

Low Carbon Growth Country Studies Program

MITIGATING CLIMATE CHANGE THROUGH DEVELOPMENT



“Global atmospheric concentrations of greenhouse gas have increased markedly as a result of human activities. In 2005, concentrations of carbon dioxide in the atmosphere exceeded by far the natural range over the last 650,000 years.”

—**Dr. R.K. Pachauri**, *Chairman,*
Intergovernmental Panel on
Climate Change



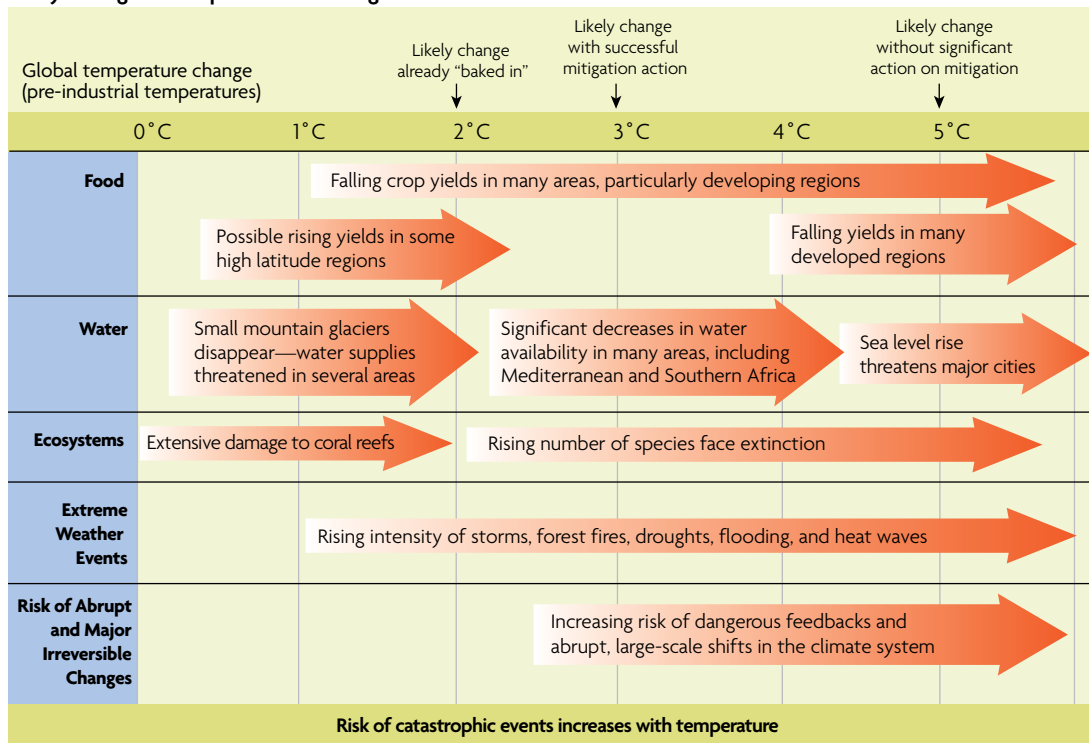
Climate Change is upon us. . .

Greenhouse gases (GHG) in the Earth's atmosphere have increased significantly over the past century. Warmer temperatures, reduced snow cover, and changing hydrology have been observed as a direct result of increased GHG emissions. Some regions and ecosystems are more vulnerable than others to changing climatic conditions, such as droughts, floods, and heat waves. These environmental changes have implications for humanity.

People in developing countries are likely to be among the worst affected. Climate change will further reduce access to drinking water, negatively affect the health of those living in poverty, and pose a threat to food security in many countries. Adapting to the effects of climate change is necessary to reduce vulnerability and ensure sustainable development.

Efforts taken over the next 2–3 decades will have a large impact on the ability to stabilize GHG concentrations and limit climate impacts. Addressing this global climate mitigation challenge will require actions across multiple sectors—energy, transport, industry, agriculture, and forests—as well as changes in individual lifestyle and behavior. It will take the combined efforts of developed and developing countries to achieve this. While the major effort should be carried out by developed nations, there are multiple opportunities for developing countries to grow in a sustainable manner. It is still within our power to influence the impact on our world.

Likely Changes — Dependent on Mitigation



Source: Adapted from IPCC 2007.

Affecting Change

Six emerging economies—Brazil, China, India, Indonesia, Mexico and South Africa—are proactively seeking to identify opportunities and related financial, technical, and policy requirements to move towards a low carbon growth path. The governments of these countries have initiated country-specific studies to assess their development goals and priorities, in conjunction with GHG mitigation opportunities, and examine the additional costs and benefits of lower carbon growth. This requires analysis of various development pathways—policy and investment options that contribute to growth and development objectives while moderating increases in GHG emissions.

Under the umbrella of the *Low Carbon Growth Country Studies Program*, these efforts are supported through:

- Technical assistance
- Knowledge transfer
- Funding to support modeling of carbon pathways
- Policy response

The Energy Sector Management Assistance Program (ESMAP) is assembling the lessons generated from these six country studies to develop knowledge products—modeling toolkits, best practices and ‘how to’ guidance, and interactive training. ESMAP will foster knowledge exchange and capacity

building with its clients—low- and middle-income countries—to support their exploration of low carbon growth opportunities.

There is no single approach to the Low Carbon Growth Country Studies. The exact scope and breadth of each study varies. Each study is determined by the country—government and local stakeholders—and tailored to the country’s economic circumstances. Each country leads its own study in its local context. This approach better equips each country to plan and implement responses to the unique challenges posed by climate change on its people and ecosystems.

Scope and Highlights of Low Carbon Growth Country Studies Program

Brazil	Land use and land use change model
China	Renewable energy and energy efficiency
India	Bottom up capacity building
Indonesia	Strategic options for development
Mexico	Comprehensive low carbon program
South Africa	Implementation support for energy efficiency

Overview of Low Carbon Growth Country Studies

BRAZIL

Brazil is a key partner for the Low Carbon Growth Country Studies Program, providing clear, direct and candid guidance on how to proceed technically, institutionally and politically to maximize the impact of the study in Brazil. The Brazilian study focuses on land use and land use change models, including deforestation, energy sector options, transport, waste management, and cross sector issues. Since the study started in spring 2007, some impacts are already evident in the country—detailed sector methodologies, technical results, improved information sharing, and stronger linkages between the Brazilian Government’s designated technical group on climate change and other ministries, institutions, and agencies of the government.

To provide more options and information to the Brazilian Government, the study will produce a GHG cost abatement curve; a municipal and interstate transport model; reference points and low carbon scenarios for 2030; a simulation of GHG emissions due to deforestation and agriculture; potential GHG mitigation opportunities; and policy options. A model for land use and land use change, testing a bio-ethanol expansion model, and detailing the contribution of forest plantations to carbon sequestration are also under development.

CHINA

The Chinese Government is supportive of economy-wide low carbon country studies and has previously completed work on energy efficiency, integrated gasification combined cycle power generation, and carbon capture and storage. Additionally, China





has identified priorities to reduce the energy intensity to gross domestic product ratio by 20% over the next five years. Given its experience with low carbon growth studies and its five-year goal, the Chinese Government is able to provide clear guidance on specific areas where research is needed. Rather than country or sector assessments, the Chinese study targets renewable energy and energy efficiency modeling, carbon growth path, and related policy issues.

China's study includes three specific policy notes. The first is an analysis of coal and emissions savings from improved power dispatch efficiency, which incorporates an assessment of financial barriers and international good practice suggestions for transition to efficient dispatch. The second is an evaluation of energy efficiency investment potential and policy options related to phasing out inefficient and obsolete cement production capacities, including social safety net issues related to job layoffs. The third is a re-evaluation of China's renewable energy targets, growth paths, and related policy issues against their five-year plan.

INDIA

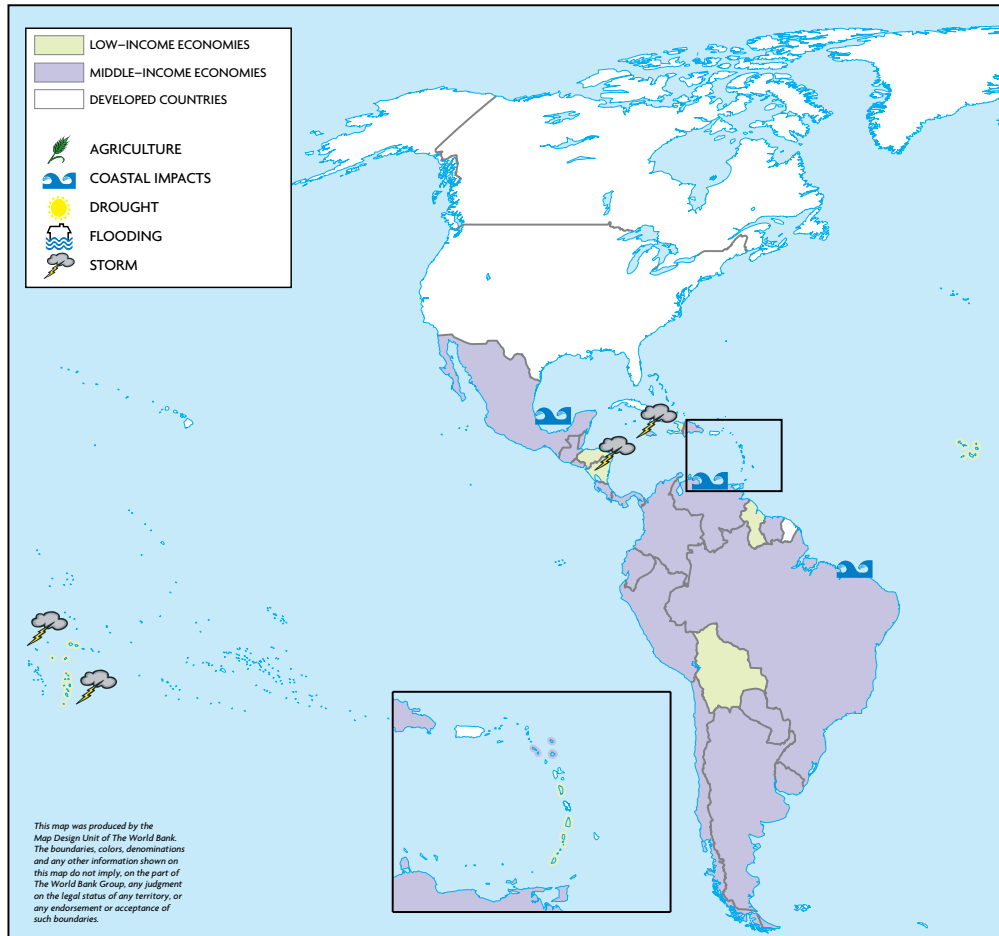
In India, the Government has been an active partner in the analysis, with specific interest in energy efficiency options. Here the study is funding the development of a detailed, bottom-up, modeling framework, which will serve to comment on opportunities for low carbon growth. Data was collected across several sectors—power supply, household appliances, transportation, industry, and buildings—resulting in a flexible model that has generated interest among various stakeholders in India. Even now, the Indian Government is seeking ways to mainstream this modeling framework as an energy sector planning tool.

The study has also developed a cross-country comparison of India's CO₂ performance; reviewed clean coal power generation technology, GHG emissions from the creation of hydropower reservoirs and residential consumption of electricity; and a cost-effectiveness assessment of GHG mitigation options. India's study also explores CO₂ mitigation potential of grid-supplied thermal power generation expansion, options for scaling up carbon finance, and grid-connected electricity supply options.

Initial results indicate India is a relatively low carbon economy. It has among the lowest per capita emissions in the world and its energy intensity is 20% below the world average. India, however, has an energy deficit. 400 million of its citizens do not have access to lifeline electricity, 800 million live on less than \$2 per day, and 75% of household energy consumption is dedicated to cooking predominantly using traditional biomass. India's priority remains to meet energy demand and sustain high economic growth so that it can lift millions out of poverty.



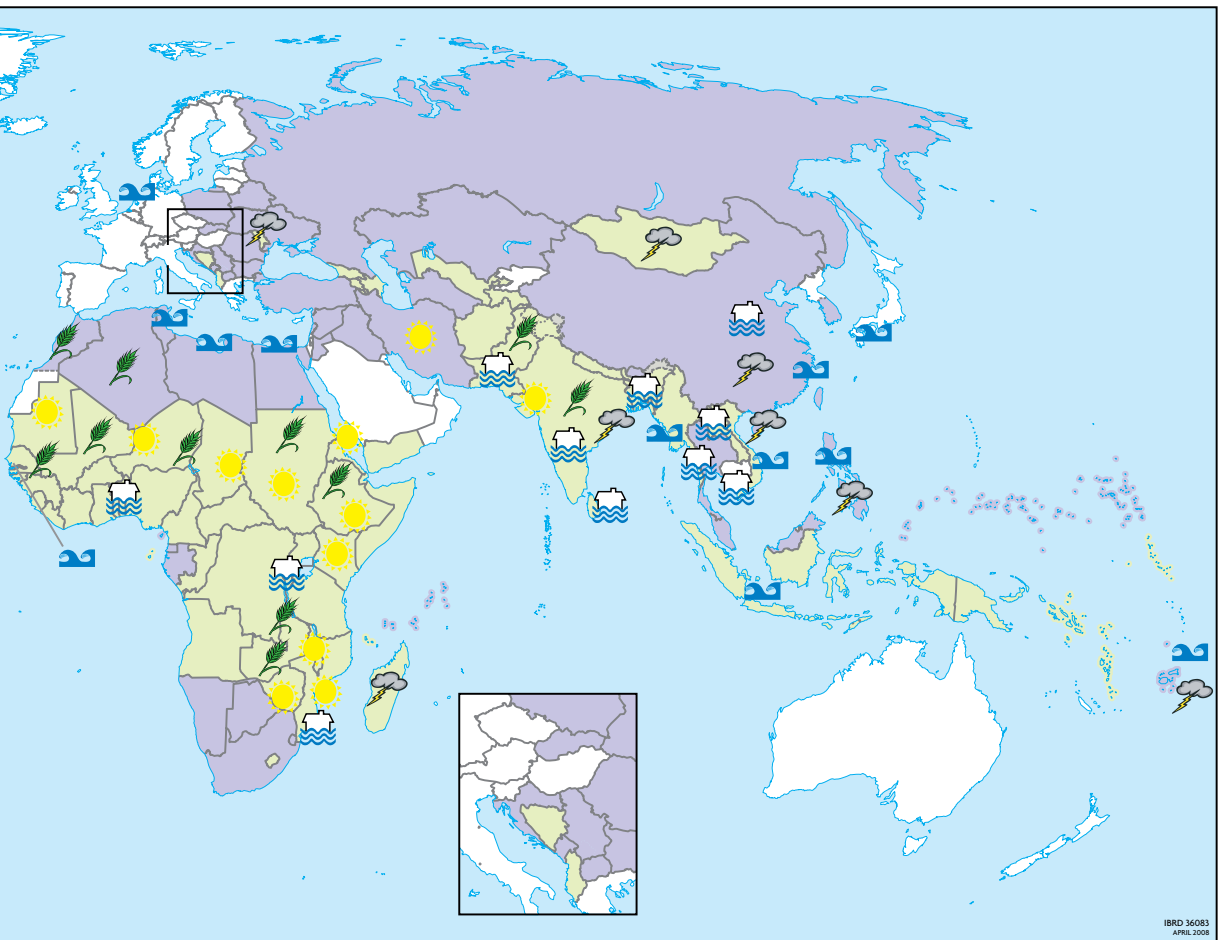
Climate Threats



INDONESIA

With development as the priority, Indonesia is looking to design development plans that make sense economically, socially and environmentally. The Indonesian Ministry of Finance has already examined fiscal and financial policy instruments to support investment, evaluated tax and spending policies to promote movement toward a low carbon economy, considered strategic climate investment approaches and financing sources, as well as improved fiscal incentives in the forestry sector. Thus, the goal of Indonesia's study is to evaluate and develop strategic options to mitigate climate change without compromising the country's development objectives. Priorities lie with emissions and policy challenges. In the meantime, work continues on developing macro policy options and detailed sector analyses, covering forestry and land use, power generation, transport, and energy efficiency.

Indonesia plans to use the study results to develop alternative energy options; reduce emissions intensity in the energy sector while meeting growing demand; improve energy efficiency; develop carbon credits for Reduced Emissions from Deforestation and Degradation (REDD); facilitate additional investments and transfer of technology; and make use of growing sources of carbon finance.



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MEXICO

Mexico has an excellent track record in climate change mitigation, submitting three National Communications to the United Nations Framework Convention on Climate Change, as well as drafting a framework for their low carbon development trajectory in 2007. Under the study, a comprehensive low carbon program is being prepared. The plan will include a low carbon strategy; identification of priority sectors for carbon abatement; analysis of specific investment options; a country specific Marginal Carbon Abatement Curve; identification of implementation barriers and necessary policy responses; and a prioritized list of potential interventions once low cost financing for these projects has been established.

The Mexican study assesses priority mitigation areas and ranks abatement options based on financial and economic costs, cobenefits, and the ease of implementation given social, legal, and institutional considerations. Four priority areas were evaluated in the study—(a) transport, particularly increasing modal share of public urban transport and raising vehicle fuel efficiency; (b) generation of power in industry through cogeneration as a low cost power supply source, and improvement of renewable energy potential; (c) energy efficiency in residential, commercial, industrial and public sectors; and (d) land use, which can provide the single largest potential for reducing GHG emissions in Mexico. The



conclusions of the study are being provided to the Government of Mexico through the Inter-Ministerial Commission on Climate Change.

As a result of the Low Carbon Growth Study, Mexico has prepared Investment Plans for consideration by the Clean Technology Fund that will support energy efficiency, renewable energy, and sustainable urban transport. Already, the results of the study are also being used to demonstrate the range of mitigation options and costs to other developing countries as they prepare low carbon programs.

SOUTH AFRICA

In 2006, South Africa launched its Long-Term Mitigation Scenario process on climate change, the first of its kind in a developing country, with a pioneering stakeholder consultation process. South Africa's study funded an international peer review of the Long-Term Mitigation Scenario. Findings and policy recommendations were presented to the Cabinet in July 2008. The top mitigation priorities were identified as: industrial energy efficiency, renewable energy, nuclear energy, modal shift through improved public transportation, and improved vehicle efficiency. Preliminary results of South Africa's study have enriched the region's knowledge base.

Now, South Africa is ready to embark on the next phase of its plan—implementation of the mitigation options highlighted in their Scenario. By introducing international experiences and best practices, the South African study focuses on building capacity for energy efficiency and demand-side management solutions, especially timely given the country's power crunch. The study explores approaches and mechanisms that enable policy and regulatory frameworks, forge institutional arrangements, establish financing mechanisms, and cope with the energy crisis.

“If we continue with business-as usual, we will go out of business. . . According to the IPCC Fourth Assessment Report, avoiding dangerous climate change requires developed countries to reduce their emissions compared to 1990 levels by 80% to 95% by 2050, and by 25% to 40% by 2020. In developing countries, substantial deviations below business-as-usual baselines are required.”

—**Mathinus Van Schalkwyk**, *Minister of Environmental Affairs, South Africa*



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The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance program administered by the World Bank that assists low- and middle-income countries to acquire know-how and increase institutional capability to secure clean, reliable, and affordable energy services for sustainable economic development.

For more information on the Low Carbon Growth Country Studies Program or about ESMAP's climate change work, please visit us at www.esmap.org or write to us at:



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