countries. More precisely, this happens in two main ways (Steele, 2004), at the local and national levels:

- A route out of poverty for poor people: biodiversity can, particularly in areas with few other economic opportunities, provide a way for poor households to generate a surplus and eventually invest in other economic activities and escape poverty.
- A route out of poverty for poor countries: at a macro-level, biodiversity and ecosystem services can, under certain conditions, generate growth at an economy-wide level that may in turn, under certain conditions, benefit poor people. Biodiversity-related natural resources often provide a key export, foreign exchange earner and source of government revenues, as illustrated by the importance of seafood exports from Africa and Asia.

Both ways, however, demand that biodiversity not be exploited beyond sustainable levels, and that the growth generated be reinvested to shift away from biodiversity-dependence. Moreover, the highly speculative character of the convergence between conservation and poverty alleviation is reinforced by the various, contrasted meanings of “poverty” (Billé & Pirard, 2007). For example,

depending if material wealth or flexibility is favoured, the conversion of a primary forest into a mono species industrial plantation may be seen as a driver of enrichment (with increased cash incomes in the short term) or on the contrary of impoverishment (reduced choices in the long run, vulnerability to commodity markets fluctuations...). This was summarized by Wunder (2001) when opposing the roles of “poverty trap” and “safety nets” played by biodiversity-rich areas, of which tropical forests are an emblematic example.

The biodiversity-poverty relationship clearly has to be addressed in dynamic terms. We need to be cautious about statements on the dependence of the poor on biodiversity - this dependence being demonstrated in many studies reviewed by Roe (2010). To say that poor people depend on biodiversity does not say much about their fate in case of biodiversity loss, which may be better (alternative sources of income) or worse (disappearance of livelihoods). In other words biodiversity conservation may be an obstacle to economic improvement of people’s lives, or on the contrary it may be extremely important because of positive impacts on vulnerability and an absence of alternatives. All in all, Roe (2010) mentions that “at least six conservation mechanisms have been a route out of poverty for some people in some places: community timber enterprises, nature-based tourism, fish spillover, protected area jobs, agroforestry and agrobiodiversity conservation”.

1.2.3. Is poverty alleviation a route to better biodiversity management?

This hypothesis is supported by the well-known Environmental Kuznets Curve, which suggests that environmental quality declines as income rises until income reaches a certain level, at which point environmental quality improves. However, this curve is strongly disputed, be it by pessimists or optimists (Dasgupta et al., 2006), and even for its advocates the extent to which it applies to biodiversity is questionable: once a species is lost, it is gone forever.

A majority of analysts actually seem to believe that poverty alleviation will not in itself achieve conservation goals. For example, experience from Africa and Asia shows that as wealth increases, so too does the demand for wildlife (Robinson & Bennett, 2002) and even more impactful is the availability of capital for more destructive and large-scale activities. More pertinent questions may therefore be: can reducing poverty actually contribute to halting biodiversity loss? If yes, how?

Swanson, among others, highlights the apparent incompatibility between biodiversity and development: “states with high material wealth have low biodiversity wealth and vice versa” (in Koziell & Saunders, 2001). In

the same perspective, the MA scenarios suggest that “future development paths that show relatively good progress toward meeting the poverty, hunger reduction, and health targets also show relatively high rates of habitat loss and associated loss of species over 50 years. This does not imply that biodiversity loss is, in and of itself, good for poverty reduction. Instead, it indicates that many economic development activities aimed at income generation are likely to have negative impacts on biodiversity unless the values of biodiversity and related ecosystem services are factored in”.

Consequently, while poverty can be a root cause of biodiversity loss, this is just as true of wealth and economic development: “deforestation, for example, is partly caused by local demand for agricultural land or construction materials, but is even more fundamentally driven by the industrialized world’s demand for timber and the growing international trade in forest products” (UN Millennium Project, 2005), as well as by demand for biofuels. Do poor people degrade their environment because they are poor? Do increasing incomes affect the way in which poor people exploit natural resources? IIED’s Poverty and Conservation Learning Group came to the conclusion that “issues of governance, security of land tenure and access to resources are likely to have a significantly greater impact on the way in which people over-exploit now or conserve for the future. (...) Poverty is only one factor driving biodiversity loss. Reducing poverty will not necessarily, therefore, lead to biodiversity conservation unless the other drivers are also addressed” (Roe and Elliott, 2005). Poverty alleviation may thus yield better biodiversity conservation only if tied to explicit conservation objectives, strategies, policies and actions, in an appropriate governance context (World Resources Institute, 2005).

1.2.4. An intricate problem with no “silver bullet”

The aim of this short discussion is mainly to acknowledge that the linkages between poverty and conservation are dynamic and context specific, reflecting geographical, social and political issues among the groups involved (Kepe, Saruchera & Whande, 2004) more than their actual poverty level. For instance Indonesian hunters-gatherers and slash-and-burn farmers never deeply degraded surrounding biodiversity, contrary to what migrants did through wood harvesting and land clearance for agriculture. In material terms, though, they are equally poor.

In any case, linkages between poverty and conservation are so complex that they rarely authorize simple cause-and-effect analyses. Synergies and positive externalities between sustainably managing biodiversity and alleviating poverty do exist. They are sometimes obvious, but

more often win-win solutions to poverty and conservation dilemmas are elusive, and trade-offs tend to be the more realistic outcome (Petersen & Huntley, 2005): trade-offs between biodiversity and economic development on the one hand, between those who benefit and those who bear the costs on the other hand. Unfortunately, there is no “silver bullet” (Robinson & Bennett, 2002) for the twin goals of conserving biodiversity and preventing the people whose lives now depend on biodiversity from being driven further against the wall.

2. New insights from the TEEB study

2.1. Conservation as an economic stimulant with equitable returns

Traditional economic measurement indicators like GDP, National Income and Household Consumption fail to reflect the true value of the flows of ecosystem services and biodiversity for society. TEEB for National and International Policy Makers – Chapter 3, states that for developing countries, where the rural poor are dependent on natural resources for employment and subsistence, the exclusion of ecosystem services flows from national accounting systems results in an unsustainable future for generations to come. Additionally, this leads to a tyranny of the average where there is an implicit assumption that a measure of average progress like GDP can reflect progress in the distribution of wellbeing within society at large (TEEB D1 for National and International Policy Makers – Chapter 3 2009). For low-income groups in rural areas, which mainly rely on free services supplied by ecosystems that have little or no market value, the inadequate recognition of environmental resources in national accounts (focusing on productive functions of ecosystems: timber, energy, etc) causes an extraction of valuable commodities from ecosystems at the expense of the free services that the poor depend on (TEEB Climate Issues Update 2009), although admittedly also at their benefit when land development takes place in an appropriate manner (cf section 1). Consequently, the degradation of the natural capital substantially reduces the welfare of a significant part of the population that is poor.

A decline in future ecosystem services and biodiversity coupled with the poor getting poorer has serious implications for the continued economic growth and progress of countries. This is because the importance of natural resources to economies is likely to be under-appreciated resulting in sub-optimal use of these assets, economically, environmentally and socially (TEEB Climate Issues Update 2009). Thus, in an assessment by TEEB’s Climate Issues Update, if the assets are underperforming and getting eroded, natural capital gets run down and future benefit streams of the country get increasingly

smaller. The long-term sustainability and economic performance of a country are then in question.

Haiti for example (left with only 3.8 percent of its forest cover in 2004, see box 2), is facing strong ramifications from severe environmental degradation and deforestation resulting from an inadequate recognition of the significance of natural resources for the country. Due to a loss of natural capital, disposable incomes and critical assets of the poor have disappeared, translating into political turmoil, health concerns and an emergence of environmental refugees that have effects on the stability of Haiti and its relations with neighbouring states (Peduzzi, 2005).

Box 2: Environmental degradation and vulnerability: Haiti and the Dominican Republic

The relationship between environmental degradation and impacts on vulnerable populations is evidenced by the differing impact of Hurricane Jeanne in Haiti and the Dominican Republic (DR).

Haiti was originally fully forested but from 1950-1990 the amount of arable land almost halved due to soil erosion. Deforestation reduced evaporation back into the atmosphere and total rainfall in many locations has declined by as much as 40 percent, reducing stream flow and irrigation capacity. By 2004 only 3.8 percent of Haiti was under forest cover compared to 28.4 percent of DR.

In Haiti, floods and Hurricane Jeanne killed approximately 5,400 people due to destruction of mangroves and the loss of soil-stabilising vegetation, causing landslides that led to most casualties. In DR, which is much greener and still has 69,600 hectares of mangroves, Jeanne claimed less than 20 lives (Peduzzi 2005).



This stark difference reflects the impacts that deforestation and resource degradation have on the resilience of poor people in the face of environmental hazards.

It also highlights the higher risks experienced by vulnerable populations that do not have enough disposable income, insurance or assets to recover from disasters. With an average monthly income of US\$30.5, Haitians are deeply affected by the worsening state of the environment.

Source: Peduzzi 2005

A new adapted measure of GDP such as GDP of the Poor is required to reflect the dependence of the poor on natural resources and integrate environmental, economic and social aspects to reflect the vulnerability of poor people if valuable ecosystem services are lost. The resulting 'real income' based on the true cost of biodiversity loss would demonstrate the actual well-being of the poor and have cascading impacts on the longevity of economic prosperity in a country, as it would ensure equitable benefits reaching the poor from evident growth.

2.2. A Tale of Two Tragedies: the measurement gap around the rural poor

Traditional measures of national income like GDP, which measures the flow of goods and services, can be misleading as indicators of societal progress in mixed economies because they do not adequately represent natural resource flows. This misrepresents the state of weaker sections of society, especially in rural areas.

To move beyond paradigms focused on income, human development indices (HDI) have been developed to provide a broader-based measure of development. However, HDI also fails to take account of the contribution of natural resources to livelihoods. The World Bank has published total wealth estimates (Dixon, Hamilton and Kunte, 1997), which seek to account for the contribution of natural capital, but this is a stock concept. There is also a need for a flow variable, which adequately captures the value of natural resource flows, even though these are mainly in the nature of public goods.

Developing "green accounts", with adjustments to GDP to account for natural capital depletion, is a step in this direction but does not show the social dimension. Similarly, the Genuine Savings Indicator (Pearce and Atkinson, 1993) does not indicate the real cost of natural resource degradation at the micro level, even though this is where real and often acute costs are felt by the poorest and most vulnerable sections of society.

Particularly for developing countries, where many poor people are dependent on natural resources for employment and subsistence, the result is often a tale of two tragedies. The first is that the exclusion of ecosystem service flows from the accounts of society, including GDP, results in a lack of policy attention and public investment in ecosystem and biodiversity conservation.

The second tragedy, which is intra-generational rather than inter-generational, is because of the "tyranny of the average", or an implicit assumption that an increase in any measure of average progress (such as "GDP Growth", for example) can reflect progress in the distribution of well-being within society at large. This is as

much a matter of inappropriate psychological conditioning as it is bad economics, because “GDP growth” as a headline indicator has become so ubiquitous that it is used in everyday conversations as a proxy for all forms of national economic performance which it was never intended to be, not least as a measure of progress.

2.3. Measuring what we manage: GDP of the poor

A “beneficiary focus” helps better recognize the human significance of observed losses of ecosystems and biodiversity. The costs to the welfare of poor and vulnerable sections of society of the depletion or degradation of natural capital (water availability, water quality, forest biomass, soil fertility, topsoil, inclement micro-climates, etc.) are real and can be acute at the micro-level, but are not recorded systematically or brought to the attention of policy makers. Hence the need to move beyond broad measures of income such as GDP, and to focus sharply on the well-being of the poor. For transitional economies where rural and forest-dweller poverty is a significant social problem, we advocate using a measure of GDP, which is sectoral and focused on their livelihoods: TEEB calls this “GDP of the poor”.

Like sustainable development frameworks, TEEB argues that what we need is a three dimensional metric, which can integrate the economic, environmental and social aspects together, and which can show the dependence of poor people on natural resources, and the links between ecosystems and poverty, thereby indicating the vulnerability of these sections of the population if valuable natural resources are lost.

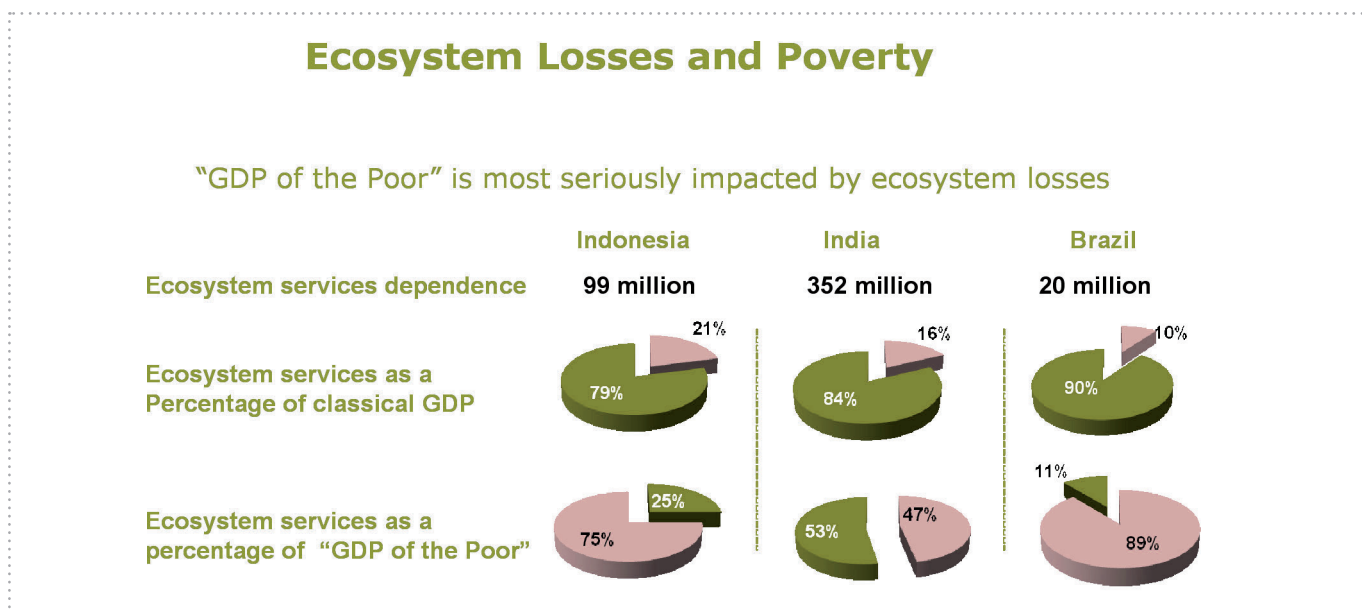
TEEB proposes a new indicator named “GDP of the poor”, as the key beneficiaries of forest biodiversity and ecosystem services are in fact the rural poor and forest-

dwellers. The proportion of GDP that can be attributed to the rural and forest-dependent poor directly is termed “GDP of the poor”. We measure this for mixed economies (i.e. where rural and urban economies differ, and where the former are more agricultural and the latter more industrial and service-sector) where at the same time there are wide income disparities (such as India, Indonesia and Brazil).

We find that the lower-income, rural and forest-dependent sectors are much more vulnerable to any loss in biodiversity than the country’s economy as a whole. Thus the “GDP of the Poor” indicator adjusted for the contribution of ecosystem services can be used along with other income indicators for targeting holistic improvements in livelihood incomes for the poor, accounting not just for their recorded incomes (included in National Accounts / GDP) but also their benefits from ecosystem services.

Sound development would imply growing a holistic measure of income, i.e., an environmentally adjusted “GDP of the Poor”. Thus, this indicator could reflect the impact of loss in biodiversity to the “real income” and well-being of the poor. In a society in which the “GDP of the poor” has a high percentage of ecosystem services included, that indicates that a loss in biodiversity would harm the poor more, thereby invoking the vicious circle of poverty and environmental degradation.

Compared to “average” Environmentally Adjusted GDP calculations (i.e. unrecorded ecosystem service values as a percent of national GDP) there are stark differences visible when we estimate ecosystem service values flowing to the poor as a percent of the “GDP of the Poor”. We give in Figure 1 the results of these calculations done for three nations (Indonesia, India, Brazil), which have mixed agrarian and industrial economies. (figure 1)



It is apparent that the extent of dependence of the rural poor on ecosystem services is very high, and measuring this at a national level must become a matter of priority in order to support an improved development paradigm, in which access of the poor to ecological resources and ecological regulation from natural areas is ensured as part of a holistic development strategy. It is often said that in developing countries, “biodiversity policy is development policy” and TEEB’s work on this does appear to evidence the wisdom of this observation.

For India, the main natural resource-dependent sectors – agriculture, forestry and fisheries – contribute around 16.5 percent to GDP. When the value of ecosystem services provided by forests and the value of products not recorded in GDP statistics are added, this increases the adjusted contribution of agriculture, forestry and fishing to GDP from 16.5 percent to 19.6 percent. For the rural poor, the average per capita value from these combined sectors was US\$138.8. When non-market goods are included as well as the value of ecosystem services, per capita effective income goes up to US\$260. This is a much larger increase than for the average across the economy as a whole. A similar pattern, with even more significant increases, is also observed in the Brazilian and Indonesian case studies.

2.4. Practical steps towards measuring the GDP of the Poor

Tackling poverty and biodiversity loss calls for efficient and sustainable utilization of natural resources. Development paradigms should take into account the nexus between growth, poverty and environment. We should emphasize that degradation of ecosystems and loss of biodiversity has different impacts at the macro and micro level. At the micro level, it leads to the erosion of the resource base and environmental services. Viewed from an “equity” perspective, the poverty of their beneficiaries makes these ecosystem service losses even more acute as a proportion of their incomes and livelihoods.

The first step for economies where rural and forest-dweller poverty is a significant social problem is to use a sectoral GDP measure focused on and adapted to their livelihoods. At a micro-level, including ecosystems and biodiversity as a source of economic value increases the estimate of their effective income and well-being provided that all services are systematically captured. Initially, adding the income from ecosystem services to the formal income registered in the economy will appear to reduce the relative inequality between the rural poor and other groups, as urban populations (rich and poor) are less dependent on free flows from nature. However, once natural capital losses are factored in, the picture of inequality changes as these affect the rural poor much

more: it becomes clear that where natural capital is being lost, the rural poor are even less well off. Moving towards this kind of measurement would be useful for policy making.

3. Two inconvenient truths? (Re)emerging issues on development and biodiversity

3.1. The “environmentalist paradox”

The MEA (2005) closed on the diagnosis that the degradation of ecosystem services over the last decades had led to significant improvements in human well-being. This finding can be qualified as a paradox if one considers the environmentalist’s expectation that degrading biodiversity has adverse consequences in terms of well-being, as abundantly evidenced in specific cases (cf. previous sections). This is indeed a prominent argument in favour of biodiversity conservation for the sake of ecosystem services’ continued provision over time. Stimulating hypotheses have been proposed by Raudsepp-Hearne et al. (2010) to explain this apparent paradox: (i) inadequate capture of human well-being by existing indicators; (ii) contrasted importance of the various categories of ecosystem services, with food production outweighing the others; (iii) decoupling between human well-being and ecosystem services due to technological substitution; and (iv) the existence of a time lag between degradations of ecosystems and their impacts on human well-being. Despite their efforts to test these four hypotheses, the authors do not draw clear conclusions as to which one(s) is/are determinant.

We find it useful here to make a link between these hypotheses – a substantial food for thought – and the issue of poverty alleviation. Raudsepp-Hearne et al. point to the possibility that increased food production overall is a key factor explaining the environmentalist paradox. But one may wonder if this increase in food production has benefited evenly to all categories of the population. It is no mystery that rural populations have often been dominated for a long time by urban ones, both in developed and developing countries, and from a political, social and cultural point of view. Undernourishment is likely to have diminished more in urban areas than in rural areas, and it is important in this respect to remember that among the 840 million undernourished people (Griffon, 2006), about three-thirds live in rural areas and make a living of agriculture. For reasons of socio-political domination by urban elites and the correlation between national prices for agricultural products and international markets, poor rural populations both sell their products at rather low prices and get a small share

of the added value. In this context, one could argue that increased food production as a factor explaining the environmentalist paradox does not necessarily support the interest of the poor, at least in rural areas.

Regarding the hypothesis that human well-being is poorly captured in the MEA, and according to the previous section highlighting the specific effects of the degradation of ecosystem services on poor people, it can also be argued that this is all the more true for those living nearby preserved ecosystems. Beside productive functions as defined by the MEA (and to which food production belongs), cultural functions play an important role in terms of human well-being. Who would assert that living next to an oil palm plantation is equivalent, *ceteris paribus*, to living near a natural forest where biodiversity plays a key role in terms of games, culture and other social practices (Sheil et al., 2005)? Examples from around the world, including again from sacred groves in India, are many and extremely telling.

Arguably, the possibility that there is a time lag between the degradation of ecosystem services and their consequences on human well-being deserves scrutiny. Would it be a hasty answer to an extremely complex question? In a more dynamic approach, it could for instance be argued that if the degradation of ecosystem services generates development, it allows for the substitution of natural capital by man-made capital. Then the poor who suffer from the erosion of biodiversity are those who remain poor as ecosystem services degrade, whereas those who manage to embark in the development process are not considered “poor” anymore: in that sense the actual benefits that the poor retrieve from biodiversity loss tend to remain invisible. Such a view would tend to support the idea that conservation is not directly linked to poverty alleviation, although it may at least avoid more extreme poverty owing to the “safety net” argument.

3.2. Poverty or inequalities? Re-opening the Millennium consensus

While fighting poverty is undoubtedly a noble cause, setting it as a global sustainable development priority is a choice that may need to be debated, at least when it comes to biodiversity conservation. Indeed, there are conceptual and practical reasons why a hasty consensus on the actual global objective may conflict with the biodiversity agenda. Even if accepting as a postulate that the poor should be provided with the right to choose their future and with the opportunity to escape poverty, some important issues should not be overlooked:

→ First, despite numerous and valuable attempts at complexifying the concept of poverty so as to account for its many dimensions, in practice poverty is still widely measured in terms of the money a person lives on. Just like GDP remains the main gauge of development, key institutions around the world, at all levels, still assess poverty against this extremely simplistic if not misleading indicator.

→ Therefore, the conceptual frameworks on which policies are grounded, developed and implemented largely fail to account for the complexity and variety of situations. For example, to what extent is someone living with 10 USD a day in the suburb of a huge, polluted, crowded megacity, working 12 hours a day in a stressful industrial environment and commuting for 4 hours every day better off than someone who lives on less than a dollar a day in a remote tropical forest? The answer is not straightforward.

→ Challenges are actually such that there is still a worrying – as far as biodiversity is concerned – lack of evidence that poverty alleviation may be decoupled from growth in the consumption of material goods. Hence there is little doubt that current development trends in the South are leading to a somewhat desperate endeavour to catch up with the level of material consumption of the group immediately higher on the social scale.

On the other hand, evidence is mounting on the adverse effects of inequalities in various dimensions of human well-being. For instance, in “the Spirit Level: why more equal societies almost always do better”, Wilkinson and Pickett (2009) argue that there are «pernicious effects that inequality has on societies: eroding trust, increasing anxiety and illness, (and) encouraging excessive consumption». They demonstrate that the situation is significantly worse in more unequal rich countries as far as 11 health and social issues are concerned⁴. Interestingly, some recent publications also demonstrate the negative impact of inequalities (more than poverty) on biodiversity (e.g. Holland et al., 2009; see summary in box 3). Inequalities are likely to be a fundamental missing piece of the biodiversity-poverty puzzle, finally putting coherence in fragmented observations that, for instance, poverty is a cause of biodiversity erosion while clearly wealth is an even greater one. If the poor are to develop and if the natural resources that ecosystems provide are limited, a drastic reduction in the gap between the rich and poor may be a first and foremost requirement.

On the whole, the belief that poverty – not inequality – is the core problem with regard to biodiversity and sustain-

⁴ These are: physical health, mental health, drug abuse, education, imprisonment, obesity, social mobility, trust and community life, violence, teenage pregnancies, and child well-being.

nable development in general, and that the answer lies in increasing the GDP, may turn out to be an example of the blindness that comes with dogma. The poverty/inequality debate is obviously a very political one because it is hardly presented as a win-win scenario in contrast with “poverty alleviation”: some believe that reducing inequalities is not a legitimate objective; others do want to reduce inequalities, and believe GDP growth is the best way to achieve it; others believe there is no direct relationship between GDP and inequalities – which does not necessarily mean that GDP growth should be avoided, but that it is not sufficient. Worth noting, little robust literature articulates poverty, inequalities, GDP and biodiversity.

The Millennium consensus at the end of the 1990s set the international agenda on poverty for clear political reasons, although they remained implicit and the choice was usually presented as «neutral». It has seldom been challenged by governments, NGOs or scientists, despite some isolated attempts to at least couple the poverty alleviation agenda with the inequalities issue⁵. It should therefore today become a priority to gather more evidence on the role inequalities play with regard to sustainable development, among others biodiversity erosion. The 2015 Millennium Development Goals horizon, as it is quickly approaching, may be the perfect opportunity to bring new arguments to a debate that definitely needs to be revived, as politically incorrect as it may be.

Box3. A Cross-National Analysis of How Economic Inequality Predicts Biodiversity Loss - Summary

We used socioeconomic models that included economic inequality to predict biodiversity loss, measured as the proportion of threatened plant and vertebrate species, across 50 countries. Our main goal was to evaluate whether economic inequality, measured as the Gini index of income distribution, improved the explanatory power of our statistical models. We compared four models that included the following: only population density, economic footprint (i.e., the size of the economy relative to the country area), economic footprint and income inequality (Gini index), and an index of environmental governance. We also tested the environmental Kuznets curve hypothesis, but it was not supported by the data. Statistical comparisons of the models revealed that the model including both economic footprint and inequality was the best predictor of threatened species. It significantly outperformed population density alone and the environmental governance model according to the Akaike information criterion. Inequality was a significant predictor of biodiversity loss and significantly improved the fit of our models. These results confirm that socioeconomic inequality is an important factor to consider when predicting rates of anthropogenic biodiversity loss.

Source: Holland et al., 2009

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⁵ See e.g. Ministère des affaires étrangères et européennes, 2011: “Fighting poverty and reducing inequalities” appears as one of the four strategic goals of the French development policy.

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Poverty Eradication and Quality of the Environment in Urban and Peri-urban Areas

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Summary: How urban centres and the peri-urban areas that surround them are managed and governed in Africa, Asia and Latin America has very large implications for whether poverty is reduced and whether the Millennium Development Goals are met. Also for whether nations in these regions develop economies and urban and rural settlements that can adapt to climate change. And finally, since almost all the world's population growth and much new investment is taking place in these urban centres, whether these are compatible with low-carbon development.

There are good precedents that show the potential for combining environmental improvements with poverty reduction, especially through supporting upgrading of informal settlements. There are also precedents to show how urban expansion can be managed in ways that protect ecological services and support low carbon development. But these remain the exceptions. For these to become the norm requires national governments, aid agencies and development banks to establish far more effective ways of working with and supporting local governments and civil society organizations in urban areas, including the organizations and federations formed by the urban poor. This paper ends with some suggestions for how this can be achieved.

The global significance of urban issues

Around one in six of the world's population lives in urban settlements in life and health threatening environments². Where their very basic needs for water, for sanitation, for drainage, for health care and emergency services are not met³. Even in nations that are democratic, a large part of this population may be unable to get on the voter's register because they live in informal settlements that have no official address. For this or for other reasons, tens of millions cannot get their children into government schools. For these people, urbanization is associated with ill-health, premature death and often hunger. Also with infant and child mortality rates 10-20 times higher than what they should be⁴. These are not

problems that only affect a small proportion of the population; for many cities, 30-60% of their population lives in informal settlements lacking provision for infrastructure and services.

Cities with growing populations and economies need to expand spatially. But in low-income and most middle-income nations, rarely is this process and the land-use changes it brings managed adequately. The areas that surround a city's built up area are often termed peri-urban areas. They usually have a mixture of rural and urban characteristics and are where agriculture and urban development interact with natural resource systems. Farmers and agricultural labourers co-exist with growing urban uses – for instance informal settlements, urban enterprises and often private housing developments, although these often compete for land and for access to water. In better-located peri-urban areas, large amounts

1 This paper benefitted greatly from the comments and suggestions of Benoit Lefèvre (IIDD).

2 Hardoy, Jorge E., Diana Mitlin and David Satterthwaite (2001), *Environmental Problems in an Urbanizing World: Finding Solutions for Cities in Africa, Asia and Latin America*, Earthscan Publications, London, 448 pages;

UN-Habitat (2003), *The Challenge of Slums: Global Report on Human Settlements 2003*, Earthscan Publications, London, 310 pages.

3 Hardoy et al 2001, op. cit.; UN-Habitat (2003), *Water and Sanitation in the World's Cities; Local Action for Global Goals*, Earthscan Publications, London, 274 pages.

4 Hardoy et al 2001, op. cit; Satterthwaite, Da-

vid (2007), «In pursuit of a healthy urban environment in low- and middle-income nations», In Marcotullio, Peter J. and Gordon McGranahan (editors), *Scaling Urban Environmental Challenges: from Local to Global and Back*, Earthscan Publications, London, pages 69-105; and Sverdlik, Alice (2011), «Ill-health and poverty: a literature review on health in informal settlements», *Environment and Urbaniza-*

of land may be vacant, as they have been purchased by real estate agents or developers in anticipation of their rise in value as the city expands. These peri-urban areas generally fall outside the jurisdiction of the city; they often have local governments that are relatively weak and may still be governed as if they are rural areas. Peri-urban areas that are close to successful cities often urbanize rapidly with little or no control on, for instance, polluting industries or protection of water sheds or ecosystems that help protect against floods – and often with disadvantages to the long-time residents and farmers⁵. It is also within particular peri-urban areas that informal settlements often develop rapidly; these often concentrate on land sites that are at high risk from landslides, flooding or other natural hazards because these hazards make the land unattractive for conventional, formal developments⁶.

Yet urbanization is generally driven by a growing economy⁷ and it can and should be associated with good health, a high quality of life and real citizen and community engagement in local governance. Well governed cities have among the world's highest life expectancies and the lowest infant and child mortality rates. Of course, successful cities have economies of scale, agglomeration and proximity for enterprises and investors; this is why they are successful and why they attract investors and migrants. But the concentration of enterprises and people also bring many potential economies of scale and proximity for what makes cities healthy – water piped into each person's home and good quality toilets, drainage and regular collections of household waste. There are also economies of scale or proximity for almost all services – kindergartens and schools, health care services, police to provide the rule of law and emergency services (fire, ambulances)⁸. Indeed, it was within cities that universal provision for these was first achieved.

It is also within cities that many of innovations in po-

verty reduction, in participation, in 'good governance' have been pioneered⁹. Over the last 20 years, it is within cities that organizations and federations formed by 'slum' or shack dwellers have demonstrated innovation in addressing their members' needs and offering governments their skills and capacities¹⁰.

The need to address urban poverty

In almost all nations, success in poverty reduction requires strong urban components. In the mid 1970s, a case could be made that poverty reduction should focus on rural areas – although even then, the scale and depth of urban poverty should have been recognized. Latin America was already predominantly urban by this time and though much of Asia and Africa were predominantly rural, Asia already had close to 600 million urban dwellers while Africa had more than 100 million¹¹. But nearly 40 years later, the ignoring of urban poverty is no longer credible. Between 1970 and 2010, the urban population in low- and middle-income nations grew by 1.9 billion while its rural population grew 1.1 billion. The urban population within these nations is anticipated to grow by 2 billion between 2010 and 2040 while the rural population is projected to decline¹². Urban and peri-urban areas now concentrate a large proportion of world's population that is hungry, that faces very large (and easily prevented) health burdens, that lacks basic services – see Table 1¹³.

As if this very large and growing scale of urban poverty was not enough justification for getting action from governments and international agencies, there are also the new issues brought by climate change. Africa, Asia and Latin America have most of the cities most at risk from the direct impacts of climate change – especially risks from more frequent and/or more intense extreme weather (storms, floods, heat waves), sea-level rise

5 Narain, Vishal and Shilpa Nischal (2007), «The periurban interface in Shahpur Khurd and Karnera, India», *Environment and Urbanization* Vol. 19, No. 1, pages 161-173; Narain, Vishal (2009), «Growing city, shrinking hinterland: land acquisition, transition and conflict in peri-urban Gurgaon, India», *Environment and Urbanization* Vol. 21, No. 2, pages 501-512.

6 Hardoy et al, 2001, op. cit.

7 There are a few exceptions to this but not many – see Satterthwaite, David (2007), *The Transition to a Predominantly Urban World and its Underpinnings*, Human Settlements Discussion Paper, IIED, London, 86 pages; for a discussion of how urbanization has slowed down in sub-Saharan Africa linked to poor economic performance see Potts, Deborah (2009), «The slowing of sub-Saharan Africa's urbanization: evidence and implica-

tions for urban livelihoods», *Environment and Urbanization* Vol. 21, No. 1, pages 253-259.

8 Hardoy et al 2001, op. cit.

9 See for instance Cabannes, Yves (2004), «Participatory budgeting: a significant contribution to participatory democracy», *Environment and Urbanization* Vol. 16, No. 1, pages 27-46; Satterthwaite, David (2009), «Editorial: What role for mayors in good city governance?», *Environment and Urbanization* Vol. 21, No. 1, pages 3-17.

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11 United Nations Department of Economic and Social Affairs, Population Division

(2010), *World Urbanization Prospects: The 2009 Revision, CD-ROM Edition - Data in digital form, POP/DB/WUP/Rev.2009*, United Nations, New York.

12 Ibid

13 See also Satterthwaite 2007 and Sverdlik 2011 op. cit. for more detail on the scale and depth of hunger and premature death in urban areas; Sverdlik 2011 also presents findings from a growing number of studies that suggest that large sections of the urban poor suffer an urban health penalty rather than benefitting from an urban health bias.

14 Bicknell, Jane, David Dodman and David Satterthwaite (editors) (2009), *Adapting Cities to Climate Change: Understanding and Addressing the Development Challenges*, Earthscan Publications, London, 397 pages.

Table 1: Estimates for the scale of different aspects of urban poverty in low- and middle-income nations

Type of poverty	Numbers of urban dwellers affected	Notes
Inadequate income in relation to the cost of basic needs	800-1,200 million	No accurate figures are available on this and the total varies, depending on the criteria used to set the poverty line (the 'income-level' required for 'basic needs')
Inadequate or no provision for safe, sufficient water and sanitation	More than 680 million for water and 850 million or more for sanitation	These estimates are for 2000 and are drawn from a detailed global UN review of individual city/urban studies ¹⁴ ; they have probably increased considerably since then
Hunger	500 million+?	In many Asian and sub-Saharan African nations, 25-40% of urban children are underweight and/or under height. In many nations, more than half the urban population suffers from food-energy deficiency including India, Pakistan and Bangladesh ¹⁴
Living in housing that is overcrowded, insecure and/or of poor quality	c. 1 billion	Based on a 2003 global UN review of the number and proportion of people living in 'slums' with an allowance for the increase in number since then
Homelessness (i.e. living on the street or sleeping in open or public places)	c. 100 million	UN estimate. There are also large numbers of people living on temporary sites (for instance construction workers and often their families living on construction sites) that are close to homeless.

and constraints on fresh water supplies¹⁵. For most urban centres in these regions, these come on top of their already evident vulnerability to disasters. It is low-income nations that concentrate most deaths from cyclones, even if many middle and high-income nations have more of their populations exposed to these.¹⁶

As if this very large and growing scale of urban poverty was not enough justification for getting action from governments and international agencies, there are also the new issues brought by climate change. Africa, Asia and Latin America have most of the cities most at risk from the direct impacts of climate change – especially risks from more frequent and/or more intense extreme weather (storms, floods, heat waves), sea-level rise and constraints on fresh water supplies. For most urban centres in these regions, these come on top of their already evident vulnerability to disasters. It is low-income nations that concentrate most deaths from cyclones, even if many middle and high-income nations have more of their populations exposed to these.

Then there is the role of urban centres in mitigation – the very urgent global need to reduce total greenhouse gas emissions. It could be argued that this is an agenda for high-income nations (and within this for their urban centres). This is supported by the much higher levels greenhouse gas emissions coming from many cities in high-income nations – for instance per capita emissions

of 10-30 tonnes of CO₂e per year when most cities in low and middle-income nations have under 2 tonnes (and many have much lower emissions levels than this)¹⁹. The case for focusing on mitigation in high-income nations is further strengthened if emissions accounting allocates the greenhouse gas emissions embedded in goods to those that buy and use these goods rather than the nations or cities where the goods were made.

But if greenhouse gas emissions are to be reduced while also not constraining development in low and middle-income nations, development itself – and especially urban development – needs to be low carbon. Most of the world's urban population and most of its large cities are in low and middle-income nations. And as noted above, almost all the growth in the world's population in the next few decades will be in urban centres in low- and middle-income nations. How these urban centres expand to house 2 billion new urbanites has very large implications for poverty reduction, for whether or not these urban centres (and their national economies) are resilient to climate change – and for whether global emissions reduce enough to avoid dangerous climate change. Will the vast expansion of the urban population in the more successful economies in Africa, Asia and Latin America be low density, private car dependent sprawl which implies greenhouse gas emissions per resident of 10-30 tonnes of CO₂e? Or well-governed, high-density, low-

15 United Nations (2009), Global Assessment Report on Disaster Risk Reduction: Risk and Poverty in a Changing Climate, ISDR, United Nations, Geneva, 207 pages.

16 UN-Habitat (2003), The Challenge of Slums: Global Report on Human Settlements 2003, Earthscan Publications, London.

17 Bicknell, Jane, David Dodman and David

Satterthwaite (editors) (2009), Adapting Cities to Climate Change: Understanding and Addressing the Development Challenges, Earthscan Publications, London, 397 pages.

18 United Nations (2009), Global Assessment Report on Disaster Risk Reduction: Risk and Poverty in a Changing Climate, ISDR, United Nations, Geneva, 207 pages

19 Dodman, David (2009), «Blaming cities for climate change? An analysis of urban greenhouse gas emissions inventories», Environment and Urbanization Vol. 21, No. 1, pages 185-201; Hoornweg, Daniel, Lorraine Sugar and Claudia Lorena Trejos Gomez (2011), «Cities and greenhouse gas emissions: moving forward», Environment and Urbanization Vol. 23, No. 1, pages 207-227.

waste, low-carbon residential developments that can combine a high quality of life with greenhouse gas emissions per resident of 1-2 tonnes of CO₂e?²⁰ What are the greenhouse gas emission implications of the needed vast expansion in electricity generation and infrastructure provision for these two billion new urbanites (as well as meeting the needs of the billion or so urbanites that also lack such provision now). Whether or not the expanding middle-class in successful economies in Africa, Asia and Latin America (including those that move out of poverty) follow a high-consumption lifestyle will in part depend on whether middle and upper-income groups in high-income nations move quickly to much lower carbon lifestyles. We can demonstrate that a very high quality of life is possible in London, Paris, Toronto, Copenhagen, Amsterdam..... with consumption patterns and individual carbon budgets that contribute to avoiding dangerous climate change. But it does not mean that middle and upper income groups in these and other cities will accept this. If they do not, why should middle and upper income groups in cities in low and middle income nations do so?

Why is so little attention paid to urban poverty and urban climate change policy?

Why have most aid agencies given so little attention to urban poverty for decades? Why do some still insist that almost all poverty is in rural areas? And still claim that good rural development slows urban development when we know that it usually does not. Successful agriculture that includes shifts to higher value crops and that brings rising incomes and opportunities for farmers usually stimulates and supports urban development as local urban centres expand to provide producer and consumer goods and services to the farmers and also provide farming families with off-farm and non-farm employment²¹. More recently, why have most discussions of climate change adaptation ignored urban centres, even as these generate most of the nation's GDP and attract most new investment as well as concentrating a large proportion of the population most at risk from climate-change impacts? And even within discussions of mitigation and

the needed 'green economy', why is so little attention paid to urban areas? If a greener economy really is to be built, much of it will need to be rooted in urban centres and supported by urban governments. Aid agencies were not set up to work with local governments and face difficulties doing so, in part because they are under constant pressure from the governments that allocate funds to them to keep down staff costs, in part because national governments do not want them to do so. But how are they to support the meeting of the MDGs, the reduction in poverty and the needed incorporation of climate change adaptation and mitigation into development without a more direct engagement with local governments?

None of the key goals for urban areas – for poverty reduction, for climate change adaptation and for mitigation – is possible without more competent, better resourced city and municipal governments in Africa, Asia and Latin America. And central to this is their capacity to engage with their inhabitants – especially those that currently live in informal settlements. There are examples of good practice that show what is possible. The city of Porto Alegre in Brazil has a high quality of life, a successful economy and relatively low greenhouse gas emissions per person²². The city of Manizales in Colombia has been innovating for more than 20 years in combining good environmental management rooted in community engagement with disaster risk reduction²³. The nationwide support in Thailand for community-organized and managed 'slum' up-grading (through the Community Organizations Development Institute) that has transformed the quality of homes and neighbourhoods for hundreds of thousands of people. There are hundreds of initiatives now underway by national federations of slum and shack dwellers as they build or improve their own homes and work with local governments to provide or improve infrastructure and services (this is described in more detail later). It is no coincidence that all the above were underpinned by local governments seeing the value of listening to, working with and supporting grassroots organizations. Perhaps this is a defining feature of what is needed to make poverty reduction work – and to be able to incorporate within this climate change adaptation and low carbon development.

20 Satterthwaite, David (2011), «How urban societies can adapt to resource shortage and climate change», *Philosophical Transactions of the Royal Society A*, Vol. 369, pages 1762-1783.

21 Tacoli, Cecilia and David Satterthwaite (2003), *The Urban Part of Rural Development: The role of small and intermediate urban centres in rural and regional development and poverty reduction*, Rural-Urban

Interactions and Livelihood Strategies Working Paper 9, IIED, London, 63 pages.

22 Menegat, Rualdo (2002), "Participatory democracy and sustainable development: integrated urban environmental management in Porto Alegre, Brazil", *Environment and Urbanization* Vol 14, No 2, October, pages 181-206; Hoornweg et al 2011 op. cit.

23 Velasquez, Luz Stella (1998), «Agenda 21; a form of joint environmental management

in Manizales, Colombia», *Environment and Urbanization*, Vol.10, No.2, pages 9-36; Velásquez, Luz Stella (2005), «The Bioplan: Decreasing poverty in Manizales, Colombia, through shared environmental management», in Steve Bass, Hannah Reid, David Satterthwaite and Paul Steele (editors), *Reducing Poverty and Sustaining the Environment*, Earthscan Publications, London, pages 44-72.

How we define a problem influences how we address it

How we define informal settlements, poverty and environmental degradation has very large implications for the policies developed to address them.

We can look at an informal settlement – at Kibera in Nairobi, Dharavi in Mumbai²⁴ or Korail in Dhaka²⁵ – and see it as ‘a slum,’ a huge concentration of dangerous, poor quality housing in unplanned sites that contravenes all official codes and regulations for health and safety. So these need to be replaced. Even to term these settlements as a ‘slum’ is to imply that they need to be replaced. Even to call them informal settlements may imply that they are not seen to be part of the city economy. Or we can look at these same informal settlements and see their contribution to the city economy and how they house among the lowest-income groups without costing the government anything. (And for those of us living in these cities, how the informal settlements may house our maids, drivers, cooks, gardeners and security guards). Here we do not see ‘a slum’ but a settlement that needs better provision for water, sanitation, drainage, health care and schools. So we look to ways in which these can be provided (and the examples of good practice given later provide us some guidance as to how this can be done).

Then also consider how others may see these informal settlements. The young migrant who finds accommodation here that is both cheap and within walking distance of their newly found and perhaps precarious employment. (Even if he or she has to share a tiny room with several others or even rent a bed for a set number of hours a day). The entrepreneur that sees the central location, the multiplicity of other producers and the ‘demand’ there as a great place to start a new business. The funding agency looking for opportunities to finance low carbon development that sees the huge informal ‘waste’ economy that supports so many livelihoods (tens of thousands of livelihoods in many large cities) and keeps down the city’s greenhouse gas emissions – probably much more so than official urban waste projects.

Then there is the issue of how poverty is defined. How

we define poverty has a very large influence on how many people are ‘poor’ and on how we address it. For instance, if poverty is defined as an income that is less than US\$1 per person per day (the definition used in the Millennium Development Goals), then urban poverty disappears for most nations. According to World Bank figures, using this definition, there is virtually no urban poverty in China, the Middle East, North Africa or Central Asia²⁶. And urban poverty is a minor issue in Latin America. But this does not accord with the very large numbers of urban dwellers in these regions that are hungry and live in poverty. Set a poverty line too low and almost no-one is poor.

Most definitions of poverty are based only on income level or food consumption. They do not consider the quality of housing or the quality of provision for water and sanitation. Or whether households can get health care services and afford to send their children to school. So the poverty lines based on these definitions make very little allowance for the cost of non-food needs²⁷. One of the defining characteristics of a city is that access to almost all needs have a monetary cost – for instance access to housing (or land for housing), infrastructure, services and employment. Large sections of the urban poor have to rent accommodation and even if this is a small room in an informal settlement, it still may take 20-30 percent of their income. As noted earlier, many of those living in informal settlements do not have access to piped water, sewers and health care so they have to pay water vendors, pay-to-use toilets and private health care services. This also takes large chunks of their income. If they live in peri-urban settlements, they may face high expenses going to and from work or services. Keeping children at school is often expensive, even if access to the school is free (for instance through transport costs and the costs of books, uniforms and school meals). The failure of most national poverty lines and the dollar a day poverty line to make sufficient allowance for the cost of non-food needs in urban areas (especially larger and more successful cities) means that they enormously underestimate the scale and depth of urban poverty. With a dollar a day poverty line, most of the world’s poverty seems to be in rural areas. With poverty-lines in each nation adjusted by location so they include an adequate

24 Patel, Sheela and Jockin Arputham (2008), «Plans for Dharavi: negotiating a reconciliation between a state-driven market re-development and residents’ aspirations», *Environment and Urbanization* Vol. 20, No. 1, pages 243-254; Patel, Sheela and Jockin Arputham (2007), «An offer of partnership or a promise of conflict in Dharavi, Mumbai?», *Environment and Urbanization*, Vol. 19, No. 2, pages 501-508; Patel, Sheela, Jockin Arputham, Sundar Burra and Katia Savchuk (2009), «Getting the information base for Dharavi’s re-development», *Environment*

and Urbanization Vol. 21, No. 1, pages 241-252.

25 Jabeen, Huraera, Adriana Allen and Cassidy Johnson (2010), «Built-in resilience: learning from grassroots coping strategies to climate variability», *Environment and Urbanization* Vol. 22, No. 2, pages 415-431.

26 Ravallion, Martin, Shaohua Chen and Prem Sangraula (2007), *New Evidence on the Urbanization of Global Poverty*, WPS4199, World Bank, Washington DC, 48 pages.

27 Bapat, Meera (2009), *Poverty Lines and Lives of the Poor; Underestimation of Urban Poverty, the case of India*, Working paper, IIED, London, 47 pages; Sabry, Sarah (2009), *Poverty Lines in Greater Cairo: Under-estimating and Misrepresenting Poverty*, Working paper, IIED, London, 48 pages; Chandrasekhar, S. and Mark R. Montgomery (2010), *Broadening Poverty Definitions in India: Basic Needs in Urban Housing*, Working Paper, IIED, London; Chibuye, Miniva (2011), *Interrogating Urban Poverty Lines – the Case of Zambia*, Working Paper,

allowance for the cost of non-food needs, the scale and depth of urban poverty greatly increases.

Finally, how the term environmental degradation is understood influences how policies are set to address it. We know that most urban dwellers with low incomes live in poor quality housing lacking provision for water, sanitation, solid waste collection, drainage and health care. So they face very large environmental health burdens. They live in homes and neighbourhoods that can be considered “degraded” environments. These often look degraded, as many of the houses are made of waste or temporary materials and there many waste piles as garbage is not collected. There may be areas where many people defecate in the open because there are no toilets or public toilets are too expensive (or too dirty). So here, urban poverty might be associated with environmental degradation or even said to cause environmental degradation.

But the term “environmental degradation” is usually used to mean the over-use or degradation of scarce natural resources (including fresh water, soils and forests), the generation of ecologically damaging wastes (including greenhouse gas emissions) and damage to ecological services. Used in this sense, there is no association between poverty and environmental degradation because poverty is associated with very low levels of natural resource use and very low levels of waste generation (and greenhouse gas emissions). It is wealth and high consumption levels that are the drivers of environmental degradation, not poverty²⁸. This can be seen in differentials between high-income and low-income urban dwellers in consumption and waste generation. For instance, in many cities, there is a 50-fold difference in the volume of fresh water used. Also a 30-fold difference in the land area per person occupied by homes. Also, very large differentials in the land- and energy-intensity of their diets, the fossil fuels consumed in the home and for transport, electricity consumption (and the environmental implications of its generation) and the purchase and use of consumer and capital goods. This can also be seen in the very large differentials between high-income and low-income groups in the greenhouse gas emissions driven by their consumption levels.

Part of this confusion as to whether it is wealth or poverty that causes environmental degradation comes from the distance between where high-income groups live and the environmental impacts of their high-consumption lifestyles. As William Rees pointed out as he developed the concept of ecological footprints, wealthy people (and cities) draw on the resources and eco-system services of ‘distant elsewhere’²⁹. So wealthy cities can preserve forests, parks and other open spaces within and around them and protect areas of special scientific interest because this land is not needed to grow food or raw materials for the city’s enterprises and inhabitants. Most wealthy cities have little heavy industry. The energy-intensive, land-intensive, water-intensive, pollution-intensive goods their inhabitants purchase are made elsewhere and imported so the environmental costs arising from their fabrication are borne in the places where they were made, not where they are consumed. Part of this transfer is also to the future as it is the world’s wealthiest consumers that are the main driver of growing levels of greenhouse gas emissions³⁰ so their current consumption is driving increasing risk levels in the future.

Can poverty reduction and environmental improvement be combined in urban and peri-urban areas?

The quality of a city environment has very large implications for good health and for poverty reduction. Also for equity. Of course, there are differentials in health in urban centres in high-income nations that are also influenced by the quality of the urban environment³¹. But one key characteristic of urban centres in high-income nations is the universal provision of (for instance) water piped into the home available 24 hours a day, toilets in the home for the exclusive use of each household, regular collection of household waste and house structures (and drainage systems) that are not at risk from extreme weather. There is also almost universal provision for health care and emergency services (for rapid treatment of injuries or serious illnesses, for responses to accidental fires). However bad the living conditions experienced by the lowest-income groups in urban or peri-urban areas in

IIED, London, 38 pages; Hardoy, Jorgelina with Florencia Almansi (2011), *Assessing the scale and nature of urban poverty in Buenos Aires*, Working Paper, IIED, London, 48 pages.

28 Satterthwaite, David (2003), «The links between poverty and the environment in urban areas of Africa, Asia, and Latin America», *The Annals of the American Academy of Political and Social Science*, Vol. 590, pages 73-92.

29 Rees, William E. (1992), «Ecological footprints and appropriated carrying capacity», *Environment and Urbanization* Vol. 4, No 2, pages 121-130.

30 Chakravarty, Shoibal, Ananth Chikkatur, Heleen de Coninck, Stephen Pacala, Robert Socolow and Massimo Tavonia (2009), «Sharing global CO2 emission reductions among one billion high emitters», *Proceedings of the National Academy of Sciences*, Vol. 106, No, 29, pages 11884-11888.

31 GRNUHE (2010), *Improving Urban Health Equity through Action on the Social and Environmental Determinants of Health*, Global Research Network on Urban Health Equity, University College London and the Rockefeller Institute, London, 92 pages; WHO and UN Habitat (2010), *Hidden Cities: Unmasking and Overcoming Health Inequities in Urban Settings*, World Health Organization, Geneva, 126 pages.

high-income nations, no urban dweller has to walk several hundred yards to queue at a standpipe for water that is not of drinking quality – or to have no access to toilets. Or to have to cook on open fires using waste materials – and not to have electricity. Or if there are examples of these in high-income nations, they affect a very small proportion of the urban population.

Yet in many urban centres in low- and middle-income nations, a third to two thirds of the entire population faces these kinds of deficiencies in provision for water, sanitation, health care and fuels³². It is common for a third to two thirds of the population in these urban centres to live in poor quality, overcrowded housing – either in tenements or cheap boarding houses or in informal settlements. A high proportion have no access to electricity and cook with biomass fuels including waste materials in open fires or stoves that expose them to high levels of indoor air pollution with serious health consequences³³.

There is also the issue of how urban expansion is managed and governed. The fact that so much urban expansion is uncontrolled and does not conform to any official guidelines or strategic plan was noted already. Most large cities are made up of many different local government units and rapid population growth and urban expansion is often concentrated in the jurisdiction of some of the peripheral local governments that are also among the weakest – as they lack the capacity to manage urban growth and lack the funding to extend infrastructure to residential developments³⁴.

Yet for the potential environmental advantages of cities to be realized requires the management of land-use and land-use changes. Such management needs to reconcile different objectives – for poverty reduction, for supporting economic success, for disaster risk reduction, for climate change adaptation and, where possible, climate change mitigation. This is never easily managed, not least because different sectors within city and municipal governments bring different priorities and seek different uses for land within their jurisdictions. We can agree that land-use management needs to ensure sufficient land is available for new housing while ensuring that this is served by trunk infrastructure and encouraging residential developments that avoid private car dependence. But we can also agree

that land-use management must ensure sufficient land is available for public use (for schools, health care, recreation/sport/children's play) while also protecting key ecological services (for instance water sheds and mangroves). And building into city expansion the needed resilience to climate-change impacts (and to other natural disasters). There is also the powerful real-estate lobby seeking land for their priorities³⁵ and often very large numbers of low-income groups seeking land where they can afford to develop housing.

Combining environmental improvements with poverty reduction

Governments and international agencies need to act on the potential environmental health advantages of concentrating people, businesses and their wastes because of the economies of scale and proximity for the infrastructure, services and regulations that guarantee good environmental health. One of the most effective ways to reduce urban poverty is to transform the quality of housing and living environments in informal settlements. If we review the experiences of cities in this, there are two different tracks. The first is the more conventional state-directed route for 'slum' and squatter upgrading where it is government agencies that have the primary role – and this has become common in many Latin American nations. The second is upgrading in which the inhabitants of the settlements to be upgraded and their own community organizations have a much more central role, although working in partnerships with local governments. Both these can also build resilience to climate change.

One of the most interesting experiences with upgrading at scale comes from Thailand. Supported by the national government's Community Organizations Development Institute (CODI), this channels government funds in the form of infrastructure subsidies and housing loans direct to community organizations formed by low-income inhabitants in informal settlements who plan and carry out improvements to their housing or develop new housing and work with local governments or utilities to provide or improve infrastructure and services. From 2003 to 2010,

32 Hardoy et al 2001, op. cit.

33 Legros, Gwénaëlle, Ines Havet, Nigel Bruce and Sophie Bonjour (2009), *The Energy Access Situation in Developing Countries; A Review Focusing on the Least Developed Countries and Sub-Saharan Africa*, World Health Organization and United Nations Development Programme, New York, 130 pages.

34 Almansi, Florencia, Ana Hardoy, Jorge-lina Hardoy, Gustavo Pandiella, Leonardo Tambussi and Gaston Urquiza with Gor-

don McGranahan and David Satterthwaite (2011), *Los Limites de la Participacion; La Lucha por el Mejoramiento Ambiental en Moreno*, Argentina, IIED-America Latina Publications, Buenos Aires, 205 pages.

35 For one detailed example of what this implies for peri-urban development, see Kelly, Philip F. (1998), «The politics of urban-rural relationships: land conversion in the Philippines», *Environment and Urbanization* Vol.10, No.1, pages 35-54.

36 Boonyabancha, Somsook (2005), «Baan

Mankong; going to scale with 'slum' and squatter upgrading in Thailand», *Environment and Urbanization* Vol. 17, No. 1, pages 21-46 and Boonyabancha, Somsook (2009), «Land for housing the poor by the poor: experiences from the Baan Mankong nationwide slum upgrading programme in Thailand», *Environment and Urbanization* Vol. 21, No. 2, pages 309-330; see also www.codi.or.th/housing/Frontpage.html

37 Boonyabancha 2005, op cit; Boonyabancha, Somsook (2004), *The Urban Com-*

within the *Baan Mankong* (secure housing) programme, CODI approved 745 projects in 1319 communities (some projects cover more than one community) in over 249 urban centres covering 80,201 households³⁶ and it plans a considerable expansion in the programme within the next few years. Overall, CODI (and the organization out of which it developed, the Urban Community Development Office) has provided loans and grants to community organizations that reached 2.4 million households between 1992 and 2007³⁷.

This initiative has particular significance in three aspects: the scale; the extent of community-involvement; and the extent to which it seeks to institutionalize community-driven solutions within local governments so these address needs in all informal settlements in each urban centre. It is also significant in that it draws almost entirely from domestic resources – a combination of national government, local government and household/community-contributions.

Support is also provided to networks of community organizations formed by the urban poor within particular cities, to allow them to work with municipal authorities and other local actors and with national agencies on urban centre-wide upgrading programmes. This initiative also demonstrates how to regularize insecure or illegal land tenure. Those living in illegal settlements can get legal land tenure by a variety of means – for instance by the inhabitants purchasing the land from the landowner (supported by a government loan), negotiating a community lease, agreeing to move to another location provided by the government agency on whose land they are squatting, or agreeing to move to part of the site they are occupying in return for tenure of that site (land sharing). CODI also provides loans to community organizations to on-lend to their members to help build or improve their homes. It also supports city governments

in taking the initiative in collaboration with urban poor organizations – for instance providing a site on which those living in various ‘mini’ squatter settlements in their jurisdiction could relocate, with the land provided on a 30 year lease.

There are also many experiences with upgrading and with the development of new housing that is affordable to low-income groups that are examples of local government-community organization partnerships. In 33 nations, women-led grassroots savings groups have come together to form larger ‘slum’/shack/homeless people’s federations and these are engaged in initiatives to upgrade ‘slums’ and squatter settlements, secure land tenure, develop new housing that low-income households can afford and to improve provision for infrastructure and services (including water, sanitation and policing). In all instances, they seek partnerships with local governments since inevitably, what they can achieve working independent of government is limited.

Most of the federations have succeeded in negotiating land for housing and this has allowed them to demonstrate their capacity to build - although the land allocations they negotiate are never on a scale to address needs of all their members. Many have undertaken city-wide surveys of informal settlements that then allow dialogue with local governments over planning for city-wide upgrading and, where needed, resettlement. Most have initiatives underway for upgrading or for developing new housing supported by local government – including in India³⁸, South Africa³⁹, Thailand⁴⁰, Namibia⁴¹, Malawi⁴², Kenya⁴³, the Philippines⁴⁴ and Zimbabwe⁴⁵. Over 150,000 families within these federations secured tenure between 1993 and 2008 and upgrading in the form of housing and infrastructure improvements have taken place in most such settlements⁴⁶. The largest and longest established

community Development Office: Increasing Community Options through a National Government Development Programme in Thailand, in Diana Mitlin and David Satterthwaite (editors), *Empowering Squatter Citizen; Local Government, Civil Society and Urban Poverty Reduction*, Earthscan Publications, London.

38 Patel, Sheela and Diana Mitlin (2004), «Grassroots-driven development: The Alliance of SPARC, the National Slum Dwellers Federation and Mahila Milan», in Diana Mitlin and David Satterthwaite (editors), *Empowering Squatter Citizen; Local Government, Civil Society and Urban Poverty Reduction*, Earthscan Publications, London, pages 216-241; Burra, Sundar (2005), «Towards a pro-poor slum upgrading framework in Mumbai, India», *Environment and Urbanization*, Vol. 17, No. 1, pages 67-88.

39 Baumann, Ted, Joel Bolnick and Diana Mitlin (2001), *The age of cities and organizations of the urban poor: the work of the South African Homeless People’s Federation and*

the People’s Dialogue on Land and Shelter, Working Paper, IIED, London and from the SDI web site <http://www.sdinet.org/>

40 Boonyabancha 2005 and 2009, op. cit.

41 Mitlin, Diana and Anna Muller (2004), «Windhoek, Namibia: towards progressive urban land policies in Southern Africa», *International Development Planning Review*, Vol 26, No 2, pages 167-186; see also www.sdinet.org

42 Manda, Mtafu A Zeleza (2007), «Mchenga - urban poor housing fund in Malawi», *Environment and Urbanization*, Vol. 19, No. 2, pages 337-359; Manda, Mtafu A. Zeleza (2009), *Water and Sanitation in Urban Malawi: Can the Millennium Development Goals be met? A Study of Informal Settlements in Three Cities*, Working Paper, IIED, London, 78 pages; also www.sdinet.org

43 Weru, Jane (2004), «Community federations and city upgrading: the work of Pamoja Trust and Muungano in Kenya», *Environment and Urbanization* Vol. 16, No. 1, pages 47-62; also www.sdinet.org

44 Yu, Sandra and Anna Marie Karaos (2004), *Establishing the role of communities in governance: the experience of the Homeless People’s Federation Philippines*, *Environment and Urbanization* Vol.16, No.1, pages 107-120

45 Chitekwe-Biti, Beth (2009), «Struggles for urban land by the Zimbabwe Homeless People’s Federation», *Environment and Urbanization* Vol. 21, No. 2, pages 347-366; also www.sdinet.org

46 d’Cruz, Celine and David Satterthwaite (2005), *Building Homes, Changing Official Approaches: The work of Urban Poor Federations and their contributions to meeting the Millennium Development Goals in urban areas*, Working Paper, IIED, London, 80 pages; Sisulu, Lindiwe (2006), *Partnerships between government and slum/shack dwellers’ federations*, *Environment and Urbanization* Vol. 18, No. 2, pages 401-406.

federations – the National Slum Dwellers’ Federation and Mahila Milan (a federation of women’s savings groups) in India – have developed partnerships with many municipal governments that have allowed much improved provision for toilets and washing facilities and for housing⁴⁷. These toilets have also been visited by members of other national federations and these have brokered deals with local authorities to design, construct and maintain toilet blocks in Cambodia, South Africa, Kenya and Uganda⁴⁸.

What gives these federations of grassroots organizations their capacity to act are the savings groups that are their foundation. Most savers and most savings-managers are women. So most of the federations are made up of hundreds (or in some nations thousands) of savings groups. For each such group, savings scheme members or potential savers are visited every day by the savings group manager. Savers can put small sums (including any spare change they have) into their savings account and most members do so every three or four days. This daily visit means that they have the opportunity to save whenever they can. These savings form a pool of money. Many savings groups also provide emergency and income-generation loans to their members. These can be accessed quickly and easily, from the daily visits. As savings group members work together to gather and manage their funds, they increase their financial management skills and build trust between each other. Over time, as they meet often, they talk about their problems and their needs. Together they begin to think about how they can address larger issues of housing and basic services⁴⁹.

These savings schemes form the federations and the federations are strengthened as their member savings groups visit other savings groups or residents thinking of forming savings groups in their own city and then others in other settlements and cities. The savings group managers also visit savings groups in other nations or grassroots groups that are interested in the Federations’ experiences. These exchanges catalyse an attitude of “can do” – on each visit they see what others have accomplished and they have a chance to talk about their own experiences. As more savings groups form in the informal settlements of any city, so the federation of these savings groups provides the possibility of a city-level partner for local government. These federations have

demonstrated a capacity to undertake city-wide surveys of informal settlements that include detailed profiles of each settlement and maps⁵⁰. They have also shown their capacity to do detailed household enumerations of every household in informal settlements that can then form the information base needed for upgrading and infrastructure and service provision. These are both valuable for any local government wishing to improve conditions in informal settlements. These have been done in a wide range of nations and cities.

One example of a partnership between grassroots organizations and a city government that is working at city scale to build resilience to extreme weather is from the city of Iloilo in the Philippines⁵¹. The partnership established between local and national government, grassroots organizations and the Homeless People’s Federation of the Philippines started before the devastation caused by Typhoon Frank in 2008 but was strengthened after it. The city government recognized that the urban poor and their support organizations are partners in the city’s development. It provided many opportunities for them to participate in local decision-making through representation in technical working groups and multi-sectoral bodies and allowing more room for effecting change in local policies. The scale and scope of housing delivery, upgrading, post-disaster assistance and other basic services were much increased because of the resource-sharing from the partnership. Local government extended facilities/equipment and personnel (site engineer, surveyors, mappers) to provide technical assistance to the Federation on housing and disaster rehabilitation measures and these also lowered the cost of projects. A portion of the relocation site was allocated to the construction of temporary housing units and communal facilities for Typhoon-Frank affected families.

Being a member of the Resettlement and Monitoring Task Force, the Federation assisted in social preparations and other resettlement-related activities conducted by local government. This include an Information Dissemination Campaign among communities living in danger zones (along riverbanks, shorelines and those directly affected by the city’s infrastructure projects) who will be transferred to government relocation sites. The city government, through the Iloilo City Urban Poor Affairs Office, assisted in the federation’s social mobi-

47 Burra, Sundar, Sheela Patel and Tom Kerr (2003), Community-designed, built and managed toilet blocks in Indian cities, *Environment and Urbanization* Vol. 15, No. 2, pages 11-32.

48 SPARC-NSDF-Mahila Milan (2009), *Citywatch India*, Issue 5, June.

49 Patel, Sheela (2004), “Tools and methods for empowerment developed by slum and

pavement dwellers’ federations in India.” *Participatory Learning and Action (PLA)* 50, October, Pages 118-119; Boonyaban-cha, Somsook (2001), «Savings and loans - drawing lessons from some experiences in Asia», *Environment and Urbanization* Vol 13 No 2, pages 9-21.

50 Patel 2004, op. cit; Karanja, Irene (2010), «An enumeration and mapping of informal settlements in Kisumu, Kenya, implemented

by their inhabitants», *Environment and Urbanization* Vol. 22, No. 1, pages 217-239.

51 Carcellar, Norberto, Jason Christopher Rayos Co and Zarina O. Hipolito (2011), “Addressing disaster risk reduction through community-rooted interventions in the Philippines: experience of the Homeless People’s Federation of the Philippines”, *Environment and Urbanization* Vol 23, No 2.

lization which include mapping of high-risk/disaster-affected communities, identification and prioritization of communities to be given post-disaster assistance (temporary houses and material loan assistance for housing repair)⁵².

The city of Manizales in Colombia provides an example of a city government committed to community-government partnerships in disaster risk reduction. This included the involvement of the population in each district in risk mapping and responses and discussions that brought together all key local stakeholders. The risk mapping of each district identified risk zones and settlements particularly at risk from landslides and the city government worked with their inhabitants to relocate them to safer sites and convert the land at risk into neighbourhood parks with measures to stabilize the slopes⁵³. 112 women were trained as “Guardians of the slopes” to create and maintain slope stabilization in their neighbourhood and to report on any problems. Environmental observatories have been created in each of the 11 comunas into which the city is divided to support public engagement and the implementation of the city’s environmental plan. These monitor progress on environmental conditions and progress on these is summarized and displayed publicly in a simple set of indicators – the environmental traffic lights (semaforos ambientales)⁵⁴. The city also introduced a system of collective voluntary insurance to allow low-income groups to have insurance for their buildings and the city government has an agreement with an insurance company and allows any city resident to purchase insurance coverage through municipal taxes⁵⁵.

We have fewer precedents on how city and municipal governments can manage urban expansion in ways that address development and environmental needs – including needed measures to maintain, restore and enhance productive and protective ecological services. Protecting and managing urban wildscapes and green spaces (as interconnected systems – sometimes termed green

infrastructure) is often among the most effective ways of reducing flood risks and reducing high temperatures and lessening heat island effects⁵⁶ – while also providing for sport, recreation and children’s play that are themselves also important for health. It can also contribute to low-carbon development.

The city of Durban has developed a climate change adaptation strategy that recognizes the importance of working at a regional scale and incorporating landscape management into climate change adaptation⁵⁷. The benefits of inter-jurisdictional collaboration is shown by the ten municipalities within the Ayuquila river basin in Mexico who formed a collaborative association to reduce river pollution and, more generally, to work together to improve living conditions and promote more sustainable management of natural resources within and across their administrative boundaries⁵⁸. In Sao Paulo, there have been initiatives that seek to protect and restore watersheds and protect key reservoirs while working with those who live in informal settlements⁵⁹. The city of Ilo in Peru managed rapid population growth by making land for housing available for low-income groups and supporting the inhabitants of each neighbourhood to work with them in improving conditions and expanding public areas⁶⁰. In Mombasa (Kenya), a park has been developed by the rehabilitation of a disused quarry with local groups contracted to undertake the rehabilitation and now this 220 hectare park attracts 150,000 visitors a year⁶¹.

International funding mechanisms to support bottom-up action

Bilateral agencies and development banks were not set up to support civil society groups. Or to support local governments. Yet as this paper has emphasized, effective action depends on more effective and accountable local governments that are capable of and willing to

52 Ibid.

53 Velasquez 1998, op. cit. and Hardoy, Jorge-lina, Gustavo Pandiella and Luz Stella Velasquez (2011), «Local disaster risk reduction in Latin American urban areas», Environment and Urbanization Vol. 23, No. 2.

54 Velasquez 1998, op. cit

55 Hardoy et al 2011, op. cit.

56 Kithia, Justus and Anna Lyth (2011), «Urban wildscapes and green spaces in Mombasa and their potential contribution to climate change adaptation and mitigation», Environment and Urbanization Vol. 23, No. 1, pages 251-265.

57 Roberts, Debra (2008), «Thinking globally,

acting locally - institutionalizing climate change at the local government level in Durban, South Africa», Environment and Urbanization Vol. 20, No. 2, pages 521-538; Roberts, Debra (2010), «Prioritising climate change adaptation and local level resiliency in Durban, South Africa», Environment and Urbanization Vol. 22, No. 2, pages 397-413.

58 Graf Montero, Sergio, Eduardo Santana Castellón, Luis Manuel Martínez Rivera, Salvador García Ruvalcaba and Juan José Llamas (2006), «Collaborative governance for sustainable water resources management: the experience of the Inter-Municipal Initiative for the Integrated Management of the Ayuquila River Basin, Mexico» Environment and Urbanization Vol. 18, No. 2, pages 297-314.

59 van Horen, Basil (2001), «Developing community-based watershed management in Greater São Paulo; the case of Santo André», Environment and Urbanization Vol 13, No 1, pages 209-222; Ducrot, Raphaële, Ana Karina Bueno, Vilma Barban and Bastiaan P. Reydon (2010), «Integrating land tenure, infrastructure and water catchment management in São Paulo’s periphery: lessons from a gaming approach», Environment and Urbanization Vol. 22, No. 2, pages 543-560.

60 López Follegatti, Jose Luis (1999), «Ilo: a city in transformation», Environment and Urbanization Vol.11, No.2, pages 181-202.

61 Kithia and Lyth 2011, op. cit.

work with their low-income citizens.

There are two financial mechanisms that show how this can be done. The first is the Urban Poor Fund International. In 2001, a fund was set up on which the federations of slum or shack dwellers could draw. It was managed by IIED and Slum/Shack Dwellers International, a small umbrella organization formed by the federations and their support NGOs. This provided small grants to the federations' savings groups to enable them to work out how to secure tenure, improve their basic services, and address their shelter needs. Since 2001, this has channelled around US\$ 6.93 million (£4.5 million) to over 100 grassroots initiatives and activities in 17 nations.

Up to 2007, most funding went to support projects of up to 100 households – for instance for

- Tenure security (through land purchase and negotiation) in Cambodia, Colombia, India, Kenya, Malawi, Nepal, Philippines, South Africa and Zimbabwe
- 'Slum'/squatter upgrading with tenure security in Cambodia, India and Brazil
- Bridge financing for shelter initiatives in India, Philippines and South Africa (where government support is promised but slow to be made available)
- Improved provision for water and sanitation in Cambodia, Sri Lanka, Uganda and Zimbabwe
- Enumerations and maps of informal settlements in Brazil, Ghana, Namibia, Sri Lanka, South Africa and Zambia that provide the information needed for upgrading and negotiating land tenure
- Exchange visits by established federations to urban poor groups in Angola, East Timor, Mongolia, Tanzania and Zambia (in Tanzania and Zambia, these helped set up national federations)
- Community-managed shelter reconstruction after the 2004 Indian Ocean tsunami in India and Sri Lanka
- Federation partnerships with local governments in shelter initiatives in India, Malawi, South Africa and Zimbabwe

Since 2008, the Fund has grown substantially, with support from the Bill and Melinda Gates Foundation. By 2008, some of the federations were ready to implement larger initiatives in areas where they had worked for many years. Since 2008, the Fund has supported many larger-scale initiatives in land development, housing and basic services in over 22 towns and cities.

The second example is the Asian Coalition for Commu-

nity Action (ACCA) which provides small grants to catalyze and support city-wide upgrading and partnerships between community organizations⁶². Set up and managed by the Asian Coalition for Housing Rights, in its first year of operation, it provided support in 64 cities. It sets very low budget ceilings for the funding it provides (and leaves it to the implementing communities to work out how best to use it and raise other funding). It explains the principle of 'insufficiency' because there is not enough development funding to fund 'sufficiently' all that needs to be done in informal settlements. As the report on its first year of operation explained:

"The \$3,000 for small upgrading projects and the \$40,000 for big housing projects which the ACCA Program offers community groups is pretty small money but it is available money, it comes with very few strings attached, and it's big enough to make it possible for communities to think big and to start doing something actual: the drainage line, the paved walkway, the first 50 new houses. It will not be sufficient to resolve all the needs or to reach everyone. But the idea isn't for communities to be too content with that small walkway they've just built, even though it may be a very big improvement. Even after the new walkway, the people in that community will still be living in conditions that are filled with all kinds of "insufficiencies" – insufficient basic services, insufficient houses, insufficient land tenure security and insufficient money..... the ACCA money is small but it goes to as many cities and groups as possible, where it generates more possibilities, builds more partnerships, unlocks more local resources and creates a much larger field of learning and a much larger pool of new strategies and unexpected outcomes⁶³."

Both these initiatives have worked out funding mechanisms that respond to the needs and priorities of urban poor groups while also being accountable to the institutions that fund them.

Conclusions

It is difficult for politicians, civil servants or aid agency staff to see those living in informal settlements or squatting on open spaces as potential partners. Their homes and often their livelihoods contravene laws and regulations. Their settlements present a visual image that may be viewed as obstacles to attracting new investments. Their living environments are clearly very poor. The organizations formed by their inhabitants may be seen as troublesome lobbies – or even if viewed more positively,

62 ACHR (2010), 64 Cities in Asia; First Year Report of the Asian Coalition for Community Action Programme, Asian Coalition for Housing Rights, Bangkok, 96 pages.

63 Ibid, page 9

at least as sources of demands that local government cannot meet. City and municipal governments are often faced with an enormous gap between what is needed in terms of basic infrastructure and the cost of fulfilling it using conventional means that work within official codes and standards. Meanwhile, in any successful city, many of the informal settlements may occupy land that is valuable and may be considered as needed for new infrastructure or commercial developments. Local politicians may be more prepared to work with those in informal settlements for their votes but this is usually from the perspective of the politician considering that when elected they have the mandate to make decisions and determine what is done. In such circumstances, they may view community-based organizations formed by the residents of informal settlements as potential sources of opposition.

Now, there are the additional pressures brought by climate change and this makes even more urgent a capacity to manage land-use and changes in land use. Land-use management has always had to bring together support for a prosperous economy and ensuring sufficient land for housing (so low-income groups do not have to develop new informal settlements). It has to protect the ecological services on which cities and many peri-urban livelihoods depend – and now integrate into this resilience to climate change impacts.

The successful precedents described in this paper depended on politicians and civil servants:

- 1: Viewing those who live in informal settlements as legitimate citizens with a right to make demands on them
- 2: Seeing them and their settlements as key parts of the city's society and economy
- 3: Involving them in discussions about priorities
- 4: Seeing the resources and capacities that they can bring to what needs to be done
- 5: Seeing their own community organizations and the local NGOs that work with them as useful for this
- 6: Working out how to work with these organizations as partners.

None of these is easily achieved. The last of these

changes is also particularly difficult, because many progressive local governments that have gone through all but the final change see the community organizations and local NGOs as groups they contract to undertake particular tasks, not as partners. To state the obvious, partnerships need partners who want to work together. In some instances, clearly it was changes in the attitudes of those within local government that were an important catalyst to this. In others, the key catalyst was grass-roots organizations and their networks or federations demonstrating to local governments their capacities and their willingness to work in partnerships and then senior civil servants or politicians responding positively.

For aid agencies and development banks, there is a need to consider how their institutional structure at headquarters and within country offices can support what is outlined above. This includes developing the financial mechanisms through which they can support city and municipal governments. It also includes the financial mechanisms that can support the urban poor groups and their federations to take action and to offer local governments partnerships, as illustrated by the Urban Poor Fund International and the Asian Coalition for Community Action. This is not easily done. But without mechanisms to support these two critical actors – city or municipal governments and representative organizations of the urban poor - it is difficult to see urban poverty being reduced, resilience to climate change built – and needed global reductions in greenhouse gas emissions achieved.

What is the role of the private sector in combating poverty and caring for the environment?

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The global significance of urban issues

The issue of the relationship between combating poverty and caring for the environment has been a matter of public debate for a very long time. As long ago as 1972, we saw the establishment of ENDA, the international non-profit organization dedicated to environmental development in the third world, with the precise aim of simultaneously addressing the issues of development and environmental protection in southern countries. Nevertheless, the convergent involvement of the private sector in these two issues is a more recent development, and one that has its roots primarily in the concept of corporate social and environmental responsibility that has established itself so strongly over the past fifteen years or so as a recurrent theme in this sector. Corporate Social Responsibility (CSR) is still the subject of lively debate: although considered by some as nothing more than another type of communication or even manipulation, others see CSR as holding out the hope of becoming an effective social lever for change.

Lively as this debate undoubtedly is, it rarely addresses the legitimacy of a concept that links together two areas that are, by definition, independent as far as the private sector is concerned: environmental protection and combating poverty.

It is a revealing fact that the acronym CSR is used as a single catchall term to describe social and environmental responsibility: Corporate Social Responsibility. This ambiguity of language is an accurate reflection of the inaccuracies of the concept that intermittently encompasses environmental issues. This limited concept is also misleading, because it ignores the potential contradiction between social and environmental disciplines.

In reality, social and environmental responsibility is seen by the most critical observers as a highly partisan area of discussion: by linking environment and society in this systematic fashion, the concept not only avoids address-

ing the question of possible trade-offs between the two, but also presupposes a simultaneous and positive contribution to both by the private sector.

Nevertheless, a closer inspection of these issues confirms that the linkage between them has been the focus of very little shared research in the management sciences (Kandachar, 2008). Networks of professionals working on social and environmental questions also remain isolated and compartmentalized. It is this paradoxical situation that explains the highly antagonistic positions adopted in this debate.

On one side there is a clear and conscious optimism, combined with the belief that the private sector offers THE solution to solving social and environmental problems as parts of the same process. From this point of view, the constant and obligatory quest of the private sector to identify new sources of growth and dovetail with consumer requirements is capable of seamlessly connecting economic growth, environmental protection and the fight against poverty in the same virtuous process. This is very much the sense that emerges from the literature published over the last decade or so, which treats environmental and social problems not as a negative external reality requiring correction, but rather as a source of opportunity for the private sector. At the heart of this virtuous circle lie innovation and technical progress.

Conversely, others see the private sector as the INCARNATION of the PROBLEM on the basis of very similar reasons: its constant and obligatory quest for new sources of growth inevitably results in a race to exploit resources and people. At the same time, and in some developed countries at least, we are seeing a profound mistrust of technical progress in the resonance achieved by the precautionary principle in public debate. It then becomes necessary to consider a kind of 'prosperity without growth' in order to be able to break the vicious circle between social demand for rampant consumerism, exploitation of resources and social damage.

These two opposing visions of essentially the same situation seem both exaggerated and dangerous. In our view, it is vital that a more precise and nuanced approach is taken to analyzing the contribution made by the private sector to reconciling the fight against poverty with the need to protect resources.

From this viewpoint, such analysis is guided by four factors:

- **Zones of interdependence:** the point here is not to analyze the possible contribution of the private sector to better management of resources or the fight against poverty independently, but rather to understand the intersections and challenges common to the triangle formed by the private sector, the need to combat poverty and the need to protect resources.
- **Economic models:** having identified these zones, the goal shifts to identifying the possible contribution to be made by the core business of the private sector to solving the problems of poverty without compromising the environment. This means that we are not interested here in the indirect business contributions of the private sector represented by wealth creation, salaries and the contribution to public funds, or in the direct but non-business contributions of philanthropy and what Stuart Hart refers to as 'greening' strategies, by which he means limited adaptations made to existing practices for the purpose of anticipating changes in environmental regulations (Hart, 1997). Our intention is to take a broader view in order to devise economic models that move beyond discussion to the practical integration of social and environmental challenges as part of the same process.
- **Governance:** these new models will undoubtedly call for revised governance methods that must be clearly identified. In our view, the issues surrounding governance are central to combating poverty and protecting the environment. They will be a non-negotiable element of any initiative adopted by the private sector to combine the two objectives into a single positive process. In this context, it is vital to build governance models that involve public authorities and organizations rooted in civil society. Such governance is not only a precondition for the legitimacy of private sector involvement, but also a source of efficiency for whatever action it may take.
- **Funding:** Appropriate funding is crucial, because it provides well-considered support for initiatives that, in most cases, offer a lower return on investment than that offered by the market. We see the emergence of the Impact Investing sector, whose goal is to respond to this need to identify patient capital methods as a first element of response.

I. Despite their interpenetration, the private sector has traditionally addressed social and environmental issues quite separately

A. Two largely-independent fields of analysis

It is striking to observe the analogue approach that the private sector has taken to addressing social and environmental issues.

In the first instance, the relationship between growth, the environment and inequality is often modeled using the same self-regulating mechanism represented by the Kuznets curve. Developed in the 1950s by economist Simon Kuznets, this curve was originally intended to model the link between growth and economic inequality, but is now being used as an illustration of the relationship between growth, poverty and the environment.

Kuznets begins with the assumption that economic growth initially benefits a restricted elite, and therefore begins to make inroads against inequality. Once growth is established, it begins to benefit an increasing number of people, thereby reducing economic inequality. The relationship with the environment is characterized in the same way (Grossman, Krueger, 1994): growth would begin as a source of damage to the environment, but as environmental concerns increased as a result of improved wellbeing, the result would be the introduction of environmental protection policies.

Nevertheless, over and above this self-regulating mechanism, an increasing number of companies - mostly multinationals - have in recent years focused on implementing strategies intended to protect the environment and contribute to development. Historically, these mechanisms have been motivated by defensive attitudes, since the primary responsibility of the private sector in terms of environmental and social issues is to avoid doing any harm. The many widely-publicized environmental and social disasters occurring simultaneously in many different countries have scandalized public opinion. The most polluting or socially-impactful sectors - especially heavy industry - have therefore been obliged gradually to introduce programs designed to reduce their impact or, alternatively, compensatory mechanisms.

In the 1990s, adopting terms like 'operating license' or 'access to resources', companies developed strategies for reducing poverty or damage to the environment whenever they felt themselves to be morally or contractually dependent on particular parts of the world, and obliged to maintain high-quality relationships with local communities. Those industries involved in natural resources extraction have therefore introduced a number of so-called

'community' programs (Renouard, 2007), usually as a result of pressure from civil society or public authorities. It wasn't until the 2000s that the management sciences began to flag up commercial opportunities related to environmental and social issues - the parallel attitude remains striking. Books like *Green is Gold* (Esty and Winston, 2009) and *The Fortune at the Base of the Pyramid* (Prahalad, 2004) are based on the same twin premise. They begin by legitimizing the role of the private sector by stressing the appropriateness of market-based approaches for solving social and environmental issues, at the same time as criticizing the involvement of national and international public authorities and excessively restrictive regulation. They go on to turn environmental and social challenges into sources of profit and innovation for the company. This therefore reflects a gradual trend away from responsibility and the management of negative externality to social and environmental innovation. Even so, the two fields remain largely independent.

1 → The environmental challenges involved in market-based approaches to combating poverty

Over the last decade or so, we have seen the development of alternative market-based approaches intended implicitly or explicitly to combat poverty. Even today, the two main forms adopted by these market-based approaches to combating poverty take only marginal account of the environmental issue.

On the one hand, the *Base of the Pyramid* (Prahalad and Hart, 2002) strategies respond to one natural trend of globalization: the quest for new unexploited markets. Using these strategies, multinationals seek to incorporate a proportion of the 4 billion people who live on less than \$5 or \$6 a day into their business models in order to identify new opportunities for growth. One aspect of the *Base of the Pyramid* (BoP) approach proposed by Prahalad and Hart (2002) is the way in which it reconciles the traditional argument of economic rationality with the fight against poverty. The BoP approach urges companies to address the 'fortune' at the base of the pyramid in their own interest (maximizing value for shareholders). The BoP logic is one of seeking out new economic opportunities, with Prahalad and Hart reviving the ideas of Adam Smith and applying them to the slums of poor countries. Consumer goods companies in particular have conducted pioneering programs to adapt their economic models to rural areas. In this way, Hindustan Lever, the Indian subsidiary of Unilever, has made many of its products more accessible by using an individual product packaging system and a tailored distribution system to reach Indian villages. The mobile phone industry has also achieved very strong growth amongst poor populations by introducing prepayment systems and alternative distribution methods.

In parallel with the BoP theories, the Nobel Peace Prize Winner Muhammad Yunus has popularized the concept of social business (2007, 2009) that has formed the basis for many partnerships with companies for the purpose of implementing new development models. The aim of social business is to contribute to solving a social problem: it operates on the 'no loss, no dividend' principle. In other words, social business aims to provide underprivileged populations with access to a basic service - such as credit, water or energy - through the creation of companies that are 'traditional' in the sense that they must be financially sound in the long term, but at the same time 'social' in the sense that any profits are reinvested in the company itself. A number of multinationals, including Danone and Veolia, have committed to this approach by creating joint ventures with Grameen Bank or its subsidiaries. Danone and Grameen have formed Danone Grameen Food Limited, with the stated aim of improving infant nutrition in rural Bangladesh. Similarly, Veolia has got together with Grameen Healthcare to create a water treatment and distribution company to serve Bangladeshi villages. This form of company offers a more legitimate way of combating poverty and creating partnerships with non-profit organizations, since the absence of the profit motive creates a de facto 'demilitarized zone' (Yunus, 2010) open to all partnerships.

The emergence of these strategies has been the subject of intense debate and criticism regarding their real contribution to combating poverty and their ability to reach the poorest in society, rather than the emerging middle class (Karnani, 2007, 2009). Over and above these criticisms, it is important to note that the environmental issue remains a virtual blind spot for both BoP and social business. In his 12 principles for successful innovation, Prahalad refers to the necessity to avoid exploiting environmental resources (principle 4), but proposes no other practical method of reducing any negative impacts imposed by the models offered. Furthermore, the examples offered may reasonably be questioned from the environmental point of view. The unprecedented growth in individual packaging, particularly in consumer goods, provides a perfect illustration of the tension that exists between accessibility and environmental protection. Although these products may be tailored to the purchasing power of the poor, they remain largely harmful to the environment, and it was not long before the individual sachets of HLL products spread right across the Indian subcontinent.

In the same way, Yunus makes environmental protection one of the seven points of social business (2010), but the issue is hardly addressed in any depth. So the requirement for economic viability relegated the attempts made by Danone to develop a green packaging product (PLA) into second place, and the company had no choice but

to market its yoghurts in traditional plastics (Ardoin et al 2011).

So in reality, the social and environmental goals would be difficult to reconcile, leaving us with a choice between inter-generational fairness and intra-generational fairness. Worse still, setting more than one extra-economic target for the private sector would ultimately prove totally paralyzing. The result would be to fall into the multiple target trap (Garrett and Karnani, 2009).

2 → The social challenges of 'green business'

Conversely, the economic models developed with the aim of contributing to improved environmental protection take little account of social issues. Their main thrust is to decouple economic growth from the pressure on resources, but without introducing mechanisms capable of including the poorest populations. This 'decoupling' may be achieved in many different ways, but we will focus on two particular levers for action: economic models and the behavioral lever (Hahn, 2008).

a. The business models

Eco-efficiency

The term 'eco-efficiency' was coined at the Rio Earth Summit in 1992 (WBCSD, 1992). Its underlying concept is not to produce less, but to produce better, whilst reducing the impact of production on the environment. Its basis lies in the shared observation that growth cannot be sustained indefinitely given the pressure it places on natural resources. In seeking to reconcile the two contradictory imperatives of growth and caring for the environment, eco-efficiency aims to progressively reduce ecological impact and the intensity of natural resource extraction to achieve a level compatible with the recognized capacity of the planet to sustain itself. This theme has been taken up by a very large number of economic actors - it is no longer just companies that have introduced initiatives in this direction - because it explicitly reconciles private interests (savings in terms of raw materials and energy) with public interests (environmental impact). Indispensable as it may be, this model will however fall far short of being sufficient in itself. The sheer extent of the needs that go hand-in-hand with poor populations points to the fact that the ecological impact of eco-efficient models seems hardly tenable (Hahn, 2008).

The economy of functionality

The economy of functionality is the complete or partial replacement of a product sale by the sale of a service with the aim of decoupling the equation that says profit equals the use of natural resources. In other words, by proposing models in which profit is derived from usage

or maintenance services, it is possible to conceive of economic models that substantially limit the exploitation of natural resources. This direction is followed by many companies, including Schneider Electric, Michelin and Hilti. For example, Michelin has rethought its economic model and now offers major road haulage operators a total tyre management service. The billing for this service is no longer based on tyres sold, but on the total mileage covered by the entire vehicle fleet. This radically changes the business goal of the tyre manufacturer, because to maximize its profit, Michelin must now focus on ensuring that its road haulage customers consume as little rubber as possible; a virtuous objective from the environmental point of view (Renault, Dalsace and Ulaga 2009).

Green technologies

New technologies are ultimately sources of economic opportunity, and the aim here is to design new products or processes that consume much lower levels of natural resources. The generation of energy from renewable sources using solar or wind technology, making best use of the energy we have by means of smart grids, introducing electrically-powered vehicles and constructing energy-positive buildings are just some examples that illustrate how new technologies can help to reconcile growth with environmental protection.

Nevertheless, these practices and thought processes - and their implementation - have usually been restricted to the developed countries of the world, where their impact would be the greatest. From this viewpoint, green technologies are usually highly sophisticated technologies, and therefore expensive technologies. In other words, given the relative proportional importance of developed countries, the private sector has tended to focus chiefly on OECD countries.

b. The behavioral lever and patterns of consumption

The second lever is behavioral. It involves analyzing the behavioral changes needed to achieve 'prosperity without growth' (Jackson, 2009). In other words, the private sector must contribute to raising consumer awareness of better ways to use products and services in order to reduce their environmental footprint. Naturally, this lever is not particularly appropriate for the already-restricted patterns of consumption seen amongst poor populations; here again, it cannot be denied that the considerations surrounding the role of the private sector in environmental issues are applied principally to the developed countries of the world.

In overall terms, and despite all the talk that links environmental issues with poverty via the umbrella concept of social and environmental responsibility, the proactive

mechanisms that the private sector is currently trying to implement remain very largely independent of each other in reality.

B. Nevertheless, both these questions are very profoundly interdependent

A closer interconnection between the issues of poverty and environment are nevertheless vital in today's world, both for poor populations and for companies.

1 → Convergence: a necessity for the populations concerned

The BoP and social business theories have raised the profile of a phenomenon that is well-known, but little researched in its entirety: the penalties of poverty or 'double squeeze'. The fact is that poor populations pay more in absolute and relative terms for their goods and services than wealthier populations (Prahalad, 2004). Prahalad also demonstrates the price differentials that exist for many goods and services (including water, credit, medications and rice) between the residential district of Bombay Warden Road and the Dharavi slums.

There is also a third 'penalty' to be considered: the environmental damage that acts retrospectively and very significantly to depress the incomes of poor populations. The very great majority (75%) of the world's poorest people - those who live below the \$1 per day income threshold - live in rural areas. They depend very heavily on services provided by ecosystems in order to live, but 60% of such services are now degraded or damaged (Millennium Eco-system Assessment, 2005). These populations have potential recourse to four different types of environmental revenue: cultivated land, forests, fisheries and mineral resources. In fact, 2.6 billion people rely for their living on agriculture, whilst a further 1.6 billion depend on forests in one way or another. The ecosystems built around agriculture, forestry and fisheries represent between 6% and 17% of GDP in Indonesia, India and Brazil, and contribute between 47% and 89% of the income generated by the poor in these countries (Eloi, 2011).

2 → Convergence: a necessity for companies?

At the same time, and more surprisingly, acceptance of the interdependence between the two issues seems to be becoming a genuine route to innovation for companies.

Both the BoP and 'green' strategies require genuine step-change innovations across all company business sectors, in terms not only of products, but also of production processes (Lehman Ortega, Faivre-Tavignot, Moingeon, 2010). It is imperative for companies to renew their economic models as part of facing up to increasing

competition from companies in emerging countries (Govindarayan, Immelt and Trimble, 2009). Consequently, tackling the issues of 'green' innovation and 'social' innovation head-on and making them a priority direction for research has, for some years, been a necessity for proponents of the BoP approach. One of the most recent articles published by CK Prahalad focuses on this 'holy grail of innovation' (Prahalad, 2010); an innovation capable simultaneously of addressing the twin needs to conserve resources and combat poverty.

Prahalad defines this new form of innovation as 'Gandhian innovation' (Prahalad, 2010), because it is based on Gandhi's twin principles of accessibility and sustainability summarized in two maxims of India's great leader: "I would prize every invention of science made for the benefit of all," and "Earth provides enough to satisfy every man's need, but not every man's greed." This type of innovation, referred to by some as frugal innovation (The Economist, 2010) to reflect the radical process it presupposes, would enable the creation of tomorrow's economic models, thereby creating considerable comparative benefits. Similarly, it is interesting to note the creation of 'The Great Leap': a research program led by Stuart Hart to examine convergence between 'green technologies' and 'BoP'. This 'convergence' would be all the more well-advised were it not for the fact that the real market for green technologies is not to be found in developed countries, but in emerging countries. It is therefore important to make a distinction between two types of green company. On the one hand, there are the 'green giants' of developed countries, like wind energy and solar energy projects that require public investment and centralized coordination, and on the other hand, there are the 'green sprouts' involved in small-scale decentralized systems (Hart, 2010).

These small-scale green technologies seem to be difficult to implement in developed countries, since those companies already established in these markets put obstacles in the way of their development in order to defend their own positions and profits. In this regard, the maturity of developed markets would be the main obstacle to the establishment of new technologies. In other words, the introduction of green technologies into emerging countries would require a 'creative creation' mindset (Hart and Christensen, 2002), which is the opposite of the situation in developed countries, where new technologies are introduced largely at the expense of existing technologies. BoP markets therefore provide the most relevant laboratories in which to experiment with green technologies.

The example of the Indian company D-Light provides an effective illustration of this possible convergence. D-Light Design is a for-profit company whose mission

is to: “Enable households without reliable electricity to attain the same quality of life as those with electricity”. Traditionally, Indian communities - and especially those in rural areas - make very extensive use of kerosene. This solution is nevertheless costly, dangerous (it causes nearly one-third of all cases of lung cancer in India) and polluting (100 million metric tons of CO₂ are emitted every year as a result of the use made of kerosene) (Kennedy and Novogratz, 2010). It is against this background that D-Light Design offers a solution that is both accessible and more environmentally-friendly: an LED lamp of which more than 50,000 were sold in 2009, generating revenue equivalent to around €1 million. The company believes that it has helped to save 30,000 metric tons of CO₂ emissions since it was formed (Kennedy and Novogratz, 2010).

II. The convergence strategies are co-creation solutions that require patient capital and are based on specific conditions of governance

A. New innovation processes built on co-creation

1 → Co-creation with the populations concerned

The reasoning put forward as the basis for success in achieving the twin objectives of protecting the environment and achieving universal access is that of frugal innovation, as proposed by CK Prahalad. In practice, this means offering essential goods and services created using a minimum of resources. This innovation process must also involve the populations concerned in work based on co-creation, which is in turn subject to a series of imperatives.

The first of these is that of acceptability and local adoption. Regardless of whether they address environmental protection or the fight against poverty, a very large number of development programs have failed in practice simply because they have not been adopted by the populations concerned. ‘Beneficiary education’ has emerged as one of the responses to this problem. The presupposition of this educational initiative is that although the solutions implemented by experts, whether from the world of development or the corporate world, are relevant, they are not immediately understandable by beneficiary populations. This education initiative nevertheless risks reinforcing a debatable form of multiple definition of solutions and contributing to disrupting local ways of life. A number of companies are seeking to move away from this risk of multiple definitions towards approaches

based on co-creation and participation with the communities concerned (Chambers, 1997). For example, SC Johnson has introduced such a co-creation process in the slums of Nairobi (Thieme and DeKosmovsky, 2010). This involves proposing a local enterprise model based on micro-entrepreneurship, which enables slum households to be offered a sanitation service. The company has addressed the environmental issues by introducing a new product packaging system that produces very little waste.

From this point of view, companies must come to terms with a type of innovation that intrinsically erodes skills and ‘learn to unlearn’ (Hart and London, 2004): the process of education that was destined for local populations not so long ago must then be applied to companies in general, and multinationals in particular (Murphy, 2008)

Participation is also an economic imperative. Many research projects based on company pilot initiatives have demonstrated that there is no BoP market as such, and have analyzed the difference between ‘needs’ and ‘demand’ (Simanis, 2010, Perrot, 2010). In other words, there are currently no pre-existing economic opportunities that can be intelligently grasped in this way. On the contrary, companies must work concomitantly to create supply and demand (Simanis, 2009, London and Hart, 2010).

Creating a market enables demand to emerge gradually as an expression of the needs of local populations and their ways of life. Participation and co-creation avoid the painstaking work of constructing demand on the basis of a supposed need; a practice that is also questionable in terms of imposing external changes on existing ways of life. On the contrary, co-creation is based on understanding the aspirations of the populations concerned. The BoP protocol (Hart and Simanis, 2008) sets out to offer a practical methodology for co-creation.

The co-creation obligation also raises questions of reproducibility. If each initiative requires a long period of co-creation, is it possible to reproduce successful projects on a larger scale? This question is particularly pertinent for multinationals, whose favored operating method is based on economies of scale.

2 → New innovation processes

Involvement in these new markets therefore requires a real cultural step-change in approaches to innovation, which has yet to be studied in the broader sense. One central question here is that regarding the ability of traditional companies, especially multinationals, to deliver market-focused breakthrough innovations rather than technology-focused breakthrough innovations. Emerging companies would be best placed to implement this type of strategy.

This question relates directly to the classic problem of innovation: are large organizational structures actually capable of delivering breakthrough strategies? Former IBM President Lou Gerstner answered the question ironically in *Who Says Elephants Can't Dance?*, his classic book on the subject.

The first way of 'getting elephants to dance' refers to the concept of open innovation (Chesbrough, 2003), which involves opening up the process of innovation by collaborating with other organizations (technology suppliers, smaller companies, NGOs, etc.) and accepting the need to participate in creating a more open intellectual property market in which innovations may be bought or sold. For example, Procter & Gamble has made a major commitment to open innovation by seeking to create an innovation ecosystem involving start-ups, P&G research laboratories and consumer networks, with the goal that 50% of the new products it launches into the market will be co-created in this way (Huston and Sakkab, 2006)

A second innovation lever lies in the incubation of existing structures in combination with the creation of dedicated investment funds. Many initiatives that have proved effective in terms of combating poverty have been originated by social entrepreneurs or very small businesses with the flexibility required to put in place pilot projects and move forward with the development of innovative solutions using an iterative process of error and adjustment. In this context, the role of mid-size and large companies may be not one of replacing those small structures, but rather of supporting them and, where appropriate, incorporating those whose initiatives have proved effective over time. For example, Schneider Electric has created the Schneider Electric Energy Access fund, one aspect of which is investment in structures focused on developing innovative solutions to energy access issues.

B. Tailored funding solutions: the growth of impact investing

The increasingly-popular concept of Impact Investing refers to investment strategies that target not only profitability, but also - and simultaneously - social and environmental profitability and impact. This concept has emerged to describe the initiatives already undertaken by some investors, which although very different in nature (environment-focused or social-focused on opportunities in underprivileged areas of developed countries or poor countries), all seek to generate extra-financial value from their investment (Monitor Institute, 2009). The interesting thing about this idea is its proposition of a single concept to describe inherently-disorganized emergent movements, where the act of conceptualization enables consistency and encourages convergence.

These funds take a more intensive approach than socially responsible investment (SRI) funds, which are based essentially on a best-in-class approach that excludes those sectors seen as problematic. The emphasis here is no longer on 'doing no harm', but on aiming to maximize the social and/or environmental impact of financial investment.

The Impact Investing sector is a broad term that also includes the investment strategies of Foundations and 'traditional' investors wishing to take account of social or environmental impact factors. These funds are currently responding to demand by developing special expertise in particular sectors and/or regions of the world. Founded in 1994, E+Co concentrates on the business models of companies seeking to develop universal access to clean energy in emerging countries, whilst the Acumen Fund created in 2001 by Jacqueline Novogratz works on key sustainable development issues, such as access to water, energy, housing and healthcare.

The Monitor Institute now makes a distinction between two major types of strategy - 'Financial First' and 'Impact First' - as a way of distinguishing between goal and constraint (2009). Typically, traditional financial institutions follow the first type of strategy as the basis for adopting the concept of social value creation, whilst those traditional development actors that seek to use financial markets as a tool for development tend to adopt the second type of strategy.

C. Cooperative strategies involving public and non-profit actors

Lastly, it is important to stress that companies will not be able to act alone in connecting the fight against poverty with the need to protect the environment. The fact is that the private sector can no longer ignore existing provisions or take the place of locally-involved actors in addressing these issues: it is through partnership that the private sector will be best placed to contribute its added value.

In these cooperative strategies, the work done alongside non-profit organizations and public authorities would seem to be decisive. This often means overcoming the cultural barriers between organizations whose mindsets and operating methods are fundamentally different. But it is essential for companies to be able to benefit from the experience and expertise of professionals in social engineering and public policy.

Furthermore, poverty is not limited simply to a lack of financial resources, and access to essential goods and services at a better price will not in itself deliver a definitive response to poverty.

As Sen has demonstrated, poverty should not be confused with low income, but refers primarily to a 'loss of capacity'. Sen also reminds us that: "the aim of development is to expand the real freedoms that people enjoy" (Sen, 1999). Human development must therefore be understood as a process whose goal is to expand the choices of people and increase their capacity to be and to do. Far from eradicating financial poverty, the point of combating poverty is to put people at the centre of development. In other words, it means contributing in ways that enable development program beneficiaries to achieve their full potential, enjoy more choices and benefit from the freedom to live the lives they wish.

In the same way, relationships to the environment are very closely linked with local cultures. The need is therefore not only to create and distribute new goods, but also to create new social and cultural links.

It is from this viewpoint that the role of the private sector should be analyzed: is the company acting in good faith

and does it have the ability to address the many different dimensions of poverty? It seems more reasonable to take the view that at the same time as offering well thought-out solutions to combat financial poverty, companies can also become involved in wider partnerships in order to contribute to bringing about social change.

Although many companies are committed to working alongside NGOs, there is still a lot of work to be done on partnerships involving local public authorities (Cholez et al, 2010).

Furthermore, the success of all strategies intended to combat poverty at the same time as protecting the environment relies on establishing a trust-based relationship with the people targeted by these initiatives. Building trust takes time, and that trust is often the privilege of non-profit organizations, which, regardless of form, have been operating at local level for many years.

There exists today an awareness of the ability of the private sector to reconcile the need to combat poverty with the need to protect the environment. This awareness can be seen in an increasing amount of research and the emergence of new forms of innovation, and is now finding its way into the practices of companies committed to bringing forward innovative economic models.

But this awareness is still too limited, and the very small number of 'exemplary' achievements bears witness to the practical difficulties involved in establishing both a real economic interest in taking action and effective methods of implementing a long-term financial framework.

The challenge now is therefore to move beyond 'anecdotes' to create a more coherent and far-reaching approach to these issues. Intellectual commitment is the first condition required for success in such a project.

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The Poverty-Climate-Vulnerability Nexus

A Review of the Debate since The Stern Review

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Two of the greatest challenges facing our interdependent world – overcoming poverty in the developing world and combating climate change – are inextricably linked. The channels linking climate change to development are numerous: droughts, floods, storm surges and changes in rainfall patterns all affect the natural environment as well as the livelihoods of poor people, their nutrition, their security, their future opportunities and probably those of their children. The social impacts of climate change are numerous and difficult to assess as interactions are complex and poorly understood. Nevertheless, evidence is presented in a growing number of studies demonstrating that climate change is an exacerbating factor of poverty that confines people in so-called poverty traps.

The Stern Review has conducted a comprehensive assessment of the links between poverty and climate change. The results have been confirmed by additional studies providing new information and insight. This paper reviews the conclusions of some recent literature against the major findings of the Stern Review and the IPCC Fourth Assessment Report, clarifying the underlying assumptions and questioning some of the conventional wisdom.

There is wide scientific consensus relating to the scope of climate change impacts. Rise in temperature level is one major aspect but the impacts of climate change often translate into water problems, such as floods, extreme precipitation, sea level rise or conversely lack of water and ensuing droughts. These impacts have varying effects on countries, regions and people. These differentiated impacts are at the heart of the poverty and climate change nexus.

The current debate addresses two underlying questions: Does climate change deepen existing poverty and if so, how? And how does poverty increase vulnerability and affect capacity to cope with extreme weather events and slow onset changes in climate?

Poverty and Vulnerability

Poverty encompasses various dimensions: the poverty of a nation - measured by GDP, per capita GDP or a broader definition of their level of development such as the Human Development Index; household poverty as measured by income (monetary measure); or poverty as a lack of capabilities and assets (individuals).

Defining and measuring poverty are essential to any discussion on development and poverty alleviation. Definitions of poverty have traditionally focused only on material - specifically monetary - measures of well-being but have expanded to include the social and psycho-

logical burdens of daily survival on lower level society. This broader concept is described by Amartya Sen as a lack of the capabilities that enable a person to live a life he or she values, encompassing such areas as health, education, empowerment, and human rights in addition to income¹.

A better understanding of these complexities has led to the use of participatory assessments that allow the poor to speak for themselves and identify their own priorities. Such studies make it clear that, in addition to being without financial resources, being poor often means suffering sickness, chronic pain, or exhaustion. It means enduring difficult social relations, sometimes facing exclusion from the community or family. Poverty also

¹ Sen, A.K. 1999. *Development as Freedom*. Oxford. Oxford University Press.

translates into insecurity and powerlessness, a lack of access to information and institutions, and often a lack of self-confidence and voice. These varying aspects of poverty tend to be self-reinforcing, making it all the more difficult to move out of poverty and construct a stable life. It is hard to plan ahead or to seize new opportunities when you are exhausted, stressed, or hungry. In addition, the poor often live in dangerous and degraded environments, since that is all they can afford nor do they have the capacity or right to migrate to a more suitable living environment. In this context, it is important that the poverty impacts of climate change be analyzed taking into account these various dimensions².

Vulnerability adds another dimension to the climate-poverty nexus. Vulnerability to climate change is determined by both physical and social assets. It refers to the quality of the physical asset base as well as the likely responses of the sectors and resources on which societies and individuals depend, the availability of resources and, crucially, the entitlement and choice of individuals or groups to call on these resources (access to assets).

Vulnerability to climate change is not strictly synonymous with poverty. While climate change impacts fall more heavily on the poor, it is important to remember that the levels of warming that we risk would be profoundly damaging for all countries, rich and poor. Nearly all human societies and activities are sensitive to climate in one way or another. Where people live and how they generate livelihoods and wealth are influenced by the ambient climate. All nations will need to adapt to increased climate risk.

The conventional wisdom is that poverty in the narrow sense (monetary) is the main factor of vulnerability, since low-income households have less capacity to adapt. This however is rather simplistic, since it measures ability to adapt (and thus reduce vulnerability) solely on the basis of economic and technological means. Yet there are many other factors in responding (or not) to natural disruptions. A more comprehensive view of vulnerability includes several factors other than income: the layout of the land, the sensitivity of ecosystems, social cohesion, diversity of activities (economic and subsistence), political and institutional organization, and living conditions. Only the last factor (living conditions) is tied directly to development level, which proves that low income is not the only measure of vulnerability, and at times only has minor influence³.

Poverty of Nations and the Geographic Factor

As the Stern Review and IPCC reports established, the adverse impacts of climate change will be most striking in the developing nations because of their geographic and climatic conditions, their high dependence on natural resources, and their limited capacity to adapt to a changing climate.

Geographic location is a key factor in the vulnerability of poor people and poor nations. Many of these countries lie in the regions most at risk from climate change. Most of the 48 nations included in the Least Developed Countries (LDC) group will be those most severely impacted by climate change. These countries are already warmer on average and most of them suffer from higher rainfall variability, and are highly dependent on agriculture, the sector most sensitive to climate. Crop yields are expected to decline in most tropical and sub-tropical regions as rainfall and temperature patterns change with a changing climate⁴. There is also some evidence that disease vectors such as malaria-bearing mosquitoes will spread more widely and that health risks related to heat and air pollution will increase. Projected changes in the incidence, frequency, intensity, and duration of climate extremes as well as more gradual changes in the average climate will threaten the livelihoods, further increasing inequity between developing and developed countries⁵.

The effects of climate change on economies and societies will vary greatly around the world. The circumstances of each country - its initial climate, socio-economic conditions, and growth prospects - will shape the scale of the social, economic and environmental effects of climate change. IPCC defines vulnerability to climate change as exposure to changes in climate sensitivity - the degree to which a system is affected by or responsive to climate. Geographical exposure plays an important role in determining a country's growth and development prospects. Many developing countries are located in tropical areas. As a result, they already suffer from climate extremes (such as those that accompany the monsoon as well as El Niño and La Niña cycles), intra and inter annual variability in rainfall, and very high temperatures. Geographical conditions have been identified as important contributors to lower levels of growth

2 Narayan, D., Patel, R., Schafft, K., Rademacher, A., Koch-Schulte, S. 2000. *Voices of the Poor: Can Anyone Hear Us?* New York: Oxford University Press for The World Bank.

3 Magnan, A., 2010. Coastal tourism, climate change uncertainties and adaptation options. In C.A. Brebbia et F.D. Pineda (Eds.), *Sustainable Tourism 2010*, Proceedings of

the Fourth international conference on sustainable tourism, WIT Press, Ashurst, Southampton, UK, 592 p., 229-240.

4 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 and Rei-

singer, A. (eds.)]. Geneva, Switzerland: IPCC.

5 OECD. 2003. *Poverty and Climate Change: Reducing the Vulnerability of the Poor through Adaptation*. A collaborative initiative between OECD, UNDP, World Bank, African Development Bank, Asian Development Bank and more.

in developing countries (e.g. dependence on monsoon for India or Bangladesh). William Nordhaus and Jeffrey Sachs have confirmed the negative effect of “tropical geography on output per capita compared to temperate regions”, including on agricultural performance.

Climate change is expected to make these conditions even more challenging. Even slight variations in the climate can have very large costs in developing countries as many places are close to the upper temperature tolerance of activities such as crop production⁶.

The Poverty Lock-In: Dependence on Climate Sensitive Activities

For developing economies, heavy reliance on climate-sensitive sectors such as agriculture and ecosystem services, along with rapid population growth and high concentrations of people in slum and squatter settlements highly exacerbate the impacts of climate change leading to poverty lock-in.

→ Climate Change Threatens Food Security

Agriculture and related activities are crucial to many developing countries, in particular for low income or semi-subsistence economies. The rural sector contributes 21% of GDP in India, for example, rising to 39% in a country like Malawi, whilst 61% and 64% of people in Asia and sub-Saharan Africa are employed in the rural sector. This concentration of economic activities in the rural sector – and in some cases based on just a few commodities - is associated with low income levels and this creates critical sensitivity to climate. In a number of African countries like Morocco or Burkina Faso, GDP is highly correlated with precipitation⁷. Of course there are mediations between the evolution of agricultural output and poverty. Models explore how changes in agricultural productivity as a result of climate change will affect poverty in poor countries, concluding that there are various pathways by which climate change might affect agricultural income and food prices. Rising world prices for staple commodities may result in a substantial reduction in real income – and an ensuing increase in poverty – for households spending a large share of their income

on staple grains. However, the well-being of households depends not only on changes in the cost of living, but also on changes in earnings.

While climate change has a fairly consistent impact on the real cost of living at the poverty line, the impact on household earnings is quite varied. In regions where the bulk of the poor are self-employed in agriculture, higher global agricultural prices can boost factor returns in the sector, thereby reducing overall poverty. On the other hand, when poverty is dominated by wage earners and urban poverty, the opposite applies⁸. Countries combining subsistence agriculture and urban poverty will see an increase in aggregate poverty.

→ Climate Change Increases Water Constraints

Developing countries are highly dependent on water, the most climate-sensitive economic resource, for their growth and development. Water is a key input for agriculture, industry, energy and transport and it is essential for domestic purposes. Irrigation and effective water management will be very important in helping to reduce and manage the effects of climate change on agriculture. But many developing countries invest little in irrigation systems, dams, and ground water. Ethiopia for example has less than 1% of the per capita artificial water storage capacity of North America, despite having to manage far greater hydrological variability. Many developing countries do not have enough water storage to manage annual water demand based on the current average seasonal rainfall cycle. This will become an even greater bind with future, less predictable cycles. In addition, inappropriate water pricing and subsidised electricity rates that encourage the excessive use of ground-water pumping (for agricultural use, for example) also increase vulnerability to changing climatic conditions. For example, 104 of Mexico's 653 aquifers (that provide half the water consumed in the country) drain faster than they can replenish themselves, with 60% of the withdrawals being for irrigation. Similarly, water tables are falling in some drought-affected districts of Pakistan by up to three meters per year, with water now available only at depths of 200-300 meters. The consequences of inadequate investment in water-related infrastructure and poor management are important given that most climate change impacts are mediated through water.

6 Nicolas Stern. 2007. The Economics of Climate Change: The Stern Review.

7 World Bank. 2006 using 2004 data. For example, the Central African Republic derives more than 50% of its export earnings from

cotton alone (1997/99). Commission for Africa (2005)

8 Hertel, T.W., Burke, M., Lobell, D.B. 2010. The Poverty Implications of Climate-Induced Crop Yield Changes by 2030. Global Trade

Analysis Project Working Paper No. 59.

Access to water - in particular to clean water - is central in the millennium goals to fight poverty. Climate change will have a major impact on availability of water and will foster conflicts for this increasingly scarce resource.

→ **Climate Change Impacts Energy Poverty**

Debate about climate change and vulnerability has been slow to highlight the energy-poverty-climate nexus. The link between energy service and energy poverty reduction was explicitly identified by the World Summit on Sustainable Development (WSSD) in Johannesburg Plan of Implementation which called for the international community to make “modern forms of energy a sustainable solution; access to it, including electricity, natural gas, clean cooking fuels and mechanical power, are necessary to increase the productivity of agriculture”⁹.

Traditionally, energy poverty has been considered and addressed as a sub-problem of general poverty, mainly due to low income. But solving the energy poverty problem via household income, through subsidies for energy costs or fuel payments for example, can be problematic since households may not feel that covering energy service needs is the priority in assigning extra income¹⁰.

Another level through which energy poverty has been traditionally addressed is energy prices. Many countries have attempted to address energy poverty and spur development through subsidized energy prices or pricing policies. However, subsidized energy prices need to be very carefully used in addressing energy poverty since they can be counterproductive in the long-run, potentially locking households in energy poverty.

Conversely, energy prices, if properly managed, are a powerful tool for demand-side climate policies. They are expected to increase in real terms as we progress towards a carbon-constrained economy and may be an important driver of energy poverty rates in the future, leading to trade-offs between climate change mitigation and energy poverty alleviation. If the chief tool for tackling climate change is carbon pricing, energy poverty levels will rise. Conversely, if energy poverty is tackled through energy subsidies, energy consumption levels will rise as a result of inefficient capital stocks, increasing emissions. In order to avoid conflict between the welfare of future versus present generations which would arise, it is crucial to address energy poverty through its other levers.

One lever of energy poverty is the efficiency of energy-using capital stock. For this lever to make a marked difference in energy poverty levels, the efficiency levels of state-of-the-art and prevailing equipment or stock in use need to be substantial. This is the case for many buildings and heating equipment in countries where heating dominates the energy landscape.

Finally, access to modern energy carriers like natural gas or electricity is also an important determinant of energy poverty. Without such access, households are forced to spend a disproportionately large portion of their resources on meeting basic energy service needs, which may constitute a significant part of household resource expenditure.

Differentiated Impacts of Climate Change

Climate Change will impact poverty through extreme weather events and through slow onset changes. It will also have serious impacts on health and migration patterns.

→ **Extreme Weather Events and the Poverty/ Vulnerability Nexus**

Variability of climate impacts countries and people. Climate change and variability cut revenue and increase national expenditure, adversely affecting a balanced budget¹¹. Dealing with climate change and extreme variability places a strain on government budgets, as illustrated by the case of Zimbabwe following the drought of 1991-92. The severity of the effect on government revenue will in part depend on the structure of the economy. For example, the drought in southern Africa in 1991-92 resulted in a drop in income of over 8% in Malawi where agriculture accounted for 45% of GDP at that time, but in South Africa, income was down by only 2% since agriculture at that time accounted for just 5% of GDP. Morocco's GDP is highly correlated with precipitation levels. Climate change will also necessitate an increase in spending at the national level to deal with the aftermath of extreme weather events and the consequences of a gradual reduction in food and water supplies. In some cases, the government may not be able to allot the level of expenditure required. This was the case following Hurricane Mitch in 1998, when the government of Honduras (with a GNP of \$850 per capita) faced reconstruction costs equivalent to \$1250 per capita.

9 UNDP, World Bank, ESMAP. 2005.

10 Herrero, S.T., Ürge-Vorsatz, D. 2010. Fuel Poverty in Hungary: First Assessment. Central European University and The Environmental Justice Working Group.

11 Nicolas Stern. 2007. The Economics of Climate Change: The Stern Review.

Extreme climate events are a source of mounting concern throughout the world. In recent decades, the number of people affected by climate disasters such as drought, flooding and storms has been rising. As climate science develops it will provide clearer insights into the relationship between global warming and weather system outcomes. However, current evidence points very clearly in one direction: climate change will increase the risk of exposure to climate disaster.

Reported climate disasters are on an upward trend. Between 2000 and 2004, an average of 326 climate disasters was reported each year. Some 262 million people were affected annually over this same time frame, more than double the level in the first half of the 1980s¹². For the period 2000-2004, on an average annual basis, one in 19 people living in the developing world was affected by a climate disaster. The comparable figure for OECD countries was one in 1,500 affected, a risk differential of 79.10¹³.

Flooding affected the lives of some 68 million people in East Asia and 40 million in South Asia. In sub-Saharan Africa 10 million were affected by drought and 2 million by flooding. When disasters strike, they hurt whole communities—but women and children pay the highest cost.

Extreme events cost lives and create huge losses but they also undermine future development. They destroy assets that cannot be replaced easily and if repeated entail economic and social capacity to develop. But not all of the human development costs of climate shocks occur after the event. For people with precarious livelihoods in areas of climate variability, uninsured risk is a powerful impediment to increased productivity. With less capacity to manage risk, the poor face barriers to engage in higher-return but higher-risk investment. In effect, they are excluded from opportunities to produce their way out of poverty.

As households move closer to extreme poverty they become risk averse for a very good reason: adverse outcomes can affect life opportunities at many levels. Operating without formal insurance in areas of high risk exposure - such as floodplains, drought-prone regions or fragile hillsides - poor households quite understandably choose to forego potentially higher return on investment in the interests of household security. Farmers may be forced to make production decisions that are less sensitive to rainfall variation, but also less profitable¹⁴.

As stated in The Stern Review, the survival strategies adopted by poor people to cope with a changing climate may damage their long-term prospects. If there is a risk

of more frequent extreme weather events, then households may also have shorter periods in which to recover, thus increasing the possibility of being pushed into a poverty-trap.

Poor households may also be forced to sell their only assets (such as cattle during the 1991-92 drought in Zimbabwe). This can then compromise their long-term prospects as they are unable to educate their children, or to increase the level of income over time. Alternatively, to try and avoid permanent destitution, households may decide to reduce consumption levels, a strategy that can have long-term effects on health and human capital. Reductions in consumption levels during a drought in Mali, for example, led to permanent and irreversible loss of growth in children.

Vulnerability is different from risk. People living in the Ganges Delta and lower Manhattan share the same flood risks associated with rising sea levels. They do not share the same vulnerabilities. The Ganges Delta is marked by high levels of poverty and low levels of protective infrastructure. When tropical cyclones and floods strike Manila, they expose the entire city to risk. However, vulnerability is concentrated in the over-crowded, makeshift homes in slums along the banks of the Pasig River, not in Manila's wealthier areas. In many developing countries the capacity of poor people to withstand extreme weather events such as a drought is constrained both by low income levels and by limited access to credit, loans or insurance (in terms of access and affordability)¹⁵. These constraints are likely to become worse as wet and dry seasons become increasingly difficult to predict with climate change.

Even in developed countries, vulnerability to extreme events has been far greater among poor households. In 2003, Europe was hit by its most intense heat wave in more than 50 years—an event that caused thousands of deaths among the elderly and other vulnerable segments of the population. In 2005, Hurricane Katrina, one event in the worst Atlantic hurricane season on record, provided a devastating reminder that even the world's richest nations are not immune to climate disaster. "Hurricane Katrina selected its victims overwhelmingly from the most disadvantaged areas of the city. Poorer districts dominated by black communities bore the brunt. Flood damage interacted with deep racial inequalities"¹⁶. An estimated 75 percent of the population living in flooded neighbourhoods was black. Two of the poorest and most vulnerable districts of the city, were both totally devastated by Katrina. As stated in the HDR, two lessons

12 HDRO calculations based on OFDA and CRED 2007

13 CRED database 2007

14 Human Development Report 2007-2008

15 Idem

16 Idem

can be drawn from Katrina. The first is that high levels of poverty, marginalization and inequality create a predisposition for risk that converts to mass vulnerability. The second is that public policy matters since policies that provide people with entitlements to health and housing can facilitate early recovery, while weak entitlements can have the opposite effect.

Vulnerability is exacerbated by weak social safety nets. At the national level, many low-income countries have limited financial reserves to cushion the economy against natural disasters, coupled with underdeveloped financial markets and weak links to world financial markets that limit their ability to diversify risk or obtain or reallocate financial resources. Less than 1% of overall losses from natural disasters, for example, were insured in low-income countries for the period 1985 to 1999.

→ Climate, Poverty and Health

Poverty and vulnerability increase when malnutrition make people more sensitive to the impact of climate change on health. Climate shocks such as drought and floods can cause grave setbacks in nutritional status as food availability declines, prices rise and employment opportunities shrink. Deteriorating nutrition provides the most telling evidence that coping strategies are failing. The drought that swept across large areas of eastern Africa in 2005 illustrates this point. In Kenya, it put the lives of an estimated 3.3 million people in 26 districts were at risk of starvation. In Kajiado, the most affected district, the cumulative effect of two poor rainy seasons in 2003 and the total failure of rains in 2004 almost completely wiped out production. The decline in production of rain-fed crops such as maize and beans harmed both people's diet and their purchasing power. Health centres in the district reported an increase in malnutrition, with 30 percent of children seeking medical assistance found to be underweight compared to 6 percent in normal years.

Climate change affects human health both directly and indirectly¹⁸. Direct effects are a consequence of extreme weather events such as heat waves, cold spells, drought, fires, flooding and storms. Such events have direct health impacts through injury, post disaster mental stress, and excess mortality and morbidity. Indirect

health effects occur via ecosystem changes (such as desertification or air pollution) and include changes in seasonal and spatial patterns of infectious diseases. In particular, food-borne diseases that increase in summer and diseases transmitted by ticks, mosquitoes and other vectors are projected to increase in a warmer climate, but this also applies to allergies and respiratory diseases. Longer-term consequences of climate change may include adverse effects on food production and micronutrients in food, the availability of safe water and secure dwellings. In combination with other recent emerging processes of global environmental change (such as urbanization, biodiversity loss, land degradation, depletion of freshwater supplies), the direct and indirect effects of climate change are expected to have negative impacts on human health and well-being worldwide in the future.

→ Health Impact of Extreme Temperature and Air Pollution

Every summer, high temperatures and heat waves are associated with increased mortality, especially among the most susceptible individuals living in urban areas. Large multi-city studies from Europe and the United States have documented a geographic heterogeneity in both the temperature threshold and the effect of high temperatures^{19/20}. Thresholds at higher temperatures were found in the warmest cities, suggesting that these populations are probably better acclimatized to high temperatures. The extent of heat-related effects depends on the size of the susceptible population, the intensity and duration of heat stress conditions and the adaptation measures in place at both individual and population levels. The public health significance of heat-related effects on human health is expected to increase as a consequence of the projected trend in climate-change-related exposure and some areas in the world, such as the Mediterranean, will be particularly at risk²¹. This demonstrates the need to develop better coping strategies by exploring the factors that shape the social impacts of heat waves and by drawing up a research program to address the considerable gaps in knowledge in this area.

The main factors of vulnerability are being elderly, living alone, having a pre-existing disease, being immobile or suffering from mental illness, and being economically di-

17 Portier, C., Thigpen, T. K., Carter, S., Dilworth, C., Grambsch, A., Gohlke, J., et al. (2010). A Human Health Perspective On Climate Change: A Report Outlining the Research Needs on the Human Health Effects of Climate Change.: Research Triangle Park, NC:.

18 Confalonieri, U., Menne, B., Akhtar, R., Ebi, K. L., Hauengue, M., Kovats, R. S., et al. (2007). Human Health. In M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. v. d. Linden & C. E. Hanson (Eds.), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 391-431). Cambridge, UK,: Cambridge University Press.

19 Boccini, M., Biggeri, A., & Accetta, G. 2008. Heat effects on mortality in 15 European cities. *Epidemiology*, 19(5), 711 - 719.

20 Hajat, S., & Kosatky, T. (2010). Heat-related mortality: a review and exploration of heterogeneity. *Journal of Epidemiology and Community Health*, 64(9), 753-760.

21 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 and Reisinger, A. (eds.)]. Geneva, Switzerland: IPCC.

sadvantaged. The synergetic effects of such factors will prove fatal for some.

→ **Climate-Sensitive Infectious Diseases**

Infectious diseases are still one of the greatest challenges for public health, in terms of lives lost as well as diminished health and quality of life. Climate, as one of the main modulators of the environment, influences various aspects of epidemiological dynamics as well as the interaction between bacteria, viruses, vectors and humans. This is why there is reason for concern about the emergence or re-emergence of certain infectious diseases as a consequence of a changing environment.

Climate can influence infectious diseases by three principal gateways: human behaviour, disease pathogen and disease vector. At different temporal scales (seasonal, inter-annual, longer-term climate trends) factors like temperature, rainfall, parasitic life cycle and vector activity, population movement, water availability after storms and floods can drive outbreaks of various climate sensitive infectious diseases²². According to the type of transmission, infectious diseases can be divided into water- and food-borne diseases, vector-borne diseases and those transmitted from human to human.

The impacts of climate change will exacerbate poverty, in particular through its effects on health, income and future growth prospects. Equally, poverty makes developing countries more vulnerable to the impacts of climate change. This chapter raises some of the specific risks faced by developing countries. But it is the sum of the parts that creates perhaps the greatest concern. Poor households and governments may, for example, have to face falling food and water supplies that will directly increase poverty directly, while also having to face greater health risks, for example, malaria or fallout from extreme weather events. These impacts may be compounded if governments have limited, or reduced financial resources.

→ **Poverty and Environmental Migration**

Understanding how climate change can influence migration requires an understanding of the relationship between environmental change and migration, of how climate change exposes people to risks, and of existing estimates of the number and distribution of likely climate migrants. Migration caused by environmental degradation or change remains difficult to define, mainly due

to the fact that it is linked to the difficulty of isolating environmental factors from other drivers of migration. Another major hindrance when discussing displacement linked to environmental disruption lies in the confusion of forced versus voluntary migration.

Both gradual environmental change and extreme environmental events influence population movements, but in different ways. While the latter may force affected populations to leave their homes, often suddenly and in large numbers, the prospect of returning in such cases is said to be 'feasible' in the long run. Migration caused by a gradual deterioration of the environment however, is more often irreversible²³.

Most research agrees that environmental change is an important proximate factor in decisions to migrate. Thus, while recognizing the complexity and spatial and temporal contingency of the relationship between climate change and migration, and recognizing that social drivers are more important than environmental changes per se, climate change is nevertheless a factor that influences migration. Given the magnitude of environmental changes expected because of climate change, there are grounds to think that climate change may contribute to increased numbers of new migrants. And it is not just resource-dependent low-income rural people at risk. Many people whose incomes depend on primary resource industries may also be affected. Also at risk are the urban poor, who might experience increased health problems and rising prices of basic goods such as food and water. Migration can represent a real adaptation strategy but not all people will have access to that option. The poorest of the poor may not be able to bear the cost of migration²⁴.

It will be a challenge in the future to decide what status (notably legal) is to be granted to people thus affected. International legal norms provide little if any protection for environmental migrants, and all too often there is no recognition at all that this migration phenomenon exists. Since the responsibility for climate change rests primarily with the western industrial nations, they are accountable for helping those forced into environmental migration. But the countries from which environmental migrants originate also have major responsibility for their citizens and they too must do their best to protect their lives. This effort includes taking preventive measures to adapt to the consequences of climate change and lessening their impact thereof over both the short and long term²⁵.

22 Parry, M. L., Canziani, O. F., Palutikof, J. P., Linden, & C. E. Hanson (Eds.), *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK: Cambridge University Press.

23 Raleigh, C., Jordan, L., Salehyan, I. 2010. *Assessing the Impact of Climate Change on Migration and Conflict*. The Social Development Department at The World Bank.

24 Gemenne F. *Migrations et populations dans un monde à + 4°* Etudes 2011/6

25 Hummitzsch, T. *Climate Change and Migration: The debate on causality and the legal position of affected persons*. Focus Migration. Policy Brief No.15. December 2009.

HOW CAN WE ADAPT?

Adapting to the consequences of climate change requires anticipation, investment (in information, equipment and infrastructure) and organisation. It will in many cases involve radical changes in patterns of economic activity and ways of living. There are many actions which will be justified under a broad range of possible outcomes. These may be called ‘win-win’ strategies.

The design and quality of infrastructure and buildings should be a crucial part of any adaptation strategy. If appropriate care is taken at the design stage, infrastructure can be made much more resilient to climate change. Irrigation systems clearly have to be designed appropriately if rainfall patterns and the behaviour of water systems are to change. Roads, bridges, tunnels, transmission of electricity and railways should be designed to cope with an increase in storms, floods and droughts. Communities in the Indian Himalayas are faced with erratic rainfall in the spring and summer, which means a short growing season of just two to five months. Farmers have developed a number of water harvesting practices to ensure food security and additional income, including small ponds (with spring water collected in small reservoirs that is then used at appropriate intervals to irrigate higher ground); roof-water harvesting (roof water collected in dugout structures near homes); harvesting of rainwater (excess water stored directly in farm ponds and depressions, or stream flow diverted to safer points where it is stored then used for irrigation from dugout structures).

For agriculture, a particularly important challenge is to develop climate resilient crop varieties and techniques. Along with significant investment, progress will depend on international agricultural research systems and stations making this a top priority.

Cultivation techniques which use water more economically (such as in rice cultivation) are also likely to release fewer greenhouse gases like methane. Low-till agriculture may preserve the water content of soils, helping with adaptation while simultaneously releasing less carbon thanks to less disturbance of the soil. In agriculture as in other activities that generate emissions, adaptation can be combined with mitigation.

Adapting buildings so that they cope more easily with higher temperatures is another response that bridges adaptation and mitigation. After all, many traditional buildings in low latitudes are designed to cope with high temperatures without energy-intensive cooling systems.

A substantial part of any strategy must also be to facilitate recovery from damage after the fact. The insurance sector is already re-evaluating the probabilities of extreme weather events and natural disasters. As the likelihood of severe damage goes up, it will be important to develop ways to share risk and reduce exposure of those most vulnerable, who are often the poorest. Programs developed in the UK between government and insurance companies allow small businesses and households at risk to gain access to flood insurance.

Extensive programs of crop insurance can be developed to help cover farmers. These can be difficult to administer but could, in principle, be handled at a district level. Administration can be simplified and the problem of false claims reduced if payments are triggered by measurable events occurring in that district. In India, Lombard General Insurance in association with Weather Risk Management Services has launched an insurance product to cover risk incurred by wheat farmers. The idea is to link climate to an index of weather data rather than actual crop losses, which significantly reduces moral hazard as well as the time it takes to settle claims.

A final important feature of adaptation is disaster management, both before and after the event. The way in which the logistics of early warning and relief efforts are handled can have a major impact on the scale of the disaster. (The tsunami of December 2004, for example, would have caused much less loss of life if information had been transmitted earlier). Disaster response is sorely needed. Comparing the Chinese reaction to the earthquake in Sichuan in May 2008 with that of the Myanmar government to Cyclone Nargis that same month (146,000 deaths), we can see the difference that organisational logistics and social organisation can make. Bangladesh six months earlier suffered a similar cyclone but with only 3400 victims²⁶. The need for extra transport, equipment, food and medical services was denied for a long period, with the consequence of substantial and unnecessary loss of life.

Preparation for many of these kinds of disasters is best handled at an international level where equipment and vehicles can be shared and made available quickly and relevant experience successfully exploited. For an individual country, particularly a small, poor country, it can be very costly to store the necessary hardware. Ethiopia, for example, faced a series of huge forest fires in early 2000, the severity of which could have been eased by helicopters, but the government simply did not have many.

²⁶ Tubiana, L., Gemenne, F., Magnan, A. 2010. *Anticiper pour s'adapter*. Pearson. Paris.

Extra funding for disaster preparedness and management can give high returns. In China, expenditure of \$3 billion for flood control was estimated to have returns of \$12 billion. In India, disaster programmes in Andhra Pradesh have shown benefit/cost ratios of 13 or more. And in Vietnam, planting mangroves to protect coastal populations from typhoons and storms has yielded benefit-cost ratios of 50 or more.

The cost of disasters and extreme events related to climate change will of course still be very high, but it makes good sense to prepare and protect as best we can. This should be a top priority for national policy and international assistance.

The financing involved is not high in comparison to Overseas Development Assistance (ODA). The sum of \$86 billion compares with around \$100 billion for ODA, although recent ODA figures are swollen by the falling value of the dollar and debt relief to Iraq, which is accounted for, rather misleadingly, as aid. Annual foreign direct investment to low and middle-income countries is close to \$3000 billion, although more than 90% of this goes to the latter and not the former. Currently, the member countries of the Organisation for Economic Cooperation and Development (OECD) allot some 0.3% of their GDP to ODA. If this figure were increased to 0.7%, as many of these countries have promised to do by 2015, there would be an extra \$150-200 billion a year²⁷.

If the costs of managing climate change in the developing world are indeed in the ballpark of HDR estimates of \$86 billion per annum (a conservative figure), they would eat up most of the increase that has been pledged by 2015. On the basis of current trends, many rich countries are likely to fall short of the target of 0.7% by 2015, while others have not even made such a promise.

Current total allocations to adaptation funds in 2007 were \$279 million²⁸. This is miniscule in relation to needs. The scale of the tasks involved in adapting to climate change and the intricate links between adaptation and development are such that a serious international contribution to taking on the problems of development in a more hostile climate must include a substantial increase in development aid.

→ Towards Low-Carbon Growth

The two great challenges of the 21st century are the battle against poverty and the management of climate change. On both we must act strongly now and plan to

continue to do so in the decades ahead. Our response to climate change and poverty reduction will define our generation. If we fail on one, we will fail on the other. But whilst recognising that we must respond, and respond strongly, to both challenges, we should also recognise the opportunities, since a well-constructed response to one can provide great direct advantages and opportunities for the other. So what do we need to do to combat the threat of climate change whilst boosting efforts to reduce poverty and tackling the global economic downturn?

Developing countries should ultimately want to go low-carbon. Not only is it the future, but it brings huge benefits beyond climate change. Renewable energy sources can free countries from dependency on imported fossil fuels. Cleaner transport and cooling mean less pollution and better health. Halting deforestation protects water supplies, controls flooding and provides bio-diversity. The transition to a low-carbon future can bring major economic gains in the short term. Energy efficiency can help boost incomes. Low-carbon technologies can open up new sources of growth and jobs. They can help even the poorest countries leap-frog old approaches, avoiding some of the cost of large grids in the way cell phones helped cut the need for telephone wires. And smarter grids can both enhance energy efficiency and enable new technologies whilst cutting transmission costs. New sources of low-carbon energy – hydro, solar – could help create a comparative advantage for some of the poorest countries.

But the fact remains that no matter how successful we are with mitigation, we will in the next few decades be faced with a degree of climate change due to GHG levels already in the atmosphere along with emissions in the coming years. That means all countries will have to adapt. The challenge is particularly urgent for developing countries as they are the first and hardest hit.

Many of the poorest people in the world will be those most exposed and vulnerable to the impacts of climate change that will occur over the next few decades. These are also the people who are least able to afford the cost of adaptation, which is even more unfair since they have contributed much less than those in the rich world to the current levels of greenhouse gases in the atmosphere. This fundamental inequity should be a strong incentive for the rich countries to provide more funds to developing countries, in addition to current development commitments to fund the extra costs created by climate change²⁹.

27 This target was originally agreed in UN General Assembly Resolution 2626 in 1970. It was reaffirmed with reference to the Millennium Development Goals in the Monterrey

UN Financing for Development meeting of 2002, and in June 2005 the EU set this target for achievement by 2015.

28 United Nations Development Programme, op. cit., p.25.

29 Nicolas Stern. 2009. A Blueprint For A Safer Planet. London.



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