

Fighting  
climate change

# Local, global: integrating mitigation and adaptation

Bruno Locatelli

Since concerns about the present and potential impacts of climate change first emerged, responses have focused more on reducing greenhouse gas (GHG) emissions in the atmosphere, or “mitigation”, than on reducing the vulnerability of societies and ecosystems to climate change, or “adaptation”. Today, climate change is seen as inevitable. Adaptation is therefore becoming increasingly important in international and national policies, as well as in local initiatives. Policies address mitigation and adaptation separately, yet they are complementary and must both be implemented at different levels, from the international to the local.

Forests provide an interesting example of how this complementarity could work. Ecosystem services are already recognised and remunerated in mitigation policies (reforestation and soon, perhaps, avoided deforestation). But what about the role of forests in adaptation? How can mitigation and adaptation be linked?

## Global ecosystem services

With their ability to capture and store carbon, forests contribute to global climate regulation and to climate change mitigation. Reforestation makes it possible to increase carbon stocks in ecosystems. Reducing deforestation – which represents between 15 and 20% of global GHG emissions – is a way to conserve existing stocks. While this ecosystem-based climate mitigation cannot solve the problem alone, it can complement efforts made in other sectors such as energy, industry, housing and transport.

Carbon sequestration is recognised as a global ecosystem service (see box on next page). It is included in international climate change agreements. For example, the Kyoto Protocol Clean Development Mechanism (CDM) remunerates the contribution of afforestation and reforestation activities in tropical zones. As regards avoided deforestation, or REDD (Reducing Emissions from Deforestation and Forest Degradation), negotiations are underway to include it in the future international climate agreement.

perspective

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## Ecosystem services

The authors of the Millennium Ecosystem Assessment distinguish three types of services provided by forests to humans:

- provisioning services – the production of goods such as food, firewood, medicinal plants and fibres;
- regulating services – the regulation of environmental processes such as the global climate (through carbon sequestration), the quantity and quality of water and the force of winds, etc.;
- cultural services, such as spiritual, cultural heritage or recreational benefits.

Ecosystem services are provided on several spatial scales: immediate proximity (for landscape beauty, etc.), the watershed (for water quality, etc.) and the world (for carbon sequestration, etc.). Regulation and cultural services are termed “positive externalities” by economists, as they benefit human societies without being taken into account by markets. These are the services concerned by payments for environmental services (PES) (for water, landscape beauty, etc.).

### Local ecosystem services

However, forests do not yet play a significant role in national and international adaptation policies. Indeed, they may suffer from climate change, in which case adaptation measures will be needed for forest ecosystems, local populations and forestry sectors. Furthermore, forests provide ecosystem services that facilitate adaptation to climate change in other sectors of the economy and the society.

They provide local populations with goods that enable them to ensure or diversify their livelihoods (provisioning services), especially when harvests are poor.

They reduce exposure to climate events (regulation services) by moderating the force of winds and waves in coastal areas, by fostering groundwater recharge, which is useful during droughts, and by reducing air temperature – especially in cities – during heatwaves, etc.

In Costa Rica, for example, the intensity of rainfall has increased in recent years, causing greater erosion and sedimentation in hydroelectric dams. As forests protect the ground, their conservation is seen as an adaptation measure by the hydroelec-

tric sector. In Indonesia, forests stabilise hillsides and reduce landslides, which are responsible for human and material losses and which, according to certain studies, could become more frequent in the future. By breaking waves, mangroves and coastal forests in Asia protect the populations and their property during storms, a role which could take on greater importance with the potential increase in the force of storms and sea level rise.

The services provided by forests therefore contribute to reducing the vulnerability of populations and related economic sectors – water, hydroelectricity, transport – in the face of climate change and variability. However, they are not taken into account in policies, whether international or national, or in local adaptation projects, which are mostly limited to a sectoral approach.

The Ecosystem-based Adaptation (EbA) approach emerged recently in international talks on adaptation. In 2008 and 2009, countries like Brazil, Costa Rica, Panama and Sri Lanka, along with non-governmental organisations such as the International Union for Conservation of Nature, sent proposals to the Climate Convention asking that EbA, defined as the sustainable management of ecosystems to help the society to adapt, be included in actions aimed at adaptation. Certain proposals argue for recognition of services provided by ecosystems, but without suggesting any specific measures, such as the remuneration of environmental services (see box on next page).

EbA could be more environmentally, economically and socially effective and sustainable than adaptation based exclusively on the creation of infrastructure, for example investment in reservoirs and dikes to cope with the impact of climate change. EbA, which is particularly well adapted to societies that are dependent on natural resources, could also complement other approaches in different contexts.

*The sustainable management of ecosystems to help the society to adapt*

## Payments for environmental services

An innovative incentive mechanism to protect the environment, payments for environmental services (PES) emerged around 15 years ago. The beneficiaries of these services reward ecosystem managers for the services provided. PES involves voluntary and contractual transactions for one or several well-defined services.

Many PES schemes have been set up throughout the world. For example, since 1997, Costa Rica has been paying landowners for four services (carbon sequestration, biodiversity, services linked to hydrological services and landscape beauty) provided by natural forests, forest plantations and agroforestry.

Certain conditions are required if PES is to be effective: land regulations, social organisations and institutional capacities. These make it possible to secure the provision of environmental services, whether global (carbon payments) or local (payments for hydrological services, for example). Already implemented for climate

mitigation, they could be used for adaptation or even in synergy for both: a PES for carbon sequestration may have a positive impact on the conservation of other services, such as hydrological ones. And by remunerating the conservation of a forest to protect a watershed, a local PES may contribute to conserving carbon stocks.

Moreover, PES may have positive effects on institutions and local development. Certain experiments have shown that they can incite local communities to get involved in political processes, contribute to improving the livelihoods of recipients, strengthen institutions and create linkages between sectors, for example those that manage ecosystems and those that benefit from the services.

These elements, which are important for a better governance of natural resources and the adaptation of societies, should not hide the fact that PES is only one tool among others.

## Mitigation and adaptation: conflict, synergy, integration

Ecosystem-based approaches can therefore be used for both mitigation and adaptation. The interactions between these two approaches may be positive or negative. Conserving forests to mitigate climate change at the global scale may increase the production of local ecosystem services and facilitate adaptation in local societies, just as an ecosystem-based adaptation project will contribute to conserving forests and their carbon, and consequently to mitigating climate change. Synergies are therefore possible. But mitigation measures may also be detrimental to the adaptation of local populations. For example, to protect carbon stocks, a REDD project may forbid or reduce the local populations' access to natural resources, and thereby restrict possibilities for development and adaptation.

Alone, the presence of ecosystems that provide services is not enough. Vulnerable populations must also be able to take advantage of them; they must have rights and access to these resources. Safeguards are therefore necessary to ensure mitigation projects do not harm local populations.

Adaptation and mitigation are not limited to ecosystem services. They are part of the broader issue of sustainable development (see box on the next page). They presuppose that local populations have, in the long term, diversified livelihoods that enable them to avoid deforestation and forest degradation. They also imply creating networks to enable populations and national or local institutions to share knowledge and experience and to coordinate their practices. Finally, they require flexibility to adapt to the rapid changes and to the potential negative impacts of measures taken. This means observing and analysing the effects of measures, making proposals for adjustments and putting them into effect.

In order to reconcile global environmental and local development issues, it is necessary to not only create linkages between adaptation and mitigation measures, but also to integrate both approaches into policies concerning forestry, environment and land-use planning. For example, development or nature conservation policies would address the adaptation of local populations and ecosystems to climate change, and would also benefit from international funding for their contribution to mitigation.

### TO FIND OUT MORE

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Turner W.R., Oppenheimer M. & Wilcove D.S., 2009. A force to fight global warming. *Nature*, 462:278-279.

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## Adaptation = Development ?

The distinction between sustainable development and adaptation to climate change is unclear. Many of the measures proposed for adaptation (such as capacity building or income diversification) have long been implemented as part of development projects. Furthermore, before anticipating adaptation to future conditions, populations must first be able to respond to current pressures (for example, climate variability or economic changes).

Between development activities (which deal with current problems that are unrelated to climate change) and adaptation activities (which attempt to reduce future climate change impacts), there exists a continuum. The more we advance towards adaptation, the more it will be necessary for policies to take into account the future climate and the uncertainties linked to the future, and to make it possible to test and modify actions as changes occur. Failing this, populations could become increasingly vulnerable.

Many scientists therefore argue for the systematic integration of adaptation into development processes. Others see climate change as a possibility for making progress in terms of sustainable development, with the international community's increasing attention to the climate making it possible to address many sustainable development issues.

This kind of integration implies setting up new forms of local, national and international governance. For example, it is essential to create linkages between institutions and between sectors, between those that manage ecosystems and those that benefit from the services.

As they are directly concerned, local stakeholders are called upon to play a major role in policy integration. To ensure that policies are effective and equitable, their interests must be represented during policy-making and implemen-

tation processes. This implies defining their rights, roles and responsibilities, for example within exchange and negotiation platforms that must be created. This involvement assumes that, in addition to international and national policies, decisions can be made at the local level.

Useful for mitigation and adaptation, payments for environmental services (PES) can be seen as one of many tools to foster the integration of mitigation and adaptation. This conception implies acquiring new knowledge: the role of ecosystem services, implementation approaches (remuneration, monitoring and assessment), regulatory frameworks and linkages with other tools, etc. Knowledge that research is in the best position to produce.

Scientists may also be mobilised as mediators between political decision-makers and local stakeholders, facilitating the transfer of information and taking part in platforms for discussion between researchers, politicians and citizens.

Developing policies and measures that integrate adaptation and mitigation poses certain challenges, both scientific and political. Forests, along with agricultural, agroforestry and silvopastoral systems, are relevant to planning this integration of the different uses of land and of the ecosystem services provided from a multifunctional land use approach.

It is worth addressing these challenges to ensure forestry and agricultural management benefit the global environment and contribute to local development, in today's climate and that of the future.

### A few words about...

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• Vignola R., Locatelli B., Martínez C., Imbach P., 2009. Ecosystem-based adaptation to climate change: what role for policy-makers, society and sci-

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• Guariguata M., Cornelius J., Locatelli B., Forner C., Sánchez-Azofeifa G.A., 2008. Mitigation needs adaptation: Tropical forestry and climate change. *Mitigation and Adaptation Strategies for Global Change* 13: 793-808.

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multi-criteria analysis. *Forest Policy and Economics* 10(5): 275-285.

• Locatelli B., Kanninen M., Brockhaus M., Colfer C.J.P., Murdiyarso D. and Santoso H., 2008. Facing an uncertain future: How forests and people can adapt to climate change? *Forest Perspectives* no. 5. CIFOR, Bogor, Indonesia, 97 p.

The opinions expressed are those of the author and do not necessarily reflect those of the institution to which he belongs.