Incorporating Developing Countries into Global Efforts for Greenhouse Gas Reduction

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Ramón López • January 1999
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About RFF

Resources for the Future (RFF) is a nonprofit and nonpartisan organization that conducts independent research -- rooted primarily in economics and other social sciences -- on environmental and natural resource issues. RFF’s operating budget is derived in approximately equal amounts from three sources: investment income from a reserve fund; government grants; and contributions from corporations, foundations, and individuals (corporate support cannot be earmarked for specific research projects). Some 45 percent of RFF’s total funding is unrestricted. For more information about RFF, on the internet go to -- http://www.rff.org/about_rff/index.htm.

In light of international debate over possible agreements to limit emissions of greenhouse gases, RFF launched its Climate Economics and Policy Program in October 1996 to increase understanding and knowledge of the complex issues that must be addressed to design appropriate domestic and international policies that are effective, reliable, and cost-efficient. The program responds to both the long-term debate about climate change, and the specific debates surrounding the negotiations being carried out under the United Nations Framework Convention on Climate Change. It integrates the many different aspects of climate change with ongoing basic and applied research at RFF involving energy markets, water and forest resource management, air pollution, environmental regulation, and sustainable development.

To support a well-informed public, RFF provides regular reports of its climate change activities to the news media, posts program updates and activities on RFF’s internet home page (http://www.rff.org), and maintains Weathervane, an internet forum devoted to the discussion and debate of global climate policy (http://www.weathervane.rff.org).
I. Introduction

The United States and other countries that committed to binding greenhouse gas emissions reductions in the Kyoto Protocol (the “Annex B” countries) have increasingly called upon developing countries to “participate meaningfully” in the implementation of the Kyoto Protocol. In particular, recent discussion has focused on the various ways developing countries could participate voluntarily in international carbon reduction efforts and eventually accede to the Protocol by entering the nascent international carbon trading system.

The scope for reducing developing country carbon emissions via win-win policies or low net cost mechanisms is large. First, the removal of energy subsidies could enable developing countries to reduce their total emissions of carbon while enhancing overall economic efficiency and freeing up scarce funds for pressing spending needs in other areas. Second, reductions in biomass and forest burning could result in potentially large revenues from the sale of carbon credits, if these credits were legitimated under the Kyoto Protocol. The principal economic benefit of burning forests is expansion of agricultural frontiers, but this benefit may be less than the potential economic value of carbon sequestration in standing forests once an international carbon trading regime is established.

This paper begins by examining energy subsidies in developing countries. The third section then examines biomass as a source of carbon emissions and the role that developing countries could play in limiting these emissions. The fourth section addresses implementation issues. Finally, the conclusion offers some recommendations for initiating LDC participation in implementing the Kyoto Protocol.
II. Energy Subsidies

Energy subsidies that promote coal and oil consumption cause significant local environmental damage as well as increased greenhouse gas emissions. Anderson and McKibbon attempt to model the effect of phase-out of coal subsidies in both OECD and non-OECD countries on greenhouse gas emissions. According to their analysis, the subsidy phaseout in non-OECD or developing countries would cause carbon dioxide emissions to fall by slightly over three percent in 2005 relative to what otherwise would have been emitted in a business as usual scenario (though most of these reductions would occur in OECD countries). These numbers do not account for the potential for reduced mining-related releases of coal-bed methane (a potent greenhouse gas in its own right) due to reduced coal demand. Subsidy eliminations also result in an increase in GDP in many countries due to efficiency gains – resources are freed up from distorted sectors and reallocated through the global economy, yielding higher rates of return.

Although several developing countries have acted to reduce energy subsidies (see Table 1), these subsidies are still widespread in many countries. They take the form of direct subsidies to consumers through under-priced energy services, and implicit subsidies to producers through trade barriers that limit the availability of more energy-efficient technologies. In India and China, for example, domestic prices for coal and electricity produced from coal are much lower than prices in international markets.

<table>
<thead>
<tr>
<th>Table 1: Developing countries and energy price reform</th>
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<tr>
<td><strong>Real price change</strong> (final price as % of original)</td>
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<tr>
<td><strong>Coal</strong></td>
</tr>
<tr>
<td>India</td>
</tr>
<tr>
<td>S. Africa</td>
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<td><strong>Petroleum</strong></td>
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<td>Brazil</td>
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<td>China</td>
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<td>India</td>
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<td>Mexico</td>
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Source: Reid and Goldemberg, 1998 (see Further Readings)
Countries that currently subsidize energy could be induced to cut their subsidies if they were allowed to sell carbon reduction credits to developed countries reflecting the avoided emissions. These countries could obtain large gains in terms of both carbon permit revenues and higher long-term economic efficiency, without compromising future growth. They could gradually reduce their permit sales over time if they wished in order to accumulate a stock of credits for domestic use if and when quantitative developing country emission commitments are negotiated.

III. Biomass Burning from Land Clearing
as a Source of Carbon Emissions

The technical capacity to measure carbon emissions from biomass burning has not been perfected, and any figures given are rough estimates. Nevertheless, it appears that biomass burning for land clearing in developing countries contributes a significant amount of greenhouse gases to the atmosphere annually. The most common forms of biomass burning are tropical deforestation, burning of savanna, and combustion of agricultural waste. Biomass burning has been estimated by some sources to account for about one fifth of all emissions, with tropical forest burning reflecting over half the total contribution. The primary motivation for burning is to clear land for agricultural or other purposes, and it has been estimated that only 20% of the total biomass burning in developing countries is actually used to generate energy, mostly in the form of fuelwood and charcoal (see the papers by Andreae and Levine in Further Readings).

In many regions, much of the land clearing and associated biomass burning is caused by organized interests, such as cattle ranching and timber and mining companies, as opposed to small landholders or subsistence farmers. Given current distortions in land use policies and property rights institutions, at least some of this land clearing is not justified on economic grounds, without consideration of greenhouse gas issues. Even where land clearing might be justified apart from carbon considerations, developing countries may be better off with less land clearing and more carbon sequestration, if these avoided carbon releases could be packaged and sold to developed countries as carbon credits. We return to this point below.

The possibilities are illustrated in a recent analysis of estimated land values of settlements in the Amazon (see the papers by Schneider in Further Readings). Schneider found that the market value of forest land for agriculture in eight settlements in different parts of the Amazon in Brazil ranged between $2 and $300 per hectare, depending on the attributes of the land (remoteness, infrastructure availability, and the like). Since these figures include the value of investments attached to the land as well as the value of the public infrastructure required to bring the land into production, the actual value of undeveloped forest land for agriculture may be even lower.

These values can be roughly compared to the value of retaining carbon in biomass by combining figures on the amount of carbon stored per hectare of Amazon forest with figures for actual or proposed carbon taxes in various countries. This calculation implies a value of between $700 and $5000 per hectare. This range illustrates what emitters in developed countries might be willing to pay to maintain
carbon stored in the forest biomass and use this as an offset against their own emissions. The large
difference in the carbon storage and agricultural land values indicates an enormous potential for mutually
beneficial North-South carbon trade.

IV. Implementing Biomass Carbon Retention Credits

In principle, implementing controls over groups of organized interests in land clearing would be easier than
doing so with small landholders. Such reductions, nevertheless, would be difficult to achieve in practice.
Incorporating biomass carbon sources into international greenhouse gas mitigation efforts would be
complicated given the diffuse and geographically diverse sources of the emissions, the complicated land
use dynamics and economics of deforestation and agricultural burning, the technical difficulty of measuring changes in biomass carbon emissions, and the sociopolitical difficulties of negotiating acceptable baselines.

Credits usable in an international carbon trading system could be given to countries that institute and enforce national policies to reduce biomass carbon sources through elimination of government subsidies for land colonization or “trans-migration”; improvement of land tenure and improved assignment of land property rights; Joint Forest Management programs (involving co-management of forest resources with local communities to provide incentives to conserve, including improved land tenure); restrictions on foreign and local logging industries; and programs to reduce household fuelwood usage such as adoption of new cooking technologies and creation of household woodlots.

To tap these large potential gains and to provide adequate incentives for LDC participation in these greenhouse gas reduction efforts, several scientific, legal and policy requirements would need to be implemented:

1. **A system of monitoring based on remote sensing information would need to be established.**

   This system would be used to monitor the status of forests and other biomass and to establish net carbon sequestration or emission. There are already international efforts to coordinate such a system, such as UNEP’s Integrated Global Observing Strategy program.

2. **Internationally tradable permits based on reduced biomass burning would have to be legitimated by the Conference of Parties to the Framework Convention on Climate Change.**

   The Kyoto Protocol mandated the establishment of an international permit trading system and the creation of the Clean Development Mechanism for project-based permit creation through emissions reductions, but the details of these mechanisms remain to be established. The
technical capability to count emission reductions from reduced biomass burning is not clearly established and would have to be improved. Proposed caps on trading due to supplementarity concerns would significantly reduce potential gains for developing countries, thus reducing their incentives to cooperate in trading.

3. **Deforestation permits in settled areas could be allocated in a decentralized way to communities, individuals, NGOs, firms, and local governments that are in actual or potential control of the forests.**

One interesting idea is the establishment of tradable development rights (see the paper by Panayotou in Further Readings). Once a value is placed on tradable emissions permits and governments have economic incentives to conserve forest resources, governments could commit to a moratorium in road and infrastructure construction in core forest areas and allocate tradable development permits to local interests and authorities. Local communities would lease their permits to domestic firms or to firms located elsewhere, meaning that they commit to prevent forest fires and other forms of carbon emissions within their jurisdictional geographic areas. Rural communities could thus benefit directly from carbon trade, and the infusion of income into rural communities in developing countries could help reduce rural poverty. Subsistence farmers, who cause a significant portion of the forest fires, could obtain higher incomes by devoting part of their time to prevent further deforestation.

V. **Conclusion**

Governments in many developing countries are beginning the difficult political process of reducing energy subsidies and are finally beginning to implement serious efforts to curtail forest burning. There is greater awareness in developing countries of the negative socioeconomic consequences of energy price distortions and of the often relatively small benefits of forest clearing compared with resulting environmental and ecological damage. Moreover, the high cost burden of energy subsidies in certain countries creates fiscal imbalances of which developing country populations are increasingly aware and concerned. Similarly, forest burning is becoming an urban problem affecting millions of people in large urban centers, a development that has contributed to increasing awareness of the forest fire problem among politically influential urban populations.

Reducing energy subsidies and forest burning, however, are slow processes subject to significant political difficulties. Powerful economic interests would be hurt by the removal of energy subsidies, and the control of forest fires requires political clout to enact and enforce laws and regulations affecting forests.
A system of international carbon trading that provided credits for these activities could provide significant economic benefits that would increase the political weight of those pushing for the elimination of subsidies and the forest protection in developing countries. Revenues from carbon permit sales could also greatly increase the funding for the enforcement of forestry laws. In addition, North-South technical assistance programs could help support the process of subsidy removal and the development of institutions and technical capacity to protect forests. Developing countries could thus gain a great deal by choosing to participate in the international emissions trading regime that is being created. The developed countries could also gain from reduced carbon abatement costs due to international trading if they take care to design a trading system that takes into account developing countries’ concerns and interests.

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Further Readings


In light of the continuing international negotiations over climate change, Resources for the Future (RFF) publishes Weathervane, an internet forum dedicated to the discussion and debate of global climate policy. Just as a traditional weathervane tracks the direction of the wind, Weathervane has been tracking developments in climate change policy, both internationally and within the United States, since July 1997.

Our editorial aim is to present balanced and objective information, with no one perspective or viewpoint dominating our analysis and reporting. With the stakes potentially enormous on all sides of this complicated issue, Weathervane strives to provide a neutral forum for careful analysis to complement the political calculations that so often drive decisions.

Regular site features include: Perspectives on Policy, an opinion forum for invited players in the climate policy debate. It gives experts from every corner — business, government, environmental groups, and academia — an opportunity to weigh in with their opinions on a selected topic; At the Negotiating Table, which tracks developments in global climate change policy and players in the debate; Research Spotlight, which reports new climate findings and projects; By The Numbers, a regular column by RFF’s Raymond Kopp to help decode and demystify energy and environmental data and create a better understanding of the link between economic data and policy formulation; and Sounding Off, an open forum for site visitors to voice their opinions on a variety of topics related to climate change.