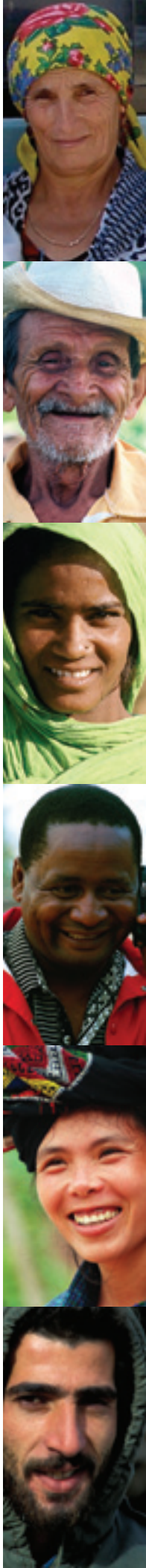


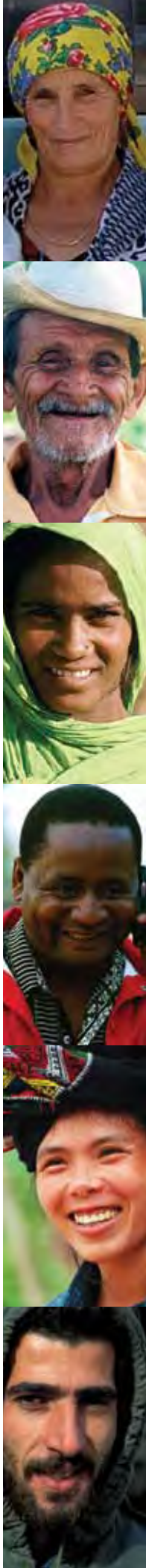
Toward a Green, Clean, and Resilient World for All

A World Bank Group Environment Strategy 2012 - 2022



Toward a Green, Clean, and Resilient World for All

A World Bank Group Environment Strategy 2012 – 2022



© 2012 The World Bank Group
1818 H Street, NW
Washington, DC 20433, U.S.A.
Telephone: 202-473-1000
Internet: www.worldbank.org/environment
E-mail: feedback@worldbank.org

All rights reserved.

First printing May 2012

This volume is a product of the staff of the World Bank Group. The findings, interpretations, and conclusions expressed in this volume do not necessarily reflect the views of the Executive Directors of The World Bank Group or the governments they represent.

The World Bank Group does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of the World Bank Group concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

R I G H T S A N D P E R M I S S I O N S

The material in this publication is copyrighted. Copying and/or transmitting portions or all of this work without permission may be a violation of applicable law. The World Bank Group encourages dissemination of its work and will normally grant permission to reproduce portions of the work promptly.

For permission to photocopy or reprint any part of this work, please send a request with complete information to the Copyright Clearance Center Inc., 222 Rosewood Drive, Danvers, MA 01923, USA; telephone 978-750-8400; fax 978-750-4470; Internet: www.copyright.com.

Cover image: Shutterstock, LLC. *Interior images:* All images courtesy of The World Bank Photo Library except where noted.

Contents

- Abbreviations and Acronyms v**
- Acknowledgments vi**
- Executive Summary 1**
- A New Environment Strategy, a New Vision 7**
- An Environment under Assault 11**
 - How Green Is Our World? 13
 - How Clean Is Our World? 16
 - How Resilient Is Our World? 19
 - Tough Questions for a Changing World 19
- Coming Together to Transform Challenges into Opportunities 21**
 - Global Efforts and Country Efforts Catalyzing Action 21
 - Assessing the World Bank Group’s Current Contributions 24
 - World Bank Group Support for the Green Agenda 26
 - World Bank Group Support for the Clean Agenda 28
 - World Bank Group Support for the Resilience Agenda—Adaptation 33
- Lessons Learned and Voices Heard 39**
 - What Have We Learned? 39
 - Voices of Our Stakeholders 43
- From Vision to Action 47**
 - Supporting the Environmental Pillar of Sustainable Development and the Green Agenda 47
 - Valuing Ecosystems, Emphasizing Oceans, Protecting Biodiversity 48
 - Policies to Remove Barriers to Green, Clean, and Resilient Growth 53
 - Market-based Mechanisms and Sustainable Supply 53
 - Updating and Consolidating the Safeguards 54
 - Supporting the Clean Agenda 55
 - Finding Answers, Providing Resources in the Fight against Pollution 55
 - Ramping Up Support for Low-Emission Development 58
 - Carbon Finance 60
 - Climate Finance 62
 - Understanding and Managing the World Bank Group’s Environmental Impact 63
 - Supporting the Resilience Agenda 64
 - Strengthening the Focus on Disaster Risk Management 64
 - Strengthening Climate Adaptation Initiatives, Targeting Agriculture 65
 - Opening Doors to Knowledge and Learning 66
 - Small Island States: Microcosms for Green, Clean, and Resilient Development 68

Environmental Actions and Commitments from World Bank Group Regions	71
Africa	71
The Green Agenda in Africa	71
The Clean Agenda in Africa	72
The Resilience Agenda in Africa	73
East Asia and the Pacific	74
The Green Agenda in East Asia and the Pacific	75
The Clean Agenda in East Asia and the Pacific	75
The Resilience Agenda in East Asia and the Pacific	76
Europe and Central Asia	76
The Green Agenda in Europe and Central Asia	76
The Clean Agenda in Europe and Central Asia	76
The Resilience Agenda in Europe and Central Asia	77
Latin America and the Caribbean	78
The Green Agenda in Latin America and the Caribbean	78
The Clean Agenda in Latin America and the Caribbean	78
The Resilience Agenda in Latin America and the Caribbean	79
Middle East and North Africa	80
The Green Agenda in the Middle East and North Africa	80
The Clean Agenda in the Middle East and North Africa	80
The Resilience Agenda in the Middle East and North Africa	82
South Asia	82
The Green Agenda in South Asia	82
The Clean Agenda in South Asia	84
The Resilience Agenda in South Asia	84
From Actions to Results	87
Results Measurement	87
Implementation Risks	87
Annex 1: Actions by World Bank Group Sectors	
Addressing Environmental Sustainability	96
References	100

Abbreviations and Acronyms

BioCF T3	BioCarbon Fund Tranche 3	IPCC	Inter-Governmental Panel on Climate Change
C	Celsius	LAC	Latin America and the Caribbean
CCKP	Climate Change Knowledge Portal	LULUCF	land use, land use change, and forestry
CDM	Clean Development Mechanism	MDB	multilateral development bank
CEA	Country Environmental Analysis	MENA	Middle East and North Africa
CI-Dev	Carbon Initiative for Development	MIGA	Multilateral Investment Guarantee Agency
CIFs	Climate Investment Funds	MRV	monitoring, reporting, and verification
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	MSME	micro, small, and medium-size enterprises
CO₂	carbon dioxide	MW	megawatt
COP	Conference of Parties	NAMA	Nationally Appropriate Mitigation Action
CPF	Carbon Partnership Facility	NGO	nongovernmental organization
CTF	Clean Technology Fund	OECD	Organisation for Economic Co-operation and Development
DDT	dichlorodiphenyltrichloroethane	PCB	polychlorinated biphenyl
DPL	development policy loan	PMR	Partnership for Market Readiness
EAP	East Asia and the Pacific	POPs	persistent organic pollutant
ECA	Europe and Central Asia	PPCR	Pilot Program for Climate Resilience
EEZ	exclusive economic zone	REDD+	reducing emissions from deforestation and forest degradation +
EITI	Extractive Industries Transparency Initiative	SAR	South Asia Region
ENRM	environment and natural resources management	SFDCC	Strategic Framework on Development and Climate Change
ESE	environmental and social effects	SEGOM	Sustainable Energy, Oil, Gas and Mining
EU	European Union	SLCF	short-lived climate forcers
FAO	Food and Agriculture Organization of the United Nations	SLM	sustainable land management
FCPF	Forest Carbon Partnership Facility	SREP	Scaling Up Renewable Energy Program
FI	financial institution	UNFCCC	United Nations Framework Convention on Climate Change
FY	fiscal year	UNDP	United Nations Development Programme
GCF	Green Climate Fund	WAVES	Wealth Accounting and the Valuation of Ecosystem Services
GDP	gross domestic product	WBG	World Bank Group
GEF	Global Environment Facility		
GHG	greenhouse gas		
GNI	gross national income		
GTI	Global Tiger Initiative		
IBRD	International Bank for Reconstruction and Development		
ICT	Information and Communications Technology		
IDA	International Development Association		
IEG	Independent Evaluation Group		
IFC	International Finance Corporation		

All dollar amounts are US dollars and all tons are metric tons, unless otherwise indicated.

Acknowledgments

The process of preparing this 2012–2022 Environment Strategy involved a wide range of contributors, including development partners, government representatives, civil society organizations, think tanks, private sector representatives, and academics from developed and developing countries, as well as World Bank Group staff from across the institution. Focal points from World Bank Group regional and sector teams were appointed to organize and hold consultations with stakeholders and to participate in discussions on environmental priorities.

Externally, a series of 66 consultations were organized from October 2009 through June 2010, with the support of key partners in a number of venues. These consultations allowed us to engage with more than 2,300 stakeholders from various countries. In addition to the face-to-face consultations, stakeholders provided comments through the Environment Strategy website, translated to all official World Bank languages. More than 73,000 visits were received.

All members of the Environment Sector Board played an active role in the strategy preparation process: Charles Di Leva, Jasmin Mason-Andersen, Herbert Acquay, Idah Pswarayi-Riddihough, Joelle Chassard, John Kellenberg, Kulsum Ahmed, Karin Kemper, Kenneth Chomitz, Hoonae Kim, Magda Lovei, Michael Toman, Neeraj Prasad, and Patricia Miller.

There was close collaboration with and contributions from colleagues from the sector departments: Jamal Saghir, Lucio Monari, Masami Kojima, Marjory-Anne Bromhead, Mark Cackler, Julia

Bucknall, Michael Peter Jacobsen, Peter O’Neill, Andreas Kopp, Marc Juhel, Marcus Lee, Dan Hoornweg, Clive Armstrong, Robert Lesnick, Alan Miller, Robin S. Horn, Doyle Gallegos, Alexander McPhail, and Laurent Besancon.

This strategy was prepared jointly by a team of World Bank, IFC, and MIGA staff and consultants under the leadership of Mary Barton-Dock (Environment Director) and Sari Söderström Feyzioğlu (Environment Sector Manager) and previously James Warren Evans (former Environment Director) and Michele de Nevers (former Environment Senior Manager). Bilal Rahill (Senior Manager, IFC Environment, Social and Governance Department) and Deniz Baharoğlu (Sector Leader, MIGA Economics and Policy Group) coordinated inputs for IFC and MIGA, respectively.

Valuable guidance and oversight were provided by Rachel Kyte (Vice President, Sustainable Development Network), Inger Andersen (Vice President, Middle East and North Africa), Hartwig Schafer (SDN Operations Director), and Marianne Fay (SDN Chief Economist), with the valuable support of Anke Reichhuber, Doreen Kibuka-Musoke, Koshie Michel, Wisambi Loundu, and Ewa Sobczynska.

The Task Team Leader for preparation of the Strategy was Yewande Aramide Awe. The Strategy drafting group, led by Elisabeth Mealey, included Laura Tlaiye, Yewande Aramide Awe, Habiba Gitay, Fernando Loayza, Valerie Hickey, Klas Sander, Yves Prevost, Hannah Behrendt, Urvashi Narain, Giovanni Ruta, Alejandra Alvarez, and Kazi Fateha

Ahmed from the World Bank and Edmond Mjekiqi and Elizabeth White from IFC.

The Task Team Leaders for the preparation of background papers were Anjali Acharya, Nilufar Ahmad, Sameer Akbar, Yewande Aramide Awe, Judith Moore, Glenn-Marie Lange, Helena Naber, Urvashi Narain, Juan David Quintero, Giovanni Ruta, Ernesto Sánchez-Triana, Klas Sander, and Claudia Sobrevila.

Additional important contributions to the Environment Strategy were made by Jane Ebinger, Karin Shepardson, Benoit Bosquet, Astrid Hillers, Juan Carlos Belausteguigoitia, Stephen Lintner, Pathmanathan Gajanand, Peter Kristensen, Paula Posas, Christophe Crepin, Nancy Chaarani Meza, Tracy Hart, Dominique Kaiser, Nina Chee, Tashi Tenzing, Mona Sur, Philippe Ambrosi, Patricia Bliss-Guest, Siv Tokle, Avjeet Singh, Klaus Lorch,

Ari Huhtala, Konrad von Ritter, Kanta Kumari Rigaud, Dahlia Lotayef, Alaa Sarhan, Craig Meisner, and Ana Goicoechea.

External consultations on the Concept Note for the Strategy were led by Jeff Brez. Logistic and multi-media support for consultations was provided by Amanda MacEvitt and Alejandra Alvarez. Editorial support was provided by Bob Livernash, Clare Fleming, Hilary Gopnik, Linda Starke, and Jim Cantrell. Administrative and logistical support was provided by Grace Aguilar, Sharon Esumei, Liudmila Mazai, Alexandra Sears, Regina Vasko, Patricia Noel, Nyambura Thande, and Juliette Makandi Guantai.

We thank the Governments of Denmark, Finland, Norway, and the United Kingdom and the World Bank Group Gender Action Plan Trust Fund for their financial support, which made the consultations and background analytical work possible.



Executive Summary



The new Environment Strategy for the World Bank Group lays out an ambitious action agenda that seeks to respond to calls from our client countries for a new kind of development path—one that supports growth while focusing more on sustainability and ensuring that the environment is a key enabler for green, more-inclusive growth.

Based on extensive consultations with more than 2,300 Bank Group stakeholders throughout the world, this Strategy articulates a new vision for **A GREEN, CLEAN, AND RESILIENT WORLD FOR ALL.**

“GREEN” refers to a world in which natural resources, including oceans, land, and forests, are sustainably managed and conserved to improve livelihoods and ensure food security. It’s a world in which healthy ecosystems increase the economic returns from the activities they support. Growth strategies are focused on overall wealth rather than gross domestic product (GDP) as it is currently measured. Governments pursue regulations that encourage innovation, efficiency, sustainable budgeting, and green growth. Biodiversity is protected as an economically critical resource. In this world, good policies enable the private sector to use natural resources sustainably as part of good business, creating jobs and contributing to long-term growth.

“CLEAN” refers to a low-pollution, low-emission world in which cleaner air, water, and oceans enable people to lead healthy, productive lives. It is a world where development strategies put a premium on access alongside options for low-emission, climate-smart agriculture, transport, energy, and urban

development. Rural women no longer spend their days hauling wood because they have access to cleaner fuels. Cleaner production standards spur innovation, and industry is encouraged to innovate for new, clean technologies that provide jobs and support export-led, sustainable growth. Companies and governments are held to account on their low-emission, low-pollution commitments, and innovative financing helps spur change.

“RESILIENT” means being prepared for shocks and adapting effectively to climate change. In a resilient world, countries are better prepared for more-frequent natural disasters, more-volatile weather patterns, and the long-term consequences of climate change. Healthy and well-managed ecosystems are more resilient and so play a key role in reducing vulnerability to climate change impacts. Climate resilience is integrated into urban planning and infrastructure development. Through effective social inclusion policies, countries and communities are better prepared to protect vulnerable groups and fully involve women in decision making.

The green, clean, and resilient agendas are complementary, and by pursuing them in concert, countries can harness their co-benefits.

Threats to the Environment Are Threats to Development

The new Strategy recognizes that despite the progress made in reducing global poverty, there has been significantly less progress in managing the environment sustainably. Pollution, overexploitation

of fish stocks, biodiversity loss, and overuse of water and land increasingly threaten countries' development efforts. The immediate and long-term consequences of climate change—from a warmer planet to more-acidic oceans—further threaten progress on poverty reduction and development.

Environmental degradation, pollution, or overexploitation of a natural resources hamper economic progress. Lack of action to address health-impairing air and water pollution, for example, is costing some countries the equivalent of 4 percent of GDP or more a year. Policy failures account for many perverse incentives in the efficient use of natural resources, and without strong institutions and governance frameworks in place, taking action to reduce environmental risks has a low chance of success.

The current economic model, driven by unsustainable patterns of growth and consumption, is clearly putting too much pressure on an already stretched environment. Current unsustainable and inefficient growth patterns highlight the need for inclusive green growth.

Building on Progress and Drawing on Lessons from 10 Years of Action

This Strategy builds on the progress made through the World Bank's 2001 Environment Strategy, which emphasized linking poverty reduction and the environment, integrating environmental actions into economic sectors, and linking local with global environmental agendas. In 2001, the Strategy focused specifically on the World Bank. This Strategy covers the work of all World Bank Group institutions, including the International Finance Corporation and the Multilateral Investment Guarantee Agency. It also ensures that the environmental commitments of World Bank Group sectors—as outlined in sectoral strategies such as water supply and sanitation, information and communications technologies, urban development, transportation, and energy—are fulfilled.

Many lessons have been learned since 2001. Key among these is that the World Bank Group's

environmental and social safeguard policies and performance standards are vitally important in avoiding, mitigating, or managing risks and impacts from operations. Evolving Bank work on the safeguards policy will complement this Strategy when complete. The need for improved measurement of integration of environmental considerations into activities in sectors from agriculture to energy and beyond is also clear. Increasingly, partnerships have become essential in a fiscally constrained world faced with major environmental challenges. There is also a growing role for the private sector in addressing sustainability concerns, developing sustainability standards, and ensuring that global markets can and do promote sustainable development. The private sector is also being recognized for helping to fill funding gaps, with multidonor facilities like the Global Environment Facility and the Climate Investment Funds now including allocations to catalyze and promote private sector climate activities.

Priorities for Action

The new Strategy prioritizes action in seven key areas across the green, clean, and resilient agendas.

GREEN AGENDA: Our focus here is on nurturing greener, more-inclusive growth and poverty reduction while protecting biodiversity and ecosystems.

- Through the **WEALTH ACCOUNTING AND VALUATION OF ECOSYSTEM SERVICES** global partnership, we will support countries valuing their natural capital assets like forests, coral reefs, and wetlands and incorporating them into their systems of national accounts. This truer measurement of national accounts will lead to better decisions in managing economies sustainably.
- Through the new **GLOBAL PARTNERSHIP FOR OCEANS**, we will work with a broad coalition of governments, international agencies, nongovernmental organizations, and private companies to find ways to restore the world's oceans to health and economic productivity. Healthy and biodiverse oceans are essential for food security, jobs, and the sustainable quality of life on earth. Managing ocean resources better can be a source of green and inclusive growth for many countries.



Under the green agenda, we will also build on our experience in carbon finance to test the market's willingness to encourage protection of critical habitat areas while also providing carbon storage benefits. With our partners, we will continue innovative work on forests and land use linked to the Reducing Emissions from Deforestation and Forest Degradation program. We will also develop methodologies to capture and monetize carbon co-benefits—for example, through wildlife conservation premiums.

CLEAN AGENDA: Our work on green growth cannot succeed without attention to the excessive pressure being placed on clean air, clean water, and productive land. Under the clean agenda, we will focus on helping countries to manage pollution proactively and find low-emission paths to development.

- **POLLUTION MANAGEMENT:** With our clients facing increasing air, water, and soil pollution as well as the challenges of legacy pollution, we will foster a South-South exchange on best practice for managing pollution. We will work with our partners and carbon finance funds to scale up use of cleaner stoves to help reduce indoor pollution and benefit women and children. We will also work with countries on river cleanup and legacy pollution issues, and we will seek partnerships with the private sector to work on cleaner production strategies.
- **LOW-EMISSION DEVELOPMENT STRATEGIES AND INNOVATIVE FINANCE:** We will work across Bank Group regions and sectors to improve energy efficiency, encourage a shift to renewable energies, find climate-smart agricultural solutions, and build cleaner, lower-carbon cities. We will continue to work to find innovative carbon

finance and climate finance solutions to help countries adopt low-emission paths to development and improve resource efficiency.

RESILIENCE AGENDA: We will continue to work with development partners and the private sector to help countries reduce their vulnerability to climate risks.

- **ADAPTATION:** We will support countries to find climate change adaptation solutions that add value to inclusive green growth, such as climate-smart agriculture or better coastal zone management. We will continue to develop innovative approaches to increasing climate finance focused on adaptation.
- **DISASTER RISK MANAGEMENT:** We will work with countries to find ways to minimize the damage of natural disasters in terms of loss of life and structural damage. This includes expanding the use of financial instruments, like climate risk insurance, to help with recovery from natural disasters.
- **IMPROVING THE RESILIENCE OF SMALL ISLAND DEVELOPING STATES:** We will continue our work with small island developing states to help reduce their dependence on imported oil while supporting efforts to boost renewable sources of energy. Through the International Development Association and the Pilot Program for Climate Resilience, we will support projects to improve climate resilience in infrastructure and to reduce vulnerability through restoration of protective coastal ecosystems such as mangroves.

Across all three agenda areas, we will promote work to improve data collection and data quality, emphasizing open access to data and knowledge. We will work closely with clients on developing and disseminating knowledge and promoting global learning across the range of country circumstances.

Regional Approaches

The Strategy also defines specific challenges and approaches at the regional level across the green, clean, and resilient agendas.

For example, to support **AFRICA** with its green agenda challenges linked to pressures from

agriculture, mining, and human settlements, we are giving priority to work on improved governance for better natural resource management alongside expanded protected areas management. In working to improve natural resources governance, the goal is to improve people's food, income, and livelihood security, while encouraging job-creating private sector investment. In **EUROPE AND CENTRAL ASIA**, where forest resources are a major source of employment, timber, and ecological services, the Region is working on sustainable forest management with an emphasis on strengthening governance and communities' and private sector roles.

In the **EAST ASIA AND PACIFIC** Region, clean agenda challenges include high greenhouse gas emissions, air-polluted cities, and heavily polluted river systems. In response, the regional focus will be on expanding work targeting greenhouse gas emissions and continuing to support investments in renewable energy and energy efficiency while making large urban and rural sanitation programs a priority. Similarly, in the **MIDDLE EAST AND NORTH AFRICA** Region increasing land, air, and marine-based pollution is threatening cities, waterways, and shared seas. The Region is working on a regional seas approach to pollution management with other regional and development partners while also supporting countries to shift to cleaner sources of energy and find cleaner, smarter approaches to industrial and urban development. In the **EUROPE AND CENTRAL ASIA** Region, clean agenda challenges include ensuring energy security while providing cleaner energy and managing legacy, current, and future pollution. In response, the Region is working on enhancing energy supply with an emphasis on clean energy options and on cleanup, containment, and remediation of land, ground, and water pollution.

For most regions, the vulnerability of large coastal populations and agricultural areas to the impacts of sea-level rise and more-intense weather, floods, and droughts is at the heart of their resilience agendas. In **SOUTH ASIA**, for example, the regional focus is on increasing the resilience of ecosystems, infrastructure, and highly vulnerable areas by, among other efforts, helping to build the needed institutions, capacity, and knowledge systems for mapping



hazards and developing world-class coastal zone management. The **LATIN AMERICA AND CARIBBEAN** Region is boosting work in adaptation, mitigation, and disaster risk management. A particular focus is on the development of low-carbon growth strategies in Mexico, Brazil, and Colombia.

Mobilizing New Finance, Resourcing the Strategy

Across all three agendas—green, clean, and resilient—the goal of the Strategy is to demonstrate how to mobilize additional sources of finance for green growth, biodiversity conservation, and low-pollution and low-emission initiatives as well as investments to build resilience to climate shocks. It will remain a high priority to support policy reforms, institution strengthening, and capacity building across all three areas.

In responding to demands from clients and global concerns, the Strategy will require continuous monitoring of progress. Implementing this Strategy will require adequate resources, both human and budgetary, to deliver on the ambitious vision proposed. Helping client countries move toward green, clean, and resilient development will mean continuing to build our own skill sets and capacity.

This Strategy recognizes the importance of our convening power, access to policy makers, analytical work, development of new financial tools, and smart risk management as well as a portfolio of investments to accelerate solutions. Spreading these solutions by sharing knowledge, demonstrating success, working in partnership, mobilizing action, and leveraging financing will be critical to our success.



A New Environment Strategy, a New Vision



THE GLOBAL FIGHT AGAINST POVERTY OVER THE PAST 20 YEARS HAS SEEN REMARKABLE SUCCESS. ON ENVIRONMENTAL ISSUES, HOWEVER, THERE HAS BEEN FAR LESS

PROGRESS. Though the world has won several environmental battles, on a global scale we are still losing the war: species are becoming extinct at a greater rate than ever, the world's area of primary forest cover continues to shrink each year, areas of degraded land and polluted water are still increasing, and carbon emissions continue to rise. Climate change is now having an increasingly negative impact on development, contributing to volatile weather patterns with more-frequent natural disasters like floods and droughts, which in turn contribute to the volatile markets for food. It is now clear that as temperatures and the sea levels continue to rise, worse is in store. Taken together, these environmental challenges constitute a significant development risk, imperiling the hard-won successes in fighting poverty.

THE WORLD BANK GROUP (WBG) STRIVES TO PROVIDE THE LEADERSHIP, SOLUTIONS, AND FINANCING NECESSARY TO KEEP POVERTY REDUCTION ON TRACK IN THE FACE OF THESE CHALLENGES. In recent years, the WBG has played a pivotal role in climate finance by deepening carbon markets and directing them toward new challenges, testing the Climate Investment Funds (CIFs) in advance of the Green Climate Fund, increasing private sector investment through the climate business group of the International Finance Corporation (IFC). The WBG is also innovating financial instruments, including testing green and cool bonds and developing instruments for disaster risk management with IDA, the IBRD, MIGA, and

the IFC. The WBG continues to step forward with initiatives on low-carbon development strategies, climate-smart agriculture, resilient cities, and a rebalanced energy portfolio.

GLOBAL EFFORTS TO DATE ARE NOT ENOUGH TO ENSURE THE FUTURE HOLDS EITHER A WORLD FREE OF POVERTY OR A WORLD THAT IS BIODIVERSE, SUSTAINABLE, AND ONLY 2° CELSIUS (C) WARMER. This prompts several key questions. Can the world grow its way out of poverty in an environmentally sustainable way? How can the planet support a population of 9 or 10 billion people? How can the world finance a new model for growth along with the necessary adaptations to a warmer planet? For its part, the WBG is working to develop a new vision of “Green Growth for All,” with each sector defining its own contribution to resolving these questions with a focus on improving efficiency of resource use and patterns of production and consumption. Underpinning this approach is a new Green Growth Knowledge Platform that aims to improve knowledge on how to promote more-sustainable patterns of growth and provide advisory and operational services on growth and on environmental and social synergies.

IN CONSULTATIONS FOR THIS STRATEGY, ALL WBG STAKEHOLDERS SAID CLEARLY THAT THE WORLD NEEDS TO RETHINK THE CURRENT GROWTH MODEL AND MOVE TOWARD GREENER DEVELOPMENT PATHWAYS. Concepts like “green growth” and the “green economy” recognize that growth is critical but that the current growth model's ability to deliver on truly sustainable development is in serious doubt. The concept of sustainable development was given international credibility by the Brundtland Commission in 1987 in



an effort to integrate environmental, economic, and social dimensions in development. While there has been some progress on integrating the economic and social dimensions, there has been very little progress in linking environmental and economic considerations. Greener growth is needed to finally implement the original notion of sustainable development. Success will require properly valuing natural capital and fully integrating environmental issues into growth policies that promote efficiency, innovation, and resilience while continuing or stepping up efforts on job creation and poverty alleviation.

SUSTAINABLE DEVELOPMENT WITH ENVIRONMENT PROPERLY INTEGRATED WILL REQUIRE A NUMBER OF TRANSITIONS. The manner in which global markets and economies are currently structured often means that people do not get paid for doing the right thing

with regard to the environment. Getting prices aligned with the true value of environmental services globally and locally is an important first step. Other transitions involving infrastructure, natural resource management, knowledge, innovation, information and communications technology, governance, institutions, and social capital are also critical and will require significant investments, analytics, data, new institutions, and financial instruments.

SINCE 2001, THERE HAS BEEN CONSIDERABLE PROGRESS IN INTEGRATING ENVIRONMENTAL PRIORITIES ACROSS DEVELOPMENT SECTORS AND REGIONS WITHIN WBG STRATEGIES. Annex 1 highlights the range of environmental actions that each of the sectors has committed to undertake. These range from increasing energy efficiency and investing in renewable energies to reducing land degradation

through more-sustainable agricultural and water management practices and reducing urban air pollution. Chapter 6 reviews the efforts by each World Bank region to address the world's pressing environmental challenges. Chapter 7 outlines how the progress of each region and sector on achieving sustainable development will be monitored under the Environment Strategy in 2012–22.

The WBG's vision for this new Environment Strategy is **A GREEN, CLEAN, AND RESILIENT WORLD FOR ALL**. This strategy recognizes that all economies, particularly developing ones, still need to grow, but they need to do so sustainably, so that income-producing opportunities are not pursued in ways that limit or close off opportunities for future generations.

WHAT DO WE MEAN BY “GREEN”? Green refers to a world in which natural resources are conserved and sustainably managed to improve livelihoods over time. It is a world in which ecosystems (both green and blue) are healthy and increase the economic returns from the activities they support—such as the fish-breeding and coastal protection services of coral reefs and the water filtering and soil protection services of forests. Other vital ecosystem services such as erosion regulation, carbon sequestration, and pest control are supported and protected. Subsoil assets are also leveraged to build other forms of wealth, such as productive and human capital. In all of this, the private sector uses natural resources sustainably as part of good business, creating jobs and contributing to long-term growth.

This is a world in which farmers receive payments for preserving sensitive ecological land and wildlife habitats. It is a world in which ministries of finance are focused on overall wealth rather than gross domestic product (GDP), while pursuing innovation, efficiency, and sustainable budgeting.

WHAT DO WE MEAN BY “CLEAN”? Clean refers to a low-pollution, low-carbon world. This is a world in which cleaner air, land, water, and oceans enable people to lead healthy, productive lives. It is also a world in which cleaner production standards spur innovation—whether through reducing air pollution, addressing legacy pollution, or encouraging recycling. It is a world in which industries are built around clean technologies—either for energy, water, transportation, or housing—providing jobs, offering the potential of export-led growth, and contributing to sustainable economic development. It is a world in which the clean technologies and production methods used by the private sector meet or even exceed international standards—partly because of management choices, but also because regulation rewards clean technologies and because clients and investors seek it. It is a world in which governments and companies are held to account by people on their clean performance.

WHAT DO WE MEAN BY “RESILIENT”? In a resilient world, countries manage the risks of disaster more effectively—especially the more-frequent natural disasters and more-volatile weather patterns. They also lessen exposure to natural disasters by anticipating shocks and adapting to both climate change and climate variability. They are able to handle shocks because they have resilient communities woven from a strong social fabric that stems from investment in women, in minorities, and in other vulnerable groups. Resilience also requires adaptation in dynamic societies focused on capacity building, on innovation, and on knowledge management within a culture of actively seeking solutions for recognized problems. In a resilient world, ecosystems are healthy and well managed, and they are a key part of reducing vulnerability to climate impacts.



2

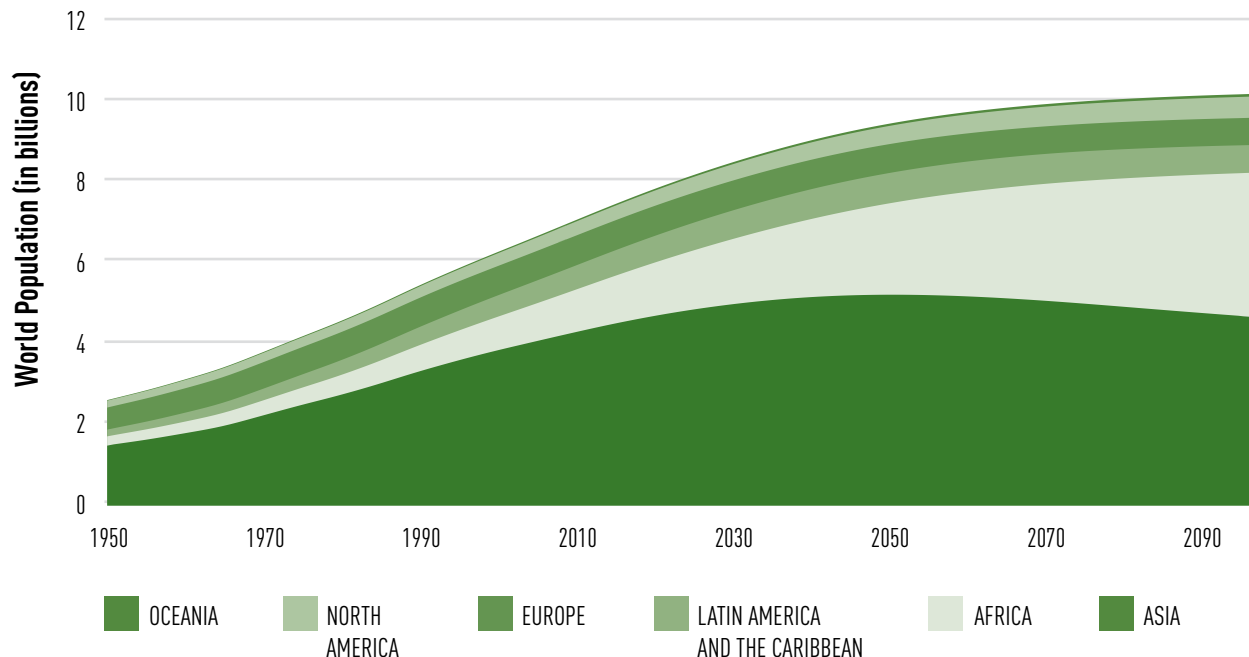
An Environment under Assault



With growing populations and increasing demand for food, water, energy, land, and other natural resources, the world faces a massive challenge in achieving a vision for a green, clean, and resilient development. Climate change, which is both an outcome and a driver of further environmental degradation, presents a special set of challenges. The accelerating impacts of climate change are narrowing the options for sustainable development, shortening the time frame for addressing poverty, and requiring a move toward cleaner, more efficient and equitable patterns of growth.

THE WORLD'S POPULATION IS NOT ONLY LARGER TODAY, IT IS MORE PROSPEROUS. The global population of 6.2 billion in 2002 had already grown to 7 billion by 2011, according to *World Population Prospects: The 2010 Revision* by the United Nations, and is projected to reach 9.3 billion by 2050 (Figure 2.1). Alongside population growth over the past two decades, there have been tremendous gains in prosperity. More people have escaped poverty over the past 20 years than at any other time in human history. Global trade has more than tripled since 1992 (WTO 2011), while developing country GDP has nearly doubled, allowing for a proportional

FIGURE 2.1
World Population 1950–2100: Toward 10 Billion by 2100



Source: United Nations Population Division 2011.

increase in consumption. This has led to improvements in access to education, health care, and infrastructure services throughout the developing world. Overall, life expectancy improved from 64 years in 1990 to 68 years in 2009 (WHO 2011).

YET HUNDREDS OF MILLIONS OF PEOPLE CONTINUE TO LIVE IN POVERTY, AND DEVELOPING COUNTRIES' SHARE OF GLOBAL INCOME AND CONSUMPTION CONTINUES TO BE DISPROPORTIONATELY LOW. Based on an expected developing country population of over 6 billion, more than 1 billion people will still be living in extreme poverty by 2015.¹ And despite increases in prosperity, developing countries, home to 84 percent of world population, still only account for about quarter of global income and consumption. This means that the world is dealing simultaneously with a dramatic contrast in environmental challenges—those posed by increasing prosperity and those associated with inequality and continuing large numbers of poor people.

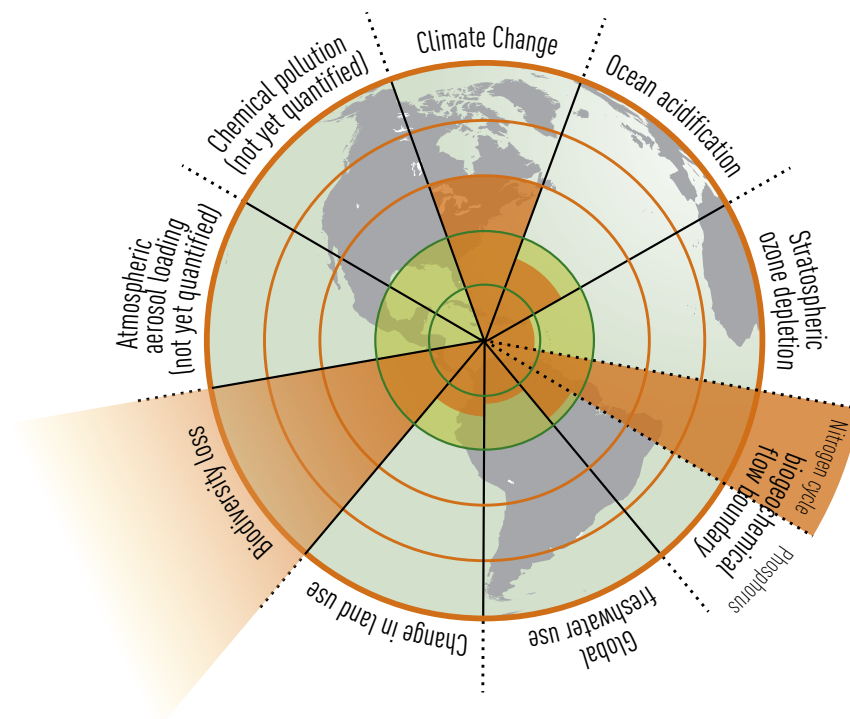
POPULATION GROWTH AND ECONOMIC PROSPERITY HAVE BEEN ACCOMPANIED BY A HEAVIER HUMAN ECOLOGICAL FOOTPRINT. As incomes have grown, so has purchasing power and consumption of goods and services. Between 1992 and 2009, developing countries saw an 80 percent increase in per capita income, even as the global population grew by 1.2 billion people. The growing demand for food has led to more and more-intensive agriculture. In the 1980s, an average hectare of cropland produced 1.8 tons of food; now it produces 2.5 tons (UNEP 2007). While critically important for food security, this agricultural intensification has also contributed to agrochemical pollution, soil exhaustion, and deforestation. Water withdrawals have tripled over the last 50 years, largely through the rapid increase in irrigation stimulated by food demand. This has contributed to water scarcity and groundwater depletion (World Bank 2007c). Demand for water is growing, with withdrawals projected to increase by another 50 percent by 2025 in developing countries and 18 percent in developed countries (UNESCO-WWAP 2006). Some researchers suggest that the world has already exceeded its safe operating space (Figure 2.2).

¹ Calculation based on Chen and Ravallion 2008 and on United Nations Population Division 2011.

AN EXPANDING GLOBAL ECONOMY HAS BROUGHT INCREASED PROSPERITY BUT ALSO ENVIRONMENTAL DEGRADATION. The growing manufacturing sector has provided jobs and raised living standards. An expanding construction sector has provided critical infrastructure services, increasingly delivered by the private sector. But the accompanying demand for metal ores and nonmetallic minerals has created environmental issues. Weak or poorly enforced regulations have allowed this growth to come at the expense of environmental degradation: runoff from agriculture and mining activities has in some cases polluted groundwater, adding to drinking water problems; groundwater, coastal ecosystems, and marine ecosystems have occasionally been threatened by oil and gas industry activities. Carbon-intensive and often polluting industries such as those for cement, glass, metals, food processing, pulp and paper, and chemicals have been allowed to grow with inefficient processes, contributing to climate change and freshwater resource depletion.

RAPID URBANIZATION HAS SPURRED GROWTH, CREATING OPPORTUNITIES AND CHALLENGES. Today, more than half of the world lives in cities. Over 90 percent of urban growth occurs in developing countries. According to the World Bank's Urban and Local Government Strategy (World Bank 2010d), the urban share of a population rises sharply—from about 10 to 50 percent—as countries move from low- to lower-middle per capita incomes of about \$3,500 per year. These trends have profound implications for the local environments of cities and for the global environment. The local environments of many cities are affected by serious air and water pollution. Urban sprawl leads to growth in built-up areas at the expense of natural land cover and to an urban heat island effect, in which temperatures in a city are significantly warmer than in surrounding rural areas. Cities often draw heavily on resources, such as freshwater, food, and energy coming from distant sources, including other countries, thus also driving changes in land use and the environment at the global scale. Yet cities, if planned and managed well, are efficient energy and resource users as well as sources of innovation, jobs, and growth (World Bank 2010c). The challenge for governments and city mayors as well as citizens and firms is to create

FIGURE 2.2
A Safe Operating Space for Humanity



Source: Rockström et al. 2009. In their 2009 article in *Nature* magazine, Rockström et al. looked at the human footprint on nine “planetary systems.” The inner green shading represents the proposed safe operating space for these systems. The orange wedges represent an estimate of the current position for each variable, with boundaries in three systems already exceeded.

ecologically sound cities, improving the lives of citizens while greatly enhancing resource efficiency.

MORE THAN EVER BEFORE, ALL DEVELOPMENT PARTNERS—PUBLIC, PRIVATE, AND CIVIL SOCIETY—NEED TO COME TOGETHER TO ACHIEVE SUSTAINABLE GROWTH.

Addressing the challenges for a green, clean, and resilient world requires leveraging the comparative advantage of all development partners. The combination of innovation, investment in technologies, sustainable management practices, and strong regulations and enforcement has proved to have a positive impact on environmental outcomes and development. Expanding development partnerships such as public-private initiatives or integrated

programs can help transform markets and address environmental and social challenges.

SO WHAT IS THE STARTING POINT FOR ADVANCING A GREEN, CLEAN, AND RESILIENT WORLD? An assessment of the current status of our environment is sobering.

How Green Is Our World?

BIODIVERSITY CONTINUES TO DECLINE. Over the past 40 years, there have been significant declines in healthy ecosystems and their flora and fauna populations. These losses have been accompanied by major reductions in the extent and quality of vital



Shutterstock

habitat—forests, mangroves, sea grass beds, and coral reefs (Butchart et al. 2010). This has seriously affected ecosystem goods and services. While public attention has largely focused on well-known fauna like tigers, pandas, gorillas, and polar bears, species loss extends to everything from fungi to insects, plants, and frogs. According to the *IUCN Red List of Threatened Species*, 875 plants and animals went extinct in 2008 (or extinct in the wild) and another 17,291 are known to face a high risk of extinction in the wild (IUCN 2009). The current species extinction rate is 100 to 1,000 times the level it was before humans walked the Earth. Future extinction rates may be even 10 times greater if all currently threatened species become extinct within the next century (Pimm et al. 1995).

THE PRIMARY DRIVER OF BIODIVERSITY LOSS IS HABITAT DESTRUCTION AND DEGRADATION. Both the extent and the quality of habitats are threatened by land use change for increased food production through cattle ranching, agriculture, and fishing (Butchart et al. 2010). Forests have seen annual losses of 5.2 million

hectares between 2000 and 2010, despite declines in deforestation rates and increased forest plantations. Forest area gains have been made in temperate and boreal zones, while most of the losses are in tropical regions (FAO 2010a), which are host to a wide range of ecosystem services and biodiversity. Invasive species (mammals, amphibians, fish, and plants) put additional pressure on native species and further degrade habitats.

ILLEGAL WILDLIFE TRADE IS GROWING AND IS INCREASINGLY LINKED TO ORGANIZED CRIME. In 2009, legal trade in wildlife exceeded \$323 billion per year (TRAFFIC n.d.). While exports of wood and other forest products were estimated at \$189 billion in 2009 (FAO 2011), and exports of fish and fishery products reached a record \$102 billion in 2008 (FAO 2010b), the total value of illegal wildlife trade may exceed \$20 billion per year (Wyler and Sheikh 2008). Poachers have become increasingly well organized and dangerous, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and INTERPOL now state that

poachers have close links to organized crime. Fragile states are particularly susceptible to wildlife crime by poachers who are well armed and may be demobilized soldiers or former rebels.

ECOSYSTEM SERVICES ARE FRACTURED. The rapid loss of biodiversity combined with shrinking habitats and deteriorating ecosystem infrastructure, such as forests and coral reefs, has fundamentally altered ecosystems that generate an array of benefits: provisioning services such as food and water, regulating services such as flood and disease control, cultural services such as spiritual and recreational activities, and supporting services such as nutrient cycling and carbon storage. Together, these services maintain the conditions for life on Earth. While the use of ecosystem services is growing, the capacity of ecosystems to provide these services has declined significantly. According to the Millennium Ecosystem Assessment (MA), 60 percent of ecosystem services are in worse shape than they were 50 years ago (MA 2005). One of the major reasons for this is the systemic undervaluation of ecosystem services in countries' national accounts.

LAND DEGRADATION IS WORSENING. Soil erosion, salinization, and nutrient depletion are all contributing to desertification and an increasing rate of land degradation. A 1991 global assessment of human-induced soil degradation found 15 percent of the world's land surface was degraded (Oldeman, Hakkeling, and Sombroek 1991). By 2008, a new assessment increased this estimate to 24 percent (Bai et al. 2008). Africa shows the fastest degradation rate, with 70 percent of the cultivated land area degraded due to deforestation and poor agricultural practices. In the Middle East and North Africa, land quality is threatened by poor water management and salinization. Similarly, 25 percent of the land area in the Caribbean is severely degraded.

Land degradation is particularly acute in dryland areas that account for some 40 percent of the world's land surface and are home to about 2 billion people. The 2010 U.N. General Assembly review of the Millennium Development Goals highlighted the lack of progress in reducing hunger and poverty in dryland areas, where well over half of the world's poor people live.

FRESHWATER SUPPLIES ARE SERIOUSLY STRESSED. Some 1.4 billion people live in river basins in which water use exceeds recharge rates. Rivers are drying up, groundwater tables are falling, and water-based ecosystems are being rapidly degraded (UNDP 2006). By 2025, about two-thirds of the world's population—some 5.5 billion people—will live in areas facing moderate to severe water stress (UNESCO-WWAP 2006).

OCEANS AND SHARED SEAS ARE UNDER STRESS FROM CLIMATE CHANGE, OVERHARVESTING, POLLUTION, AND COASTAL DEVELOPMENT. In tropical shallow waters, a temperature increase of 3°C by 2100 may result in annual or biannual coral bleaching events starting in 2030. Even the most optimistic scenarios project annual bleaching of 80–100 percent of the world's coral reefs by 2080 and a high probability of coral mortality. Numerous studies of the impacts of coral bleaching have shown measurable effects on the structure of reef fish communities, including the loss of herbivorous fish species that keep algae on reefs in check (Nature Conservancy 2011). Other effects include declines in reef fish abundance linked to losses in the three-dimensional structure of coral reefs and the associated loss of habitat for juvenile fish.

Ocean acidification—the result of excess carbon dioxide (CO₂) in the atmosphere, one-quarter of which is absorbed by the oceans—is expected to severely damage coral reefs and is already affecting shell-forming organisms. According to the U.S. National Oceanic and Atmospheric Administration, ocean acidification is decreasing the ability of organisms to build their shells and progressively affecting the function of ecosystems (NOAA Ocean Acidification Steering Committee 2010). Ocean acidification could trigger a chain reaction of impacts through the marine food web, beginning with larval fish and shellfish, potentially affecting the global fishing industry and food security (Ocean Acidification Reference User Group 2009).

At the same time, coastal development is increasing rapidly. Development is projected to affect 91 percent of all inhabited coasts by 2050 and will contribute to more than 80 percent of all

marine pollution. The effects of pollution are exacerbated by the destruction of mangroves and other habitats as a result of rapid coastal development (Nellemann, Hain, and Alder 2008). The disposal of solid waste into marine environments is further pushing the limits of the ocean, which was once thought to be vast and resilient.

FISH STOCKS ARE UNDER UNPRECEDENTED PRESSURE.

The 2010 report on the state of the world's fisheries and aquaculture by the Food and Agriculture Organization (FAO) estimated that more than half of marine fish stocks are fully exploited, with current catches at or close to maximum sustainable production (FAO 2010b). Another one-third of stocks are estimated to be overexploited (28 percent), depleted (3 percent), or recovering from depletion (1 percent). Fishing capacity is estimated to be 2.5 times sustainable harvest levels. As many shallow fishing grounds are depleted, fishing fleets (especially large industrial fleets) are increasingly targeting deep-water species on the continental slopes and seamounts (Nelleman, Hain, and Alder 2008).

THE DECLINE OF MARINE RESOURCES THREATENS THE LIVELIHOODS OF OVER 100 MILLION MEN AND WOMEN INVOLVED IN FISH PROCESSING.

According to the FAO, there are currently 35 million people working as capture fishers—90 percent of them in small-scale fisheries. Another 84 million people are estimated to be employed in associated occupations, particularly in seafood processing and trading, and the majority of these are women. Millions of other rural dwellers are involved in seasonal or occasional fishing activities. Taking into account the jobs that stem from ocean and waterfront tourism, conservatively 350 million jobs are at stake if the living oceans falter. Continued depletion patterns translate to severe livelihood setbacks for communities throughout the world's coastal and island nations. Equally concerning is that declining fish resources threaten an important source of dietary protein, micronutrients, and essential fatty acids for millions of the world's poor (FAO 2010b). Overall, seafood accounts for 15 percent of the world's protein, and it is the one source of protein that has a zero carbon and freshwater footprint.

How Clean Is Our World?

THE POOREST COUNTRIES SUFFER DIRECTLY AND MEASURABLY FROM A POLLUTED AND DEGRADED ENVIRONMENT, WITH WOMEN AND CHILDREN DISPROPORTIONATELY AFFECTED.

The World Health Organization notes that the top killers of children under the age of five are acute respiratory infections (from air pollution), diarrheal diseases (from polluted water), and malaria (from inadequate environmental management and vector control) (Prüss-Üstün and Corvalán 2006). Strikingly, the mortality rate in children under five from environmentally mediated disease conditions is 180 times higher in the poorest regions than in industrialized regions. Because of variations in exposure to environmental risks and access to health care, developing regions suffer 15 times higher losses in healthy life years from infectious diseases than developed countries.

IN SOME REGIONS AND COUNTRIES, AIR AND WATER POLLUTION ARE INCREASING SHARPLY,

particularly in rapidly growing urban areas. Particulate matter concentrations in cities in lower- and middle-income countries are more than twice the levels in high-income countries, affecting pregnant women, children, and the elderly disproportionately. The levels of particulate matter in Asia, Africa, and Latin America are substantively higher than in Europe and North America, with Asia showing by far the highest levels (WHO 2006). Meanwhile, emissions of sulfur dioxide and mono-nitrogen oxides are also increasing in developing countries. While some developing countries have been able to decrease their air pollution concentrations over the last few years—for example, in cities in northern China average particulate matter concentrations dropped by about 35 percent between 2003 and 2009—the air quality in many cities in developing countries is still deteriorating, notably in the Middle East, Africa, and other parts of Asia. Moreover, the gap is widening between the polluted cities of the developing world and the cleaner cities in Europe and North America. Overall, the air quality in most fast-expanding cities in developing countries is generations behind that of cleaner cities in developed countries.



Pollution also remains one of the most important threats to water resources in developing countries. Each day, 2 million tons of human waste enters global watercourses. Residual pesticides and metals also affect human health (UNESCO-WWAP 2006). More than 30 of the 47 largest rivers in the world are under threat from pollution and drawdown, affecting biodiversity and human water security (Vörösmarty et al. 2010). The most common freshwater quality problem is high concentrations of nutrients (mainly phosphorus and nitrogen), resulting in eutrophication that depletes waterways of oxygen, causing the death of fish and invertebrates. With increasing use of fertilizers on food crops over the next 30 years, a 10–20 percent global increase in river nitrogen flows to coastal ecosystems is expected (UNEP 2007).

HEAVY METALS AND PERSISTENT ORGANIC POLLUTANTS (POPS) CONTINUE TO CAUSE PROBLEMS FOR MANY COUNTRIES. Chemical wastes from industry and agriculture are a big source of contamination in developing countries. These chemicals affect human and animal health, water supplies, and land. They include heavy metals, such as mercury,² and organic pollutants. Mercury levels continue to increase,

² The main sources of mercury from human activity are mining, fossil fuel extraction, and waste incineration. Products such as batteries and electrical goods also contain mercury and contribute to the leakage from solid waste disposal sites.

especially in Asia, where they are the highest in the world, having almost doubled between 1990 and 2005 (AMAP and UNEP 2008). The manufacture and use of many persistent organic pollutants³ have been banned, but they persist in many land and water systems and also accumulate in food chains (UNEP 2007).

Although the concentrations of some POPs, such as DDT, have decreased, in many regions (such as sub-Saharan Africa) large stockpiles of obsolete pesticides still exist. These stockpiles, which are often leaking, are up to 40 years old and contain banned pesticides. The legacy from contaminated industrial and urban sites, common in many developed countries, is also a major problem. With the increase in solid waste and waste exports from developed to developing countries, this burden is likely to increase.

CARBON DIOXIDE EMISSIONS CONTINUE TO RISE. After a dip in 2009, CO₂ emissions climbed to a record high in 2010, with an additional increase of 5 percent from the previous record year, 2008 (IEA 2011a). This is almost 40 percent more than 1990 levels, making

³ POPs include aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, the industrial chemicals hexachlorobenzene and polychlorinated biphenyls (PCBs), and polychlorinated by-products (Stockholm Convention on Persistent Organic Pollutants 2011).



Shutterstock

the globally agreed target for 2100 of 2°C warming even more of a challenge.

THE WORLD IS ON A PATH TO AN AVERAGE TEMPERATURE RISE OF AT LEAST 2°C ABOVE PREINDUSTRIAL LEVELS—and possibly 5° or more in the worst-case scenario—by the end of the century (IPCC 2007, World Bank 2010f). The accompanying changes in sea level, rainfall patterns, glacial retreat, and frequency and intensity of extreme weather events threaten to erode development gains of the past 20 years.

At 2°C above preindustrial levels, 20–30 percent of the world’s species may be at risk of extinction. One billion more people (particularly in Asia and Africa) are likely to experience severe water stress. Declines in agricultural productivity could expose several hundred million additional people to risk of hunger. Coral reefs will be devastated worldwide. And the homelands of tens of millions of people will be flooded.

As the world approaches 3–4°C above preindustrial levels, the risk of catastrophic losses increases dramatically: droughts, floods, forest fires, and heat waves will increase in both frequency and intensity. Agricultural and forest productivity are expected to decrease in most parts of the world. Sea-level rise could exceed one meter by the end of the century, and destabilization of the Greenland and Antarctic ice sheets would further commit the planet to tens of meters of sea-level increase in the future.

Geographically, these impacts will increase in scale over time. By 2050, the number of malnourished children in South Asia could rise from 52 million (without climate change) to 59 million (with climate change) (Nelson et al. 2009). By 2080, agricultural land with severe soil or climate constraints in sub-Saharan Africa could increase by between 26 million and 61 million hectares (Fischer et al. 2005).

The growing inevitability of at least some of these impacts is narrowing options for responding to the

world's environmental challenges. Climate change increases the urgency of the overall environmental agenda: to avoid catastrophic losses and address the impacts of temperature change, we will need to act quickly and decisively.

How Resilient Is Our World?

CLIMATE CHANGE WILL INCREASE THE VULNERABILITY OF HUMAN AND NATURAL SYSTEMS. The economic costs of climate change and climate variability will be large, making it even more challenging to address issues of poverty and environmental degradation. According to the World Bank's *Economics of Adaptation to Climate Change* study, it will cost developing countries \$70–100 billion a year in 2010–50 to adapt to climate change (World Bank 2010a). Since most infrastructure is located in urban areas, and given the greater concentrations of people there, cities are particularly vulnerable to climate change impacts. Countries and cities will need considerable help to find the funds to adapt to a riskier and more volatile world. Adaptation will require a different kind of development that entails actions like breeding crops that are drought- and flood-tolerant and climate-proofing infrastructure. Loss of livelihoods, assets, and income has wide implications for people and economies. For example, the United Nations estimates that a four-year drought in Syria has caused 800,000 people to abandon their farming and herding livelihoods and has pushed many more people into poverty (De Schutter 2010).

NATURAL HAZARDS CONTINUE TO CAUSE SIGNIFICANT LOSS OF LIFE AND ECONOMIC DAMAGE. Natural hazards—earthquakes, droughts, floods, and storms—have on average resulted in 80,000 deaths per year since 1970 (World Bank and UN 2010). Droughts have proved to be the deadliest of the hazards and have affected poor countries disproportionately. Between 1970 and 2008, about 0.23 percent of cumulative world output was lost through property damage caused by these hazards. Economic damage, however, disproportionately

affects middle-income countries (World Bank and UN 2010).

WOMEN AND CHILDREN ARE AFFECTED THE MOST BY DISASTERS. They are 14 times more likely than men to die during a disaster and are more likely to suffer from post-disaster violence. Disasters place an undue burden on women and girls, who are responsible for providing care, water, and food for their households (World Bank and UN 2010).

EXPOSURE TO HAZARDS IS EXPECTED TO RISE IN CITIES AND SMALL ISLAND STATES. Although there is a lot of uncertainty surrounding climate projections, most climate models predict an increase in the intensity of tropical storms. Expected annual damage from climate-change-induced tropical cyclones alone could run into tens of billions of dollars, with small island states being particularly vulnerable. Rapid urbanization, particularly along coastlines, will also increase exposure to hazards (World Bank and UN 2010).

Tough Questions for a Changing World

THE CURRENT ECONOMIC MODEL, DRIVEN BY UNSUSTAINABLE PATTERNS OF GROWTH AND CONSUMPTION, IS CLEARLY PUTTING TOO MUCH PRESSURE ON AN ALREADY STRETCHED ENVIRONMENT. The result is a rapid degradation of the quality of local, regional, and global environmental services: clean air and water, productive land, and biodiversity. Our patterns of growth are unsustainable and inefficient, but this provides opportunities for greener—not necessarily slower—growth. Policy makers have known for decades how to improve the efficiency of production and consumption, but they have failed to make significant progress in adopting the needed measures and deploying the needed resources. The question then remains, Can we avoid the mistakes of the past and move toward green and inclusive growth fast enough to avoid the worst effects of climate change, biodiversity loss, and water stress—and do this while decreasing poverty?



Coming Together to Transform Challenges into Opportunities



As gloomy as the environmental picture seems, the forces behind these trends are not immutable. Recent history shows that the global community is moving in the right direction and that a concerted effort can bring success. The World Bank Group has been a part of this global effort. In some cases, such as the phasing out of ozone-depleting substances, global coordination was the key to progress. In others, countries have taken the lead to address threats like deforestation.

But given the reality of growing challenges, the WBG and others must work together to provide strong leadership on the environment. Taking stock of the global effort and the WBG's contribution to it helps to answer the question of how the WBG and others can amplify momentum around the progress to date.

Global Efforts and Country Efforts Catalyzing Action

Over the last 20 years there has been a tremendous global effort by countries acting locally and also coming together as an international community to act collectively. Both country-based and global efforts have yielded some key achievements, completing some of the difficult ground work to build foundations for further progress.

THE GLOBAL COMMUNITY HAS SHOWN IT CAN WORK TOGETHER FOR CHANGE. In 1987, the Montreal Protocol paved the way for effective global action to save the Earth's protective ozone layer by establishing targets to phase out the most damaging

ozone-depleting substances⁴ (Velders et al. 2007). Since then, the use of stratospheric ozone-depleting substances has decreased significantly from over 1 million ozone-depleting-potential tons worldwide in 1990 to less than 44,000 tons by 2008 (UN 2010). This success can be attributed to national actions to meet international targets, technological innovation, and close monitoring (UNEP 1999). Another example of progress executed by countries is the global phaseout of leaded gasoline; by March 2011 all but six countries had phased out leaded gasoline. Finally, international carbon markets were developed and tested the complex technical mechanisms necessary for monitoring emissions.

THE SCIENTIFIC COMMUNITY HAS COME TOGETHER TO SOUND THE ALARM. Global action to protect the environment has demanded unprecedented international scientific collaboration. The Intergovernmental Panel on Climate Change has contributed to a much greater depth of understanding of climate change and its potential impacts, as well as adaptation and mitigation options. The 2005 Millennium Ecosystem Assessment helped assess the consequences of ecosystem change for human well-being (MA 2005). It provided the needed scientific basis for action on conservation and the sustainable use of ecosystems. Similarly, the Foresight Report on the Future of Food highlighted the challenges of increasing production by 70 percent to feed 9–10 billion people by 2050 while containing and reversing ecosystem damage (Foresight 2011).

⁴ Chlorofluorocarbons and halons phased out by 2010 had some of the highest ozone-depleting potential. Current Montreal Protocol phase-out targets through 2030 focus on hydrochlorofluorocarbons, which have a lower ozone-depleting potential but are equally important due to their climate warming impacts.

CIVIL SOCIETY GROUPS HAVE BROUGHT NEW LEVELS OF SCRUTINY TO THE ENVIRONMENTAL BEHAVIOR OF GOVERNMENTS, PRIVATE COMPANIES, AND INTERNATIONAL FINANCIAL INSTITUTIONS.

The demands of a globally connected and environmentally aware marketplace have raised expectations of better environmental behavior across the board—from governments to private companies to multilateral institutions like the WBG. Access to social media tools like Facebook, Twitter, and Google Earth are further enabling participation in the global dialogue and digital documentation of environmental issues. Local civil society involvement has become a critical part of development project implementation and monitoring. All of this has added vital social capital that the world will need to prove resilient in the face of challenges ahead.

MANY PRIVATE SECTOR FIRMS HAVE RECOGNIZED THAT ADDRESSING ENVIRONMENTAL ISSUES IS GOOD BUSINESS.

Growth in programs addressing sustainability and development of standards has been a key development in the past 20 years. Large corporations are increasingly concerned about their input supplies—water, land, and fish, in particular—and are finding ways to manage risks and turn scarcity into opportunity. Certification of the sustainable harvest of timber and some other commodities is growing with the collaboration of the private sector. Voluntary standards provide a broader mechanism to effect change and improve environmental and social practices at the sector level by involving civil society and stakeholders with significant market power.

BOTH THE PUBLIC SECTOR AND THE PRIVATE SECTOR ARE TAKING AN ACTIVE ROLE IN CATALYZING ACTIONS TO ADDRESS ENVIRONMENTAL AND SOCIAL ISSUES.

The public sector is creating an enabling environment to reorient public and private flows toward sustainable investments. Increasingly, public-private partnerships focus on agricultural and climate change, based on a value-chain approach such as access to financial services, infrastructure, equipment for production (such as irrigation), agro-processing, and access to markets (such as transport, storage, and communication).

WITHOUT EXCEPTION, ALL WORLD BANK MEMBER COUNTRIES NOW HAVE SOME FORM OF ENVIRONMENTAL LEGISLATION IN PLACE.

They have laws to protect

forests, set up protected areas, assess environmental impacts of development projects, and manage natural resources. The key issue clearly remains whether adequate resources are devoted to implementation of these policies, and whether the governance and political economy will enable success. This remains a challenge in many countries. However, further progress is within reach. For example, more than 170 countries (87 percent of parties to the Convention on Biological Diversity) have established national biodiversity strategies or action plans (CBD Secretariat 2010). And nearly 133,000 protected areas—12 percent of the world's land surface—have been designated for some protection. As a result of the collective effort of governments and international and national civil society, supported by financing from national and international organizations, numerous species have been moved to lower categories of threat, including 33 bird species since 1988, 25 mammals since 1996, and five amphibians since 1980 (Butchart et al. 2010).

EFFORTS TO SLOW DEFORESTATION ARE SHOWING RESULTS IN SOME REGIONS.

Brazil and Indonesia, with the highest net losses of forest in the 1990s, have significantly reduced their deforestation rates (FAO 2010a). In Brazil, government measures, including better law enforcement, deforestation monitoring, and creation of protected areas, have led to a drastic reduction in Amazon deforestation, from more than 27,000 km² in 2004 to about 6,200 km² in 2011 (INPE 2011). While Asia experienced net forest loss of some 600 km² per year during the 1990s, the region reported annual net forest gains exceeding 22,000 km² from 2000 to 2010, primarily as a result of large-scale afforestation reported by China (FAO 2010a).

LAW ENFORCEMENT INITIATIVES TO COMBAT ILLEGAL TRAFFICKING IN FLORA AND FAUNA ARE ON THE RISE.

A 2010 study of timber-producing countries in Latin America, Africa, and East Asia, as well as of processing and consumer countries, found that actions taken by governments, civil society, and the private sector since 2000 to combat illegal logging and trade have had a considerable impact (Lawson 2010). Illegal logging is estimated to have fallen by between 50 and 75 percent since 2000 in Cameroon, the Brazilian Amazon, and Indonesia; imports of illegally sourced wood to the seven consumer and

processing countries studied were down 30 percent from their peak in 2004. Through consumer country action, international trade in illegal timber has become much more difficult. The European Union (EU) and the United States have banned the import of illegally harvested timber, and other countries are developing similar legislation.

COUNTRIES ARE TAKING STEPS TOWARD LOW-CARBON GROWTH. Following commitments made under the Kyoto Protocol, many countries that belong to the Organisation for Economic Co-operation and Development (OECD), with the involvement of the private sector, are moving toward lower-carbon economies. This includes fuel switching (coal to natural gas) and increased energy efficiency in buildings, appliances, and transportation (OECD 2010). Many developing countries are also working toward low-carbon development paths and articulating these in their Nationally Appropriate Mitigation Actions (NAMAs).⁵ In many cases low-carbon growth efforts are being led by cities, which account for more than 75 percent of the world's energy use and greenhouse gas (GHG) emissions. Renewable energy use in these countries is increasing: production of wind energy in non-OECD countries has increased by 38 percent on average each year since 2000, with recent yearly increases exceeding 55 percent. This was almost matched by increases in solar electricity of close to 50 percent (2008–09), with China accounting for a large portion of the increase, consistent with an overall record of raising its renewable energy production (IEA 2011b). Recent decisions in the seventeenth Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) in Durban indicate a move toward formalization of the NAMA process, which could provide financial support to such strategies with the establishment of a registry where countries can place their NAMAs and with an emerging template of what is required for NAMAs.

MARKETS FOR GREEN TECHNOLOGIES AND PRODUCTS ARE EXPANDING AND GROWING FAST IN DEVELOPING COUNTRIES. Global investments and production volumes

reflect an increasing trend toward “green” markets. Annual global investments in renewable energy generation capacity and manufacturing plants soared fivefold between 2004 and 2009, from \$30 billion to \$150 billion (REN21 2010). This drove up worldwide renewable energy capacity (with 10–60 percent average annual growth), in particular in grid-connected solar photovoltaic capacity (60 percent) and wind (27 percent). During the same period, global output of hydroelectricity, the most mature renewable, increased by more than 3 percent annually, with most of this growth occurring in non-OECD countries. Collectively, developing countries have more than half of global renewable power capacity, and this is affecting the business strategies of the private sector.

THERE IS NOW STRONGER RECOGNITION OF THE NEED FOR ADAPTATION TO CLIMATE CHANGE, AND ACTION IS UNDER WAY. The Bali Action Plan was adopted by the global community at the 2007 UNFCCC COP. The plan calls for developed countries to allocate adequate resources to help developing countries adapt to climate change and to help build capacity to integrate adaptation measures into sector-specific and national development plans. The December 2009 Copenhagen Accord pledged \$100 billion per year by 2020 to meet these goals, with an expectation that the amounts for mitigation and adaptation should be roughly equal. The accord presumed leveraging of private funds. Developing countries have started to prepare adaptation strategies. Supported by the UNFCCC, most of the least developed countries have prepared National Adaptation Programs of Action that identify urgent and immediate needs to adapt to climate change. Countries are drawing on a number of instruments—the Adaptation Fund and the Special Climate Change Fund—to initiate projects that help increase resilience to current and future climate variability.

ACCESS TO SANITATION HAS INCREASED MODESTLY from 54 percent of the world's population in 1990 to about 61 percent in 2008 (UN 2010). This has not kept pace with population growth, however, leaving 2.6 billion people without basic sanitation. Most of those without access live in rural areas (Joint Monitoring Program 2010). A number of countries are addressing water quality and water resource

⁵ Nationally Appropriate Mitigation Actions were launched as part of Long-term Cooperative Actions during the UNFCCC Conference of Parties in Bali in 2007. These mitigation actions are to be planned by developing countries, embedded in the context of sustainable development, and supported and enabled by technology, financing and capacity building through the convention (UN Framework Convention on Climate Change 2007).

management challenges. The EU Water Framework Directive provides for an integrated approach. For many countries, including Brazil, China and India, improved water management is a strategic priority.

Assessing the World Bank Group's Current Contributions

ENVIRONMENT IS NOW UNDERSTOOD AS A KEY DEVELOPMENT ISSUE AND IS A CORE PART OF THE WORLD BANK GROUP'S AGENDA.

In considering a new strategy for environment at the WBG, it is necessary to understand the scope of ongoing work on these issues. Responding to heightened global concerns, the WBG has integrated environmental considerations into its knowledge work, policy dialogues, country and sector strategies, and investments. The IFC has become a global standard-setter in environmental and social risk management along with new business models for sustainability for private companies and financial institutions. This evolution stemmed from client demand and from knowledge that progress in ending poverty is inextricably linked with better environmental management. Across infrastructure sectors, the WBG has helped countries to integrate environmental concerns into development. In Brazil, for example, transport operations such as the São Paulo Feeder Roads, Mato Grosso do Sul State Road Transport Project, and Brazil Road Transport Project all couple investments with technical assistance in strategic environmental management.

POLICY ANALYSIS OF ENVIRONMENTAL ISSUES AT THE COUNTRY LEVEL HAS EXPANDED. Country Environmental Analysis (CEA), a tool the World Bank developed, helps inform dialogue with countries, raises awareness of environmental problems affecting poor people, and improves understanding of the linkages between environment and growth sectors. CEAs have contributed to understanding how the burdens of environmental degradation are distributed within societies (see Box 3.1). This work has highlighted that poor people carry a disproportionate burden of illness, death, and loss of productivity and livelihoods as a result of environmental degradation.

WORK TO HELP COUNTRIES STRENGTHEN THEIR INSTITUTIONAL AND POLICY FRAMEWORKS FOR ENVIRONMENTAL MANAGEMENT CONTINUES. Policy loans to governments have helped countries strengthen environmental policies and institutional frameworks. Policy lending for environmental issues accounted for \$506 million, or 8.3 percent of total policy lending, in fiscal year (FY) 03, increasing to \$2.4 billion, or 14.4 percent, in FY10. Packages combining development policy loans (DPLs) with analytical work and technical assistance have helped broaden policy dialogue across line ministries, including sectors where the WBG is not active (see Box 3.2).



BOX 3.1 Colombia CEA highlights need for revising air quality standards

A Country Environmental Analysis of Colombia highlighted the effect of indoor and outdoor air pollution, especially on the poor (Sánchez-Triana, Ahmed, and Awe 2007), but the government was not inclined to immediately revise national air quality standards developed in the 1980s. Wide media coverage of the results of the Colombia CEA resulted in a broad public debate, which was taken up by politicians. Open public debate increased the number of champions for revising air quality standards (Chavarro Vásquez 2007). In 2007, the first air pollution control bill was discussed in the national Congress. After 13 failed attempts over the course of a decade, a more stringent Fuel Quality Law was finally passed, due in large part to public pressure in response to the CEA's findings.

THE WORLD BANK GROUP HAS BECOME AN ENVIRONMENTAL AND SOCIAL PERFORMANCE STANDARD SETTER.

The IFC's Performance Standards are recognized as a leading benchmark for environmental and social risk management for private sector investors and are often considered prerequisites for companies to raise funds, particularly from international markets. The Equator Principles—a voluntary environmental and social risk management framework—are now the benchmark for 71 banks and financial institutions worldwide, 32 OECD export credit agencies, 15 European international financial institutions, and MIGA. In 2009, of the \$75.5 billion total of project finance debt tracked (by Basel II), \$40 billion was subject to the Equator Principles, representing 53 percent of the total project finance debt in emerging economies. Seventeen Equator Banks are now from emerging markets, and this number is expected to grow quickly. Experience with the World Bank's safeguards and accountability mechanisms are also now informing other multilateral development banks (MDBs) and U.N. agencies.

Moreover, the WBG has a dual role of enhancing the positive impact of the financial system on development, including through financing for micro, small, and medium-size enterprises (MSMEs) and the allocation of capital for innovation and sustainable investments. Through their support to financial institutions (FIs), the IFC and MIGA help strengthen domestic capital and financial markets and reach smaller clients (such as MSMEs, microfinance, leasing, trade finance, guarantees, housing finance, consumer finance).

Through its engagement with FIs, the IFC supports the capacity development of the banking and financial sector to manage environmental and social risks. This is achieved in part through the development and implementation of an Environmental and Social Management System and through enhancing FIs' in-house capacity for the day-to-day management of portfolio risks, including environmental and social risk. Environmental and social risk management is part of the responsibilities that FIs assume. MIGA requires its guarantee holders to have Environmental and Social Management Systems in place to assess the impacts of individual projects that guarantee holders and its subsidiaries



BOX 3.2 Peru programmatic environmental DPLs—Supporting environmental governance and mainstreaming in key economic sectors

In Peru, an Environmental DPL program consisting of three operations supported the government's efforts to improve the effectiveness of environmental governance and institutions. The program also mainstreamed environmental sustainability into the mining, urban transportation, and fisheries sectors.

Environmental Governance: The DPL series supported the creation of the Ministry of Environment in 2008. It also supported reforms to strengthen institutional capacity for biodiversity conservation through the creation of an agency for national parks and its sustainable financial strategy. The DPL program supported air quality monitoring, networks to improve air quality, and public disclosure of information on air quality.

Mainstreaming Principles of Sustainable Development in Key Sectors: In the mining sector, the DPL series supported efforts to remediate legacy pollution in mining through participatory environmental monitoring. To improve environmental health, the DPLs supported government reforms in urban transportation related to fuel quality and improved vehicle inspection and maintenance. Finally, the environmental DPL series supported the government's efforts to sustainably manage the overcapacity and inefficiency problems plaguing the anchoveta fishery, while also supporting social protection measures for fishers affected by fleet reduction.

support. In addition, the WBG has a number of financial products for businesses and continues to expand its instruments to support investment programs that mitigate climate change and ensure environmental and social sustainability.

LENDING FOR THE ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT (ENRM) HAS GROWN. World Bank lending commitments addressing ENRM themes have grown from \$1.5 billion, or 8.4 percent of World Bank lending, in FY01 to \$6.3 billion, or 14.3 percent, in FY11 (see Figure 3.1), with the portfolio covering biodiversity conservation and protection, climate change, environmental policies and institutions, land administration and management, pollution management and environmental health, water resources management, and other areas.⁶ Commitments addressing forestry development and management of timber production have grown from \$136 million in FY01 to \$313 million in FY11. Similarly, World Bank lending commitments that address animal production, including fisheries and livestock, have grown from \$8.7 million in FY01 to \$95.4 million in FY11.

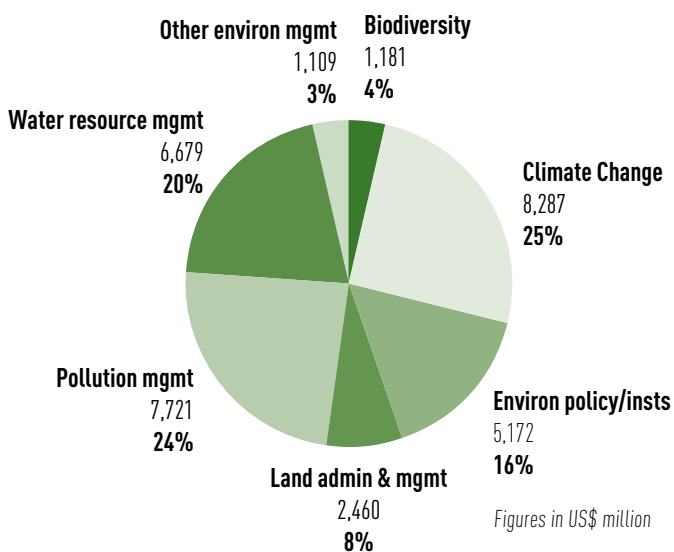
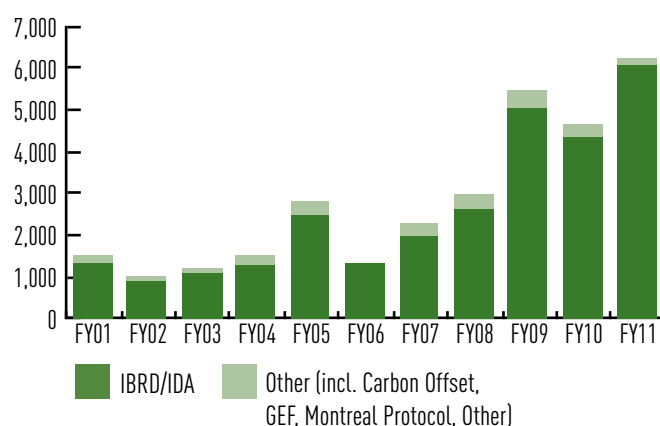
The IFC invested \$1.7 billion in climate-friendly projects in FY11, up 6 percent from \$1.6 billion in FY10. IFC is within its goal to invest 20 percent of overall commitments in climate-change-related investments by FY13. In IFC Advisory Services, the portfolio related to climate change totaled \$113.3 million, an increase of 8 percent over \$103.9 million in FY10.

Non-environment sectors are actively integrating the environment into programs and projects. As of end-FY11, 79 percent of new World Bank ENRM projects (or 95 percent of new ENRM lending commitment volume) were being managed by non-environment sectors.⁷ Figure 3.2 illustrates progress in the energy and mining and the water sectors. Much of this increase reflects stewardship in the extractive industries and energy. For example, energy and mining programs have included capacity building in environmental assessment, and infrastructure investments have financed environmental offsets and protected areas.

⁶ Lending commitments include IBRD/IDA lending as well as grant and special financing.

⁷ Includes IBRD/IDA lending as well as grant and special financing.

FIGURE 3.1
Environment and Natural Resources Management Lending Commitments (FY01–FY11)

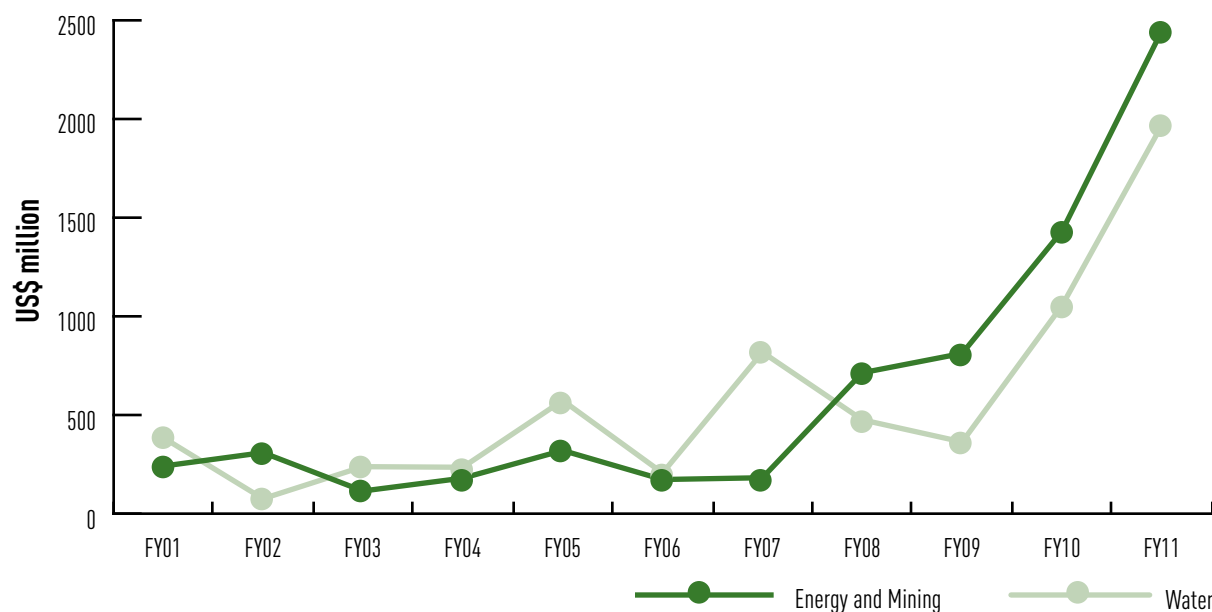


Source: World Bank.

WORLD BANK GROUP SUPPORT FOR THE GREEN AGENDA

THE WORLD BANK MANAGES MORE FUNDS FOR BIODIVERSITY CONSERVATION THAN ANY OTHER ORGANIZATION IN THE WORLD, having built up a portfolio of biodiversity projects worth more than \$6.3 billion in loans and grants. Of this, the Global Environment Facility (GEF) contributed more than \$1.4 billion in grants during the period 1991–2010. On average, the World Bank commits \$309 million annually to biodiversity

FIGURE 3.2
Environment and Natural Resources Management Lending
Commitments in Non-Environment Sectors (FY01–FY11)



Source: World Bank.

projects. Over the past 20 years, the World Bank has supported 624 biodiversity projects in more than 122 countries, including 60 multicountry projects that support biodiversity conservation and sustainable use in a range of ecosystems, such as coral reefs, coastal areas, mountains, forests, savannas, grassland, lakes, and rivers.

MANY COUNTRIES HAVE BEEN DEVELOPING LAWS TO SUPPORT SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES WITH WORLD BANK GROUP SUPPORT. The West Africa Regional Fisheries Program is an example of WBG support, augmented by funding from GEF and the New Partnership for Africa’s Development, leading to improved fisheries legislation in six countries in West Africa. In Madagascar, the Environment Program loans led to better forest legislation, and in Lao PDR, the World Bank- and MIGA-supported Nam Theun II hydro-electric project has enhanced protected areas legislation. The WBG has also spearheaded the negotiation of payments for environmental services across a range of client countries, such as Costa Rica and Brazil.

MORE THAN HALF OF THE WORLD BANK’S CONSERVATION INVESTMENTS HAVE BEEN TO PROTECTED AREAS. The World Bank has supported countries in establishing protected areas and building institutions to manage them, investing about \$275 million a year in supporting parks. A number of the WBG’s infrastructure investments have supported offset protected areas. Four of 11 national parks in Cameroon stem from WBG-financed infrastructure and tourism development. In Brazil, Peru, Colombia, Mexico, Bolivia, and countries of the Eastern Caribbean, the World Bank supports conservation funds for the management of protected areas. Some of this work incorporates biodiversity protection into productive landscapes, including forestry, coastal zones, and agriculture. Much of this work is in partnership with conservation nongovernmental organizations (NGOs), including WWF, Conservation International, the Wildlife Conservation Society, the National Wildlife Federation, the International Union for Conservation of Nature, and The Nature Conservancy. Examples of partnerships include work on endangered species and critical habitat protection through the Critical Ecosystem

Partnership Fund, Save Our Species, and the Global Tiger Initiative (see Box 3.3).

WORLD BANK GROUP SUPPORT FOR THE CLEAN AGENDA

Pollution Management

SUPPORT TO COUNTRIES TO REDUCE THEIR POLLUTION

RISKS HAS GROWN. The WBG is helping clients to create regulatory, economic, and financial incentives to reduce pollution and increase clean production. For example, the World Bank helped strengthen institutional capacity of state pollution control boards in India, promoted industrial pollution control through financial intermediaries in Egypt and Brazil, and worked on environmental compliance in small and medium enterprises in Argentina. The Bulgaria Environmental Remediation Pilot project helped reduce environmental hazards caused by past pollution and unsafe environmental management practices of a copper smelter.

MARKET-BASED APPROACHES FOR POLLUTION ABATEMENT

ARE UNDER WAY. The Egypt Pollution Abatement Project is demonstrating cost-effective solutions for industrial pollution abatement subprojects. It is enhancing the government's capacity in environmental management by supporting stronger regulation and by innovative market-based instruments. A key element is supporting Egypt's access to the emerging carbon market and financing opportunities. In South Asia, the WBG is spearheading a responsible sourcing initiative in the textile sector in Bangladesh and piloting the use of market-based instruments to address air pollution in India.

CLEANER WATER SUPPLIES AND SANITATION, BETTER URBAN AND RURAL SERVICES, AND CLEANER TRANSPORTATION AND ENERGY AND MINING PROJECTS REMAIN

PRIORITIES. In Bangladesh, the Clean Air and Safer Mobility project in Dhaka addresses air transportation and stationary sources of air pollution. Analytical work on environmental health valuation in several countries is also bringing decision makers' attention to these issues. A Pollution Prevention and Abatement Handbook has become an internationally accepted reference guide for good practice. The IFC's Environmental, Health, and Safety Guidelines contain the performance levels that are acceptable to

the IFC and set the standard for what is considered to be achievable in new facilities at reasonable costs by existing technology. The WBG has also been an active partner in the International Network for Environmental Compliance and Enforcement, particularly in a training and curriculum development capacity through the World Bank Institute.

THE WORLD BANK GROUP IS HELPING COUNTRIES ADDRESS ENVIRONMENT-RELATED HEALTH ISSUES

through rural water supply and sanitation, clean energy development, urban transportation, and natural resources management projects. The strategy for health, nutrition, and population recognizes that environmental improvements, such as clean water, sanitation, and reduced indoor air pollution, improve health outcomes (World Bank 2007b). Other WBG work focuses on how reducing outdoor air pollution can substantively improve human health outcomes in urban areas (World Bank, 2007a, 2009c). Work with the private sector supports investments in water- and energy-efficient technologies, wastewater treatment/reuse, and solid waste management. In China, the World Bank's work on air pollution control and environmental health will contribute to improved air quality and health outcomes throughout more than 600 cities, particularly in the 100 cities that do not comply with China's own air pollution standards.

THE WORLD BANK GROUP IS INCREASING COLLABORATION WITH THE PRIVATE SECTOR TO IMPROVE RESOURCE

EFFICIENCY. This includes the IFC's Cleaner Production Lending Facility, a three-year, \$125 million loan facility and advisory program that was approved in September 2009. It also includes the Cleantech investment program launched in FY10, investment and advisory services in energy efficiency and renewable energy, and direct support to financial institutions.

Climate Change

The December 2011 Durban UNFCCC COP 17 made a number of decisions that could place the world on a more "climate-safe" trajectory in the long term while advancing a suite of important modalities for global climate action in the short to medium term. The Durban Platform outlines a process toward reaching a global and legally binding agreement on emission



BOX 3.3 Global Tiger Initiative (GTI)—Conservation through partnerships

In 2008, the World Bank Group launched the GTI (with its partners, including among others WWF, the U.N. Office on Drugs and Crime, the Smithsonian Institution, INTERPOL, Humane Society International, and Conservation International), which has since received widespread support from the conservation and scientific communities. In 2010, in St. Petersburg, Russia, the Global Tiger Summit cemented political commitments to tiger conservation at the highest levels and launched specific conservation programs in tiger-range countries.

Poaching, habitat loss, and fragmentation have reduced the global population of the tiger to less than 3,500 animals, and the pressures on these animals

continue to mount. Under the current scenario, it is predicted that the tiger may become extinct within the coming decade. This loss will have implications much larger than just the disappearance of a charismatic species. Habitats where wild tigers live are high-value ecosystems that provide vital services like carbon sequestration, recreational services, maintenance of hydrological balance, crop pollination, protection from natural disasters and soil erosion, and preservation of genetic diversity of plants. The GTI supports capacity building for the public sector to respond effectively to the challenge of illegal trade in wildlife and for scientifically managing tiger landscapes in the face of mounting and varied threats.

reductions by 2015 that will include all countries in accordance with their common but differentiated responsibilities and respective capabilities. This agreement would allow time for ratification and would take effect from 2020.

A second commitment period of the Kyoto Protocol was also agreed, as was the design instrument for a Green Climate Fund. Further operationalization of the institutional modalities for the Technology Mechanism, the Adaptation Committee, and the establishment of a registry of developing country mitigation actions were agreed on as well. Other important decisions related to the establishment of a forum and work program on unintended consequences of climate change actions and policies, procedures to allow carbon-capture and storage projects under the Kyoto Protocol's Clean Development Mechanism, and development of a new market-based mechanism to help developed countries meet part of their targets or commitments under the Convention.

However, the Durban COP did not agree on any numbers for long-term emission reduction goals and peaking years. Ambition on the mitigation front was not raised, and existing mitigation pledges were not anchored in the Convention. Science tells us that we are currently on a path towards an average global temperature rise of 3–4° C (in the best case scenario with current pledges), which by far exceeds the 2° C goal of the UNFCCC framework. Avoiding a future with severe shortages of food, water, energy, and livelihoods for millions of people requires a significant and immediate increase in global climate action to build resilience to projected climate change and support efforts to reduce GHG emissions.

While the elements of a global agreement on cutting carbon emissions are slowly coming together, the WBG's clients are already moving rapidly toward lower-carbon development paths. In response, the WBG has responded by piloting innovation, exchanging knowledge, and scaling up action and finance for mitigation.

COUNTRIES ARE SEEKING LOW-CARBON DEVELOPMENT.

Through work in 130 countries, the WBG is helping nations move toward low-carbon development paths (see Box 3.4). Between FY03 and FY10, WBG

financing commitments to low-carbon energy totaled \$17 billion, consisting of renewable energy and energy efficiency investments and support to related policy reforms. Targeted mitigation support is under way in more than 50 cities. The IFC committed \$1.6 billion in FY10 to 84 private sector projects to reduce greenhouse gas emissions, and it plans to double climate-related business investments by FY13.

Climate change, both mitigation and adaptation, was selected as a special theme within the overarching theme “Delivering Development Results” for the IDA 16 replenishment. The World Bank committed to undertake several monitorable actions by the end of the IDA 16 replenishment period (FY12–FY14):

- Discussing climate change vulnerabilities in 100 percent of IDA Country Assistance Strategies as part of the discussion of the country's development challenges and priorities and including activities in climate change mitigation and adaptation areas when requested by the recipient country
- Scaling up IDA Analytic and Advisory Activities on adaptation and mitigation
- Analyzing in all projects in climate-change-sensitive sectors the potential climate impact of project activities to ensure that they are consistent with the climate change mitigation and adaptation strategies of the country
- Establishing a coding system to measure the share of IDA investments that provide climate adaptation and mitigation co-benefits and reporting on the number of projects that aim at climate change co-benefits in their design (such as a percent of IDA investments that have climate change co-benefits)
- Continuing dialogue with the OECD Development Assistance Committee and on Rio-Markers with the objective of developing and agreeing on quantitative measures of global financing for climate adaptation and mitigation.

AT THE END OF 2006, THE WORLD BANK MERGED ITS ENVIRONMENTALLY AND SOCIALLY SUSTAINABLE DEVELOPMENT PRACTICE WITH ITS INFRASTRUCTURE PRACTICE, CREATING THE SUSTAINABLE DEVELOPMENT NETWORK. This decision reflected that mainstreaming environmental and social work in an integrated way

in WBG infrastructure programs was a growing priority. It also acknowledged the synergies inherent in sustainable development, whether it is among agriculture, water, and energy or mining, social development, and forestry.

THE WORLD BANK HAS PLAYED A CRITICAL ROLE IN ESTABLISHING INNOVATIVE GLOBAL PARTNERSHIPS LIKE THE CLIMATE INVESTMENT FUNDS, the secretariat for which is hosted by the World Bank. Together with recipients, donors, and the MDBs, the World Bank helped raise \$6.5 billion for the Clean Technology Fund (CTF) and the Strategic Climate Fund. These funds support transformations in clean technology, sustainable management of forests, increased access to energy through renewable energy, and climate-resilient development in 45 countries. Developing countries are in the driver's seat, with action plans that are developed and presented by the recipient countries. Every dollar that the Clean Technology Fund raises leverages \$8.40 from other sources.

THE WORLD BANK GROUP HAS DEVELOPED A SUITE OF INNOVATIVE FINANCING OPTIONS FOR LOW-CARBON DEVELOPMENT. Recognizing that current financing for climate change mitigation and adaptation in developing countries falls far short of what is needed, the WBG has developed innovative financing tools to help developing countries pursue low-carbon economies and climate resilience.

Beyond the CIFs, this includes:

- *Carbon Finance.* From the pioneer Prototype Carbon Fund in 2000, initially capitalized at \$180 million of investible resources, WBG operations now include 12 carbon funds and facilities with a total capitalization of \$2.74 billion and financial contributions from 24 governments and 63 private companies from various sectors (see Box 3.5). Every \$1 in carbon finance leverages on average \$4 in climate-friendly investment. Carbon finance has been innovative not just as part of the Kyoto mechanism but also as a “pilot” for voluntary carbon markets.
- *Private Sector.* In the private sector, the WBG has focused on providing services and financial products that increase projects' carbon revenues, including the Carbon Delivery Guarantee, which helps developing country projects maximize the value of their future carbon credits, and guarantee products offered by MIGA.

- *Green Bonds.* In 2008, the World Bank's Treasury Department introduced Green Bonds specifically to finance climate mitigation and adaptation work in developing countries by broadening the investor group. Since then, over \$2 billion has been raised via more than 35 Green Bonds issued in 15 currencies for eligible projects that reduce GHG emissions or help countries adapt to climate change.
- *Sale of Certified Emission Reduction Certificates.* The World Bank's Treasury Department sells these certificates as a trustee of the U.N. Adaptation Fund, with over 7 million tons of emission reductions sold by 2011. This has raised nearly \$120 million to finance adaptation projects in developing countries.
- *Global Emerging Market Carbon Efficiency Index.* The IFC worked with Standard & Poor's to develop the world's first carbon efficiency index for emerging markets. Launched in December 2009, it gives carbon-efficient companies access to long-term investors.
- *Risk Guarantees and Insurance Funds.* Over the past decade, partial risk guarantee instruments have promoted renewable energy and energy efficiency investments, and risk insurance products have been applied to disaster response programs, including coverage of climate impact risks.

THE WORLD BANK GROUP IS CONTINUING TO REDUCE ITS OWN IMPACT THROUGH A STRING OF INTERNAL SUSTAINABILITY INITIATIVES. Formal programs have been set up within the World Bank and the IFC to manage environmental impacts from internal operations. Efforts to measure, report, and offset greenhouse gas emissions from internal operations have been strengthened. In 2006, the WBG became carbon-neutral for its headquarters-based internal business operations, including all facilities operations, staff air travel, and owned vehicle use. WBG facilities are now more efficient in water use, waste management, and procurement, and the results of these efforts are published annually on the website. In 2010, the IFC's headquarters building was awarded the Leadership in Energy and Environmental Design Platinum Certification for Existing Buildings by the U.S. Green Building Council. Two other WBG buildings have received a gold standard, and the new “C”



BOX 3.4

Forming a link between development and climate change

Though the World Bank Group joined early in the development of carbon finance, its overall efforts to meet the challenge of climate change lagged behind until 2007. With the launch of the WBG's Strategic Framework for Development and Climate Change in 2009, the scale and scope of the institution's support to countries have rapidly expanded, as has engagement with the international climate dialogue. In 2010, President Robert B. Zoellick directed that a Special Envoy for Climate Change be appointed to represent the Bank in international climate discussions and to strengthen the WBG's capabilities to deliver on a stepped-up role. IFC also formed a Climate Business Group.

Concerned that a lack of progress on climate change could undermine global poverty reduction efforts, the World Bank Group developed a set of "building blocks" around key themes—mitigation, adaptation, REDD+, finance, carbon markets, agriculture, technology, and water. These building blocks support engagement with developing countries on complementary actions by the WBG and others that may help advance the UNFCCC process or find progress outside

of it. The Cancun Agreements (2010) and the Bali Action Plan provide a platform for an eventual global agreement on reducing greenhouse gas emissions and helping developing countries to address climate change challenges.

Momentum for global climate action is emerging, as more and more countries realize the urgency. Yet emission reduction targets and pledges in the context of the Cancun Agreements account for only 60 percent of what is required to hold the increase in global temperatures below 2°C. Though global efforts are not yet at a sufficient level, many of the Bank's client countries are demonstrating leadership on low emission development, and in the future the Bank will assist their efforts as much as possible. Already, the World Bank Group is responding to client demand in this area by supporting mitigation and adaptation activities in 130 countries. From 2009 to 2011, over 90 percent of World Bank Country Assistance Strategies focused on climate action, while \$7.7 billion in development policy lending supported climate change actions in 17 countries. The most recent replenishment of IDA—the WBG's fund for the poorest

countries—including a special theme on “achieving climate-resilient development.” The World Bank Group is also providing upstream support to integrate climate considerations into long-term planning processes. Between 2008 and 2011, the Energy Sector Management Assistance Program and the World Bank Group supported in-depth low-carbon development studies in seven emerging economies.

The Climate Change Knowledge Platform supports screening of country-level climate risk and vulnerability, including tailored information for policy makers in key areas such as disaster risk management and adaptation.

Since the 2001 Environment Strategy, the World Bank Group’s Carbon Finance Unit has grown to include 11 carbon funds and \$2.4 billion under management. By 2010, the unit had signed 128 Emissions Reductions Purchase Agreements. This flow of funds is helping to promote investment in more-efficient infrastructure and in carbon sequestration. Most important, the Bank’s carbon work focuses on two key objectives: innovation that pushes the frontiers of carbon finance, providing depth and diversity to the market, and efforts to put least developed countries first. The two objectives are often linked, as the World Bank Group helps to develop deals on soil carbon, forestry, and community development.

In 2006, the World Bank and IFC teamed with the other MDBs to launch the \$6.5 billion Climate Investment Funds. This is a unique set of instruments giving developing countries a boost in achieving climate-smart development. The Clean Technology Fund, the Pilot Program for Climate Resilience (PPCR), the Forest Investment Program, and the Scaling Up Renewable Energy Program are now working in 45 countries, with Africa receiving the most investment. The CIFs are unique for a governance structure: 50 percent representation from developing countries, strong leadership and ownership by client countries, and strong collaboration among MDBs. Under the PPCR, countries have addressed adaptation by investing in urban drainage, coastal zone management, more-resilient roads, more-efficient agriculture and water use, and risk management. It has quickly demonstrated the links between climate change and development and the usefulness of a focus on solutions.

building also earned platinum for its core and shell. In recent years, there has been greater disclosure of WBG corporate environmental impacts through leading industry reporting venues. In 2009, the World Bank became the first multilateral development bank to report its greenhouse gas emissions to the Carbon Disclosure Project, starting with its Washington, DC, operations.

WORLD BANK GROUP SUPPORT FOR THE RESILIENCE AGENDA—ADAPTATION

THE WORLD BANK GROUP IS THE WORLD’S LARGEST FINANCIER OF DISASTER RISK REDUCTION AND RECONSTRUCTION. Since 2007, lending for post-disaster recovery projects alone has reached \$9.2 billion for 215 projects. The Global Facility for Disaster Reduction and Recovery, of which the WBG is a partner, has 75 projects under way worth \$33 million, focusing specifically on climate change adaptation.

THE WORLD BANK GROUP HAS CONTRIBUTED TO BUILDING THE KNOWLEDGE BASE ABOUT ADAPTATION TO CLIMATE CHANGE. The *Economics of Adaptation to Climate Change* study was initiated in the spring of 2008 as a result of discussions at the UNFCCC’s thirteenth COP. In partnership with the governments of Bangladesh, Bolivia, Ethiopia, Ghana, Mozambique, Samoa, and Vietnam, the study helped to develop a global estimate of what it will cost developing countries to adapt and to better understand the risks posed by climate change and design strategies for adaptation. The study estimated that it would cost \$70–100 billion per year between 2010 and 2050 for developing countries to adapt to a 2°C warmer world, and it provided empirical support for the view that adaptation is a cost-effective strategy.

A focus area has been support to countries for climate-resilient agriculture. This includes improved watershed management and storage augmentation, agricultural water management, and improved access to weather and climate services. In Morocco, which faces increasing water stress, a dual approach is supporting diversification in irrigated agriculture and sustainable natural resource management in the rain-fed sector. In Mexico, the Agricultural Sector and Water Program



Shutterstock

BOX 3.5

A global Forest Carbon Partnership Facility contributing to the REDD+ agenda

The Forest Carbon Partnership Facility (FCPF), established in 2008, focused on reducing emissions from deforestation and forest degradation (REDD+). It is an example of World Bank Group innovation and leadership in tackling challenging environmental issues.

To be effective, REDD+ has to address the multiple drivers of deforestation and forest degradation—often the agriculture, energy, mining, industry, transportation, urban, and tourism sectors—and to get the support and full engagement of government, private sector, indigenous peoples, local communities, and civil society. It also means setting the right incentives, including financial ones. Recognizing this, the World Bank led the way to set up this partnership facility with an innovative and participatory governance structure where, as with the CIFs, developing countries have the same voice as donors and other financial contributors. The partners include REDD+

countries, donors, carbon fund participants, and observers from indigenous peoples' groups, civil society, international organizations, the private sector, UN-REDD+, and the UNFCCC.

Current pledged funding to the Facility is \$393 million, including approximately \$218 million for the Readiness Fund and \$175 million for the Carbon Fund. The Readiness Fund provides readiness preparation grants to REDD+ countries. Thirty-seven REDD+ countries have been selected into the partnership (14 in Africa, 15 in Latin America and the Caribbean, and 8 in Asia and the Pacific) to meet the high level of demand.

The FCPF has made considerable contributions to the REDD+ agenda. It helped to move REDD+ from concept to reality and to establish processes, procedures, and standards for REDD+ readiness.



supports enhanced agricultural water management, integrated soil fertility management and conservation tillage, targeted research, and seed reserves and wildland conservation, together with programs to enhance agribusiness and increase social protection for the vulnerable.

THE WORLD BANK GROUP HAS A GROWING BODY OF WORK ON INCREASING RESILIENCE IN CITIES. Through its work program on cities and climate change, the World Bank has developed the Urban Risk Assessment framework, which will be piloted in selected cities in Africa and South Asia. The Mayors' Task Force on Climate Change, Disaster Risk and the Urban Poor is supported with a global study and case studies in Dar es Salaam, Jakarta, Mexico City, and São Paulo. The recently completed *Guide to Climate Change Adaptation in Cities* is being used in dialogue with cities in the Middle East and North Africa and in project preparation in Belize and Senegal. Tools being developed for cities in East Asia and the Pacific include the Multi-hazard City Risk Index, the Workbook on Planning for Resilience in Cities, and the *Urban Flood Management Handbook*.

THE WORLD BANK GROUP IS HELPING AT LEAST 90 COUNTRIES ADAPT TO CLIMATE CHANGE. Through the Pilot Program for Climate Resilience (PPCR), under the Climate Investment Funds, the World Bank works to pilot and demonstrate ways that countries can build climate resilience into development planning and implementation in 18 countries, including two subregions (the Caribbean and the Pacific Islands) (see Box 3.6). Financing for climate-affected sectors—agriculture, flood protection, water supply, and health—in the poorest countries reached \$3.3 billion in FY09, a 17 percent increase over the previous IDA funding cycle. The WBG is working with GEF, the CIFs, and other partners to help countries in sub-Saharan Africa become climate-resilient. It is also carrying out analytical work to improve the design of WBG interventions and supporting clients to get access to adaptation grants from the Least Developed Countries Fund and the Special Climate Change Fund and improve their preparedness to tap the Adaptation Fund.

THE WORLD BANK GROUP IS PIONEERING FINANCIAL INNOVATIONS TO DEAL WITH CLIMATE RISKS. The IFC is



BOX 3.6 Pilot Program for Climate Resilience

The Pilot Program for Climate Resilience is one of four programs funded through the Climate Investment Funds. The PPCR aims to facilitate scaled-up transformational change to increase the resilience of selected developing countries most vulnerable to climate change. Building on national strategies and programs, the PPCR pursues innovative ways to integrate climate risk and resilience into core development activities of the participating countries. Nine countries (Bangladesh, Bolivia, Cambodia, Mozambique, Nepal, Niger, Tajikistan, Yemen, and Zambia) and two regions (Caribbean and Pacific) were selected to participate in the PPCR.

The PPCR consists of two phases: the first phase focuses on the preparation of a Strategic Program for Climate Resilience and the second phase focuses on

the implementation of the priority investments. Since the approval of the PPCR in 2009, some 11 Strategic Programs have been endorsed by the PPCR Sub-Committee for a total of up to \$767 million of PPCR resources.

Under the PPCR, Bangladesh is targeting appropriate investments in all vulnerable coastal districts, Niger aims to reduce food insecurity exacerbated by climate change, and Samoa plans to reinforce aging infrastructure in densely populated coastal zones. A total of 44 projects are identified in the endorsed Strategic Programs for Climate Resilience and are currently under preparation or have started implementation. Bangladesh's \$110 million PPCR resources will leverage almost \$500 million, and Tajikistan's \$50 million PPCR resources will leverage more than \$120 million.

playing a leading role with index-based weather insurance in Africa. The Global Index Insurance Facility is an innovative program that is expanding access to insurance against weather risks and other natural disasters in developing countries, particularly to farmers. The Index is currently working in Burkina Faso, Kenya, Mali, Mozambique, and Rwanda and has recently been approached to support projects in the Caribbean. An IDA-supported index-based livestock insurance project in Mongolia—the first of its kind anywhere in the world—has been active for five years and is being scaled up nationwide. Important lessons have been learned on the value of risk layering and getting the policy divide right between commercial insurance products and the wider social insurance framework.

THE ROLE OF SOCIAL PROTECTION SYSTEMS IN PROMOTING RESILIENCE IS KEY. Both the World Bank's updated Social Development strategy and the new Social

Protection strategy place high priority on building resilience, given its importance in the livelihoods of poor and vulnerable groups. Through green growth strategies, public works programs that create short-run employment, for example, can be made more inclusive while also helping restore landscapes through watershed management, terracing, afforestation and reforestation, and other forms of soil erosion control. Learning from earlier experience on China's Loess Plateau, these approaches are being replicated through operations like Ethiopia's Productive Safety Nets Program and Rwanda's Vision 2020 Umurenge Program. In India, rural livelihood-support projects in states such as Andhra Pradesh, Maharashtra, and Rajasthan are being scaled up to the national level through the National Rural Livelihoods Mission. Among other things, this program addresses climate resilience through convergence with the National Rural Employment Guarantee schemes.



4 Lessons Learned and Voices Heard



The evidence is clear that the WBG and its partners have stepped up environmental efforts dramatically in the past 10 years, but the evidence is also clear that the state of the world's environment continues to deteriorate. How can the WBG use its position to have greater impact, and do it faster and better, in order to help change this? In order to answer this question, the WBG reflected on the lessons of the effort of the last 10 years and listened to the concerns of stakeholders.

What Have We Learned?

Ten years of rich experience scaling up the WBG's environmental work have crystallized key lessons.

STRONG INSTITUTIONS, LEGISLATION, REGULATION, AND ENFORCEMENT ARE CRITICAL. The WBG's experience with supporting clients to build their policy and institutional frameworks has reinforced the importance of strong environmental and regulatory institutions. Over the past 20 years, developing countries have made significant strides in setting up environment and regulatory agencies, while putting in place environmental legislation and implementing regulations. However, the WBG portfolio highlights the need for greater country ownership and involvement of a wider range of stakeholder groups, including women. Legislation and regulations are only as good as their enforcement, which has been extremely weak in many countries. The Bank's experience shows that strong institutional and policy frameworks with clear targets and guidance help create an enabling environment for

private sector undertakings to improve the environmental and social sustainability of their investments.

GOOD GOVERNANCE AND POLITICAL WILL ARE NEEDED FOR STRONG INSTITUTIONS TO EMERGE. To help countries improve enforcement, the WBG needs to focus more on sustained capacity building. It takes time to build institutions, and the WBG has repeatedly underestimated the time and persistence required. Experience also shows a need to better understand the role of nonformal institutions, the political economy dimensions, and windows of opportunity for governance and institutional reform. Where efforts to improve the governance of forests or fisheries have failed, for example, there is often a link with vested interests in government or with weak political will to confront corruption. Understanding the political landscape and then identifying local champions for reform is essential. Informing the public, the media, legislative bodies, and civil society about key issues can also help build momentum for reform.

POLICY FAILURES LEADING TO PERVERSE INCENTIVES ACCOUNT FOR SEVERAL FAILURES IN ENVIRONMENTAL MANAGEMENT. From distorting subsidies to poorly defined property rights, policy failures account for many environmental problems. Sometimes these failures are due to a lack of information or analysis, but more often they are linked to a lack of political space to pursue reform. Fossil fuel subsidies on production and consumption create incentives to continue using oil over other sources of energy. Agricultural subsidies on soy and corn also lead to distorted consumption patterns. Poor land titling and tenure make it very difficult to manage the rural

landscape efficiently, leading to distorted decisions at the interface between land and forests, for example. Offshore property rights can also be poorly defined, leading to an underinvestment in enforcement of laws governing fisheries and marine areas. A suite of other subsidies has led to the serious overcapacity of fishing fleets.

ENVIRONMENTAL RISKS IMPEDE POVERTY REDUCTION.

Typically, it is poor people who live in precarious and unsafe conditions in areas where basic services like a clean water supply and sanitation are inadequate. They live close to waste dumps and contaminated lands and in vulnerable coastal areas. Studies on the cost of environmental degradation show that direct health impacts associated with environmental risk factors cost countries the equivalent of 1.2 percent to over 4 percent of GDP (World Bank 2008a). The costs can be as high as 9 percent of GDP in countries like Ghana and Pakistan, taking long-term effects of malnutrition into account (World Bank 2008a). In some countries, health impacts of environmental degradation are almost five times higher on the poor than on others per unit of income (Sánchez-Triana and Awe 2007).

WOMEN AND CHILDREN ARE BEARING THE BRUNT OF ENVIRONMENTAL DECLINE IN DEVELOPING COUNTRIES.

Poverty often means dependence on natural resources for survival. Many rural women and their families depend on nontimber forest products for income, traditional medicines, and nutrition, but these oft-marginalized communities are increasingly losing access to even these resources. In many developing countries, women spend between several hours per day on firewood collection. In Asian and African countries, women often walk six kilometers a day to collect water, carrying 20 kilogram loads on their heads. With water scarcity in many parts of the world, water availability for hygiene is limited, adding to the risk of maternal mortality during childbirth and to infant mortality from diarrheal diseases. Access to safe, clean, and affordable water or fuel can provide significant socioeconomic and health benefits to women, in addition to environmental benefits. For example, modern, off-grid lighting solutions such as micro-solar power and light-emitting diodes can enable women to save money, reduce indoor air pollution, and operate their

small enterprises with reliable, clean lighting (Alstone et al. 2011).

Women and children are also among the most vulnerable to climate risk. Women and girls, due to cultural norms, may be less mobile than men and may lack vital survival skills to weather storm events. Consequently, women are likely to suffer greater damages from climate risks and have a lower capacity to adapt. At the same time, empowered women have a proven track record of improving adaptation and mitigation outcomes (Ahmad et al. 2010).

PARTNERSHIPS ARE ESSENTIAL TO SUCCESS IN ADDRESSING ENVIRONMENTAL ISSUES.

The agenda is huge, and one institution alone cannot have enough impact on all the environmental challenges facing the developing world. Partnerships help leverage support to address clients' needs by mobilizing and leveraging finance, by strengthening awareness, analytical, and scientific work, and by strengthening environmental governance. Partnerships with multilateral funds such as the GEF and the Multilateral Fund for the Montreal Protocol have focused on global and trans-boundary environmental issues. Close partnerships with civil society organizations have allowed a greater focus on biodiversity in particular. The partnerships with the Trust Fund for Environmentally and Socially Sustainable Development and the Bank-Netherlands Partnership Program have supported key analytical work. The Environmental and Social Fund for Africa launched by MIGA, with support from the government of Japan, provides technical advice on environmental and social matters to foreign investors in Africa. Other trust funds have focused on key subsectors, such as ProFOR or ProFISH. Partnerships with the United Nations Environment Programme allow the WBG to broaden its analytical base. Increasingly, Bank clients are demanding South-South learning, acknowledging that middle-income countries are the source of much innovation. Perhaps most important, through the Climate Investment Funds the MDBs are working in collaboration and demonstrating scaled-up climate action.

PARTNERING WITH THE PRIVATE SECTOR IS ESSENTIAL TO SUSTAINABLE GROWTH AND THE DEVELOPMENT OF TECHNOLOGICAL SOLUTIONS.

The private sector plays a

key role in creating jobs, and jobs provide a pathway out of poverty. It can contribute in ways that complement the public sector, such as through public-private partnerships, supply chain development, and adoption of environmental sustainability principles that are good for business and for improving environmental outcomes (see Box 4.1). Whether they consume water, paper, tree crops, or fish, corporations are increasingly concerned about the sustainability of their supplies. The private sector is also part of the solution for financing better environmental management as it invests in innovation, technology, and communications in key sectors. The sector is also essential for its investments in technologies that are solving clean energy challenges, improving monitoring through satellites, and improving the efficient use of natural resources.

Similarly, sustainable and inclusive growth is dependent on sound financial markets, strong governance structures, and sustainable financial institutions. It is also important in funding innovation in areas vital for green and inclusive growth and in mobilizing much of the required investments. The financial sector creates access to investments that cut across the entire value chain of financial services—from pension funds to retail banking—and innovative financial instruments. For example, in the context of climate change the insurance industry plays an important role in enabling green and inclusive growth through specialized niche products to address barriers to green development and climate resilience.

WORLD BANK SAFEGUARDS AND IFC'S/MIGA'S SUSTAINABILITY FRAMEWORK ARE IMPORTANT TOOLS FOR ENSURING THAT ENVIRONMENTAL AND SOCIAL CONCERNS ARE INTEGRATED INTO ALL ASPECTS OF WBG-FINANCED PROJECTS. The application of safeguard policies has been essential in ensuring assessment of alternatives and avoidance or mitigation of potential adverse environmental and social impacts. The policies have also provided a platform for stakeholder participation in project design and implementation. The successful application of the safeguard policies has led many borrower countries to work with the World Bank in developing systems that incorporate safeguards, particularly with respect to environmental impact assessments and resettlement plans.



BOX 4.1 Clean energy—Engaging the telecom private sector in climate change mitigation

Implemented in partnership with the GSM Association of mobile phone operators, this project promotes the adoption of renewable energy for powering telecommunication towers. An estimated 118,000 of the 300,000 towers that will be built in off-grid locations by 2012 could be powered by renewable energy sources on a commercial basis. This would represent a reduction of about 2.4 billion liters of diesel per year, the equivalent of 6.3 million tons of CO₂ emissions. To address the lack of familiarity and the perception of high risks by mobile phone operators, IFC's Advisory Services developed an online database covering more than 9,000 renewable energy tower deployments. The transition toward renewable telecommunications towers was supported through workshops, analytical tools, and training materials, including techniques to select suitable sites for renewable energy. To date, 250 sites have been identified where renewable energy deployment has a payback period of less than three years.



A 2010 Independent Evaluation Group (IEG) assessment (IEG 2010) found that World Bank safeguard policies were effective in avoiding or mitigating potential environmental and social impacts and risks in large-scale projects. For example, in the Nam Theun 2 hydropower project in Lao PDR, World Bank safeguard policies ensured attention to watershed management, biodiversity conservation, and the need for comprehensive resettlement and livelihood restoration programs. Safeguard policies can go beyond the mitigation of harm and be an important entry point for increasing the environmental and social sustainability of operations. The IEG noted the need to strengthen environmental and social supervision and improve design and implementation of Environmental and Social Management Frameworks. The IEG report also recommended that the World Bank strengthen monitoring of outcomes, enhance client capacity, ensure client ownership, and improve the management of project-level grievances.

The IFC and MIGA Sustainability Framework reflects both organizations' strategic commitment to

sustainable development in the private sector. The 2010 IEG assessment has shown success in identifying and mitigating environmental and social risks. Furthermore, compliance on MIGA-supported projects has improved since the introduction of the Sustainability Framework and Performance Standards. The updated Sustainability Framework approved by the Board of Executive Directors in May 2011 reflects the evolving nature of the social and environmental sustainability agenda as well as developments in IFC's business model and in the markets where the IFC operates. The IFC's commitments in the areas of climate change, human rights, gender, and corporate governance, as well as capacity building, are clarified and strengthened in their performance standards. While stressing the mitigation of negative impacts, the IFC will increase its focus on positive impacts and developing client capacity.

PACKAGING DIFFERENT INSTRUMENTS IS IMPORTANT IN SUSTAINING LONGER-TERM INVESTMENTS AND CONTRIBUTING TO SUSTAINABILITY. This includes packaging of knowledge products, policy dialogue, and lending. The sequencing of instruments is also important.

For example, Country Environmental Analyses have been useful inputs to the design of development policy operations, allowing choice of the right policy and institutional reforms needed to enhance environmental sustainability in the country. Packaging investment or technical assistance with policy loans enhances the sustainability of environmental outcomes. Private sector advisory services should be closely aligned with investment priorities, as this is critical to marketplace credibility and for identifying partners for piloting innovative approaches in environmental and social value creation.

PROGRAMMATIC APPROACHES HELP WITH LONG-TERM ENGAGEMENT. Programmatic approaches provide opportunities for longer-term client engagement, especially on issues of environmental governance and sector reforms that build sequentially from previous operations. For example, in Ghana forestry reforms across three DPLs built on each previous operation, strengthening ownership and support for enforcement in the government's forestry program. In Vietnam, the Poverty Reduction Strategy Paper series deepened climate change mainstreaming through sequential policy reforms.

KNOWLEDGE GENERATION IS GOOD; SHARING IT AND DEMONSTRATING CHANGE THROUGH ITS USE IS PRICELESS. WBG analytical work can provide clients with the knowledge they need to inform their decision making. Applying that knowledge in practice and ensuring its dissemination in easily understandable language to a broad group of stakeholders can help advance countries' green development goals. The study financed by the Trust Fund for Environmentally and Socially Sustainable Development on developing new policies for reducing air pollution and improving health conditions based on pilot projects in selected cities (for example, in Shanxi province) will be replicated in more than 600 cities by the Chinese government through their promulgation of new national measures and technical guidelines

BASELINES, MONITORING, AND MEASURING NEED TO IMPROVE. Through the work in carbon markets and other market-based instruments, the ability to measure environmental changes is improving. The World Bank needs to integrate these improvements

into its own monitoring as quickly as possible. In addition, while lending for environment and natural resources management has grown, the World Bank needs better systems to show this progress. This means appropriate coding and indicators to show how different sectors—agriculture, energy, transportation, water, and urban development—are factoring the environment into their operations. Effective measurement is key for progress, whether it is in reducing emissions, forestalling biodiversity loss, or managing urban pollution. Data and access to data must be improved. The IFC has established a monitoring and reporting framework to track Environmental and Social Performance against 25 related performance indicators.

INFRASTRUCTURE IS AN IMPORTANT VEHICLE FOR GREEN AND INCLUSIVE GROWTH, and the WBG needs to continue its involvement in the infrastructure business, promoting environmental sustainability. Infrastructure development is critical to delivering growth, reducing poverty, and addressing broader development goals. Infrastructure investments also are an important tool for green development as investments help to avoid locking into unsustainable growth paths.

Voices of Our Stakeholders

This Strategy draws on extensive consultations with governments, the private sector, academia, civil society, and development partners around the world. A series of 66 consultations were organized from October 2009 through June 2010, with the support of key partners in a number of venues. These consultations allowed us to engage with more than 2,300 stakeholders from 126 countries, covering Africa, East Asia and the Pacific, Eastern Europe and Central Asia, Latin America and the Caribbean, and Middle East and North Africa Regions, as well as donor countries. Consultations engaged stakeholders, including government officials and representatives of the private sector, academia, civil society, NGOs, media, and other development partners. In addition to the face-to-face consultations, stakeholders provided comments through the Environment Strategy website (www.worldbank.org/environmentstrategy), translated to all official World



Shutterstock

Bank languages. More than 73,000 visits to the website were recorded. Stakeholders called on the WBG to play a leadership role in the following areas:

- *Promoting a new development paradigm.* Stakeholders want the new Strategy to promote an ambitious vision for sustainable development, rooted in valuation and accounting for natural resources and externalities, including emissions, health impacts, biodiversity loss, marine systems, and climate change. Developing country representatives argued for help in acquiring technologies and know-how to pursue clean development priorities and in accelerating the move to green, clean, and resilient development outcomes.
- *Raising awareness and communicating about the environment and its links to development.* The Strategy should convey the urgency and need to succeed in achieving environmental sustainability and the consequences of failure. Civil society in developing countries called on the WBG to communicate more, and in accessible language, about environmental issues and how they are linked to development outcomes, to help improve demand for better governance and environmental sustainability across sectors.
- *Knowledge development and sharing for sustainable development.* The WBG's global presence, strong research and analytical work, and project implementation experience across various sectors were raised as important factors in transferring knowledge and good practices between developing countries and also between developed and developing countries. Donor countries and NGOs want the World Bank to increase research and make data more accessible to strengthen environment and development decision making.
- *Governance and competent public and private institutions.* Capable institutions that enable countries to “green” their development paths were seen as essential to progress. There were strong calls for WBG support in building capacity at national and subnational levels and across line ministries. Support for improving regulatory frameworks that facilitate private sector participation in sustainable development was also raised. Stakeholders called on the WBG to seize opportunities to complement capacity-building efforts in industries in developing countries, for example on pollutants, chemicals, and waste management.

- *Safeguards.* Recognizing the role of World Bank safeguard policies in reinforcing their own national systems and in building local capacity, stakeholders urged the World Bank to embrace a bottom-up and country-owned approach to safeguards.
- *Better measurement of results to improve environmental sustainability of the World Bank Group portfolio.* Many participants in the consultations called for a results measurement framework that recognizes the roles and strategies of environmental and nonenvironmental sectors. A related suggestion was to ramp up internal incentives for WBG staff to improve environmental sustainability of the portfolio.
- *Provide customized solutions to environmental challenges.* There is no one-size-fits-all approach—a message that came through clearly, especially from consultations with small island state representatives *who* said they want customized solutions to their unique environmental challenges.
- *Balancing attention to global public goods.* There was broad agreement that the WBG plays an important role in addressing global environmental issues but that this should shift from focusing on “trade-offs” to promoting opportunities for co-benefits and win-win approaches. Governments and development organizations urged that climate change should not “crowd out” other environmental issues.
- *Partnerships, coordination, and harmonization.* Developing country governments called for greater reliance on partnerships involving development partners, regional development banks, U.N. agencies, bilateral agencies, EU institutions, the OECD, and others to maximize efficiency. Civil society called for more work with communities and NGOs in developing countries. Closer collaboration between the World Bank, the IFC, and MIGA was viewed as important for enhancing private sector partnerships.



5 From Vision to Action



Having considered the opportunities and challenges presented by the state of the environment, examined ongoing efforts of partners, considered the lessons of the WBG's experience, and listened to stakeholders, it is clear that this Strategy must bring all of the convening power, knowledge, finance, and partnership of the WBG to bear for game changing success for a green, clean, and resilient world. The vision laid out in this Strategy is ambitious, reflecting the scale of the challenges facing countries and the continuing barriers to action on global environmental issues. But the vision focuses on scaling up in areas where the WBG can fill a gap or add value to a global effort, recognizing that scarce budgetary resources must be used efficiently and selectively. The Strategy strives to answer the question, If transformation is needed in the next 10 years, how can the WBG's capabilities best contribute to what our clients and partners need for success?

A first aspect of the Strategy will be ensuring that sectors across the WBG keep to their environmental commitments (as laid out in Annex 1). Building support for country and region-level investment in improving the environment will continue. Many of the actions in this Strategy cut across the green, clean, and resilient thematic areas. Environmental safeguards, for example, apply across the board, as do commitments to incorporating gender dimensions into WBG operations addressing the environment. Across all three agendas, the goal is to mobilize additional sources of financing while developing and spreading knowledge on innovation and best practice, providing support for policy reforms, and helping to strengthen institutions and capacity for environmental management.

Over the next 10 years, the Strategy will give priority to scaled-up action in seven key areas:

(i) Wealth Accounting and Valuation of Ecosystem Services (WAVES), (ii) a new World Bank-led Global Partnership for Oceans, (iii) pollution management, (iv) low-emission development, (v) adaptation, (vi) disaster risk management, and (vii) improving the resilience of small island states. These priority areas cut across the green, clean, and resilient agendas of the Strategy.

Implementing this Strategy will require that the WBG ensures adequate resources, both human and budgetary, to deliver on the ambitious vision proposed. Helping clients to move toward green, clean, and resilient development will mean that the WBG will itself be working more actively to ensure that its portfolio of projects and activities become greener, cleaner and more resilient. WBG staff will need to possess adequate skill sets and capacity, which can be deployed for maximum impact. To this end, the WBG is presently conducting a talent review process that will help identify skill gaps and ensure adequate staffing to deliver on regional commitments.

Supporting the Environmental Pillar of Sustainable Development and the Green Agenda

The WBG's "green" agenda places a priority on continued economic growth as a requirement for poverty reduction, but it calls for greener growth options to ensure sustainability. While waiting for the global dialogue on climate to move forward, the WBG's role is to listen to its shareholders' priorities

and to respond with leadership, advocacy, partnership, analysis, knowledge-sharing, and financing.

A large part of the WBG's green agenda will focus on how to nurture sustainable growth and poverty reduction while protecting biodiversity and ecosystems. In that regard, the Strategy considers both how growth can become more sustainable and how investing in the environment can stimulate growth. The WBG's green agenda will focus on **ACTIVITIES THAT CAN LEVERAGE CHANGE**, including analytical and knowledge-sharing work: on natural capital accounting and valuing ecosystems; on the health of the world's oceans; with the private sector on the development of key markets and initiatives; and on the expansion of support for biodiversity conservation.

VALUING ECOSYSTEMS, EMPHASIZING OCEANS, PROTECTING BIODIVERSITY

THE WORLD BANK WILL PROMOTE BRINGING NATURAL CAPITAL INTO SYSTEMS OF NATIONAL ACCOUNTS TO BETTER ASSESS THE SUSTAINABILITY OF GROWTH. Why are we overexploiting natural resources to the point of system collapse? One reason is poor accounting and worse pricing. Historically, countries have not depreciated nonrenewable commodities in their national accounts as they are exploited. This understates the importance of transforming revenues from oil, minerals, and forests into productive and human capital. In a market-based world, as natural resources become scarce, their value should rise. And this is indeed evident in price trends for many single commodities. But when natural resources are more complex than a single commodity—such as an ecosystem that prevents erosion, acts as a storm barrier, filters water, or harbors fish—then they are seldom valued correctly in local markets or in national accounts. Although the concept of environmental or “green accounting” has been recognized and discussed for over 20 years, few, if any, countries actively include their natural assets in their systems of accounts. This systemic undervaluation of ecosystems and their services has been a key factor in poor policy formulation and global environmental decline.

With green growth for all as an objective, accurately valuing ecosystem services is vital for making better

policy and investment decisions.⁸ Through the Global Partnership for Wealth Accounting and the Valuation of Ecosystem Services, the World Bank and its partners will promote sustainable development worldwide through the implementation of comprehensive wealth accounting that focuses on the value of natural capital and integration of “green accounting” in more conventional development planning analysis. In its first year, WAVES is supporting five developing countries (Botswana, Colombia, Costa Rica, Madagascar, and the Philippines) to “green” their national accounts, in partnership with developed countries that are leading the way in this area with expertise or financial support (Australia, Canada, Norway, and the United Kingdom). As WAVES builds its knowledge and experience base, and given growing demand arising from awareness of the importance of green and inclusive growth for sustainable development, the number of countries participating will significantly increase. A key goal of the World Bank's work in this area is therefore to demonstrate how countries can use environmental accounts to improve decisions about managing natural capital and thereby support their sustainable development with genuine green and inclusive growth trajectories. For example, a country rich in forests could decide how to optimize these assets for a mix of ecosystem services such as water services, carbon storage, timber and nontimber forest products, subsistence livelihoods, coastal protection, tourism, and biodiversity (see Box 5.1).

The Blue Agenda

THE WORLD BANK GROUP WILL LEVERAGE EXISTING FINANCING FOR FISHERIES, COASTAL AND MARINE PROTECTED AREAS, AND INTEGRATED COASTAL AND MARINE ECOSYSTEM MANAGEMENT TO FACILITATE THE CREATION OF A NEW GLOBAL PARTNERSHIP FOR OCEANS.

The goal of this partnership is to sustainably enhance the economic, social, and ecological performance of the ocean's ecosystems and living resources, with improved benefits captured by coastal and island developing countries and with global benefits accruing to the planet as a whole. Investing in healthier ocean ecosystems represents

⁸ Note that valuation is a critical step to permit governments to monitor the overall sustainability of growth as well as to understand the value of the services provided by assets such as forests. But it does not affect individual behavior toward these assets, which is determined by price signals (or rules and regulations or even traditions).



BOX 5.1 Investing in mangroves

Accounting for natural capital can help people make better decisions about land use. The conversion of mangroves has a strong economic impact on local fishing communities and food production in several regions, as mangroves often serve as a nursery for fish and crustaceans. Moreover, maintenance or restoration of mangroves can reduce vulnerability of coastal areas to sea-level rise and extreme weather events while also contributing to food security. Often, cost-effective ecosystem-based approaches are implemented when correctly valued and incorporated into policy decisions. For example, when accounting for only marketed goods (timber and nontimber), mangroves have an estimated value of \$864 per ha. Accounting also for coastal protection, the value per hectare is \$16,861. This knowledge would better inform policy makers about the trade-off between preservation and conversion to shrimp farming, which has an estimated per hectare value of \$9,632 (Barbier 2012).

Examples of how restoring and protecting mangroves can reduce vulnerability include:

- Mangrove forests have been estimated to have an economic value of \$300,000 per km as coastal defenses in Malaysia, when compared with engineered alternatives (Ramsar Convention on Wetlands 2005).
- Since 1994, communities have been planting and protecting mangrove forests in Vietnam as a way of buffering against storms. An initial investment of \$1.1 million saved an estimated \$7.3 million a year in sea dike maintenance and appeared to significantly reduce losses of life and property from typhoon Wukong in 2000 in comparison with other areas (IFRC 2002; World Bank 2010b).
- Loss of mangrove area has been estimated to increase in expected storm damages on the coast of Thailand by \$585,000 or \$187,898 per square kilometer (in 1996 dollars), based on damage data from 1979–96 and 1996–2004 respectively (Stolton, Dudley, and Randall 2008).
- Recent studies in the Gulf of Mexico suggest that mangrove-related fish and crab species account for 32 percent of the small-scale fisheries landings in the region and that mangrove zones can be valued at \$37,500 per hectare annually (Aburto-Oropeza et al. 2008).
- In Surat Thani, Thailand, the sum of all measured goods and services of intact mangroves exceeded that of shrimp farming from aquaculture by around 70 percent (\$60,400) (Balmford et al. 2002).

a tremendous opportunity for the global economy—and most notably for coastal and island developing countries, where so much of the ocean’s wealth can be found. As the world prepares to feed more than 9 billion people, more and more experts worry about the overexploitation of fish stocks, given that fish provide 16 percent of the world’s animal protein intake. As pollution from industry, agriculture, and human waste mounts, as coastal zone ecosystems falter, and as biodiversity loss accelerates, better management of the two-thirds of the planet covered by oceans has become critical. Although \$1.5 billion of WBG investments (including \$100 million financed by GEF) already target “the blue economy,” an intensified effort is needed to register a global impact on the future of marine and coastal resources. To accomplish this, the WBG will build partnerships and seek consensus, increase analytical work and knowledge sharing, reach out to the private sector, work across sectors, build capacity and institutions, and leverage innovative financing (see Box 5.2).

THE GLOBAL PARTNERSHIP FOR OCEANS WILL WORK TO SCALE UP SUSTAINABLE USE. At the 2011 Annual Meetings, the World Bank invited a wide range of partners to discuss the potential need and scope for a global partnership to support more sustainable use of the oceans and whether the Bank should play a role. The meeting sent a clear signal that the challenges and opportunities facing the oceans were beyond the scope of any one group or organization to address, and the Bank had a clear role to play based on its convening power around global public goods and its ability to leverage public investment across its portfolio. As a result, a WBG-wide Blue Team consisting of staff from Regions and anchor units as well as the IFC has been formed. After the Annual Meetings the Bank continued this dialogue with a number of groups and potential partners, and in February 2012 it announced the development of the Global Partnership for Oceans and invite interested partners to join. This partnership recognizes the vast array of actors working on oceans issues—foundations, NGOs, U.N. agencies, and MDBs. The partnership also includes the private sector—investors, fishing associations, aquaculture producers, seafood processors, and importers—which plays a critical role in ocean resource management, with many commercial actors



BOX 5.2 Assisting Africa to rebuild overexploited marine fish stocks

Some of the world’s most fertile fishing grounds can be found off the coasts of Africa, with fisheries providing livelihoods for 10 million people as well as 20 percent of the animal protein intake in the region. But these fisheries and the habitats that support them are increasingly threatened due to weak governance that fails to control access to the fish resources. For this reason, the World Bank and partners are supporting investments to sustainably increase the net economic benefits generated by Africa’s marine fish resources and to keep more of the output within the region. This fisheries program includes direct support for a regional fisheries partnership mechanism to promote fisheries governance and policy reforms in Africa, together with the African Union, the New Partnership for Africa’s Development, the GEF, the FAO, and WWF. The program also includes regional fisheries investments in participating countries, starting with the West Africa Regional Fisheries Program in the coastal countries from Mauritania to Ghana. These investments (\$128 million in six countries to date) aim to support the governance of marine fisheries, reduce illegal fishing, increase the local value added to fish products, and protect critical natural habitats and ecosystem processes that underpin the health of the fish stocks.

increasingly concerned about the sustainable supply of seafood. This reflects a broad consensus in many respects between conservation groups and the private sector on key priorities for healthier oceans. In our consultation, we heard clearly that the WBG can add value in supporting sustainable certification of seafood; strengthening the capacity of institutions governing fishing activities, with an emphasis on more secure and transparent rights; and using the WBG's knowledge generation and convening power to advocate for effective policy in reducing the risk of negative externalities on the ocean environment. The WBG's efforts will also build on existing partnerships that already address issues of concern to the oceans, such as PROFISH and WAVES, and strive to design a more comprehensive approach to supporting the blue economy.

AS PART OF THE PARTNERSHIP, A NEW KNOWLEDGE PLATFORM ON OCEANS WILL BE EXPLORED. The abundance of scientific and economic information on the oceans is critical for crafting solutions. With partners, particularly the FAO, the WBG will explore how data and knowledge platforms can be enhanced to serve real-time information needs and foster greater exchange of knowledge and South-South collaboration. As part of the Global Partnership for Oceans, an oceans knowledge platform will initially focus on sharing information on valuing improvements in the health of marine ecosystems and more broadly on analytical work assessing the health of oceans, including modeling global fish supply and demand through 2030. As with the World Bank's work on climate knowledge, this platform will take advantage of growing initiatives on open data to provide for an exchange of data, models, and analysis. Knowledge will also be shared in various forums, including conventions under U.N. agreements, regional fisheries management organizations, and social media. Communications efforts would focus on the need for good governance of local resources and effective action on the global commons. As a precursor to these efforts, a short film on the oceans has been developed for the Partnership by the National Geographic Society, and an independent website has been established (see www.globalpartnershipforoceans.org).

With respect to increasing funding for oceans work, the Bank will focus on leveraging the evident

alignment of the public and private sectors. A new Oceans Financing Facility will be established as part of the Partnership to catalyze greater external and IBRD/IDA financing of effective oceans governance in countries and regions, in order to help meet the triple bottom line of improving economic (rent capturing), social (poverty reduction through economic growth), and environmental protection outcomes.

Biodiversity and Conservation

In the past, World Bank clients have not always chosen to borrow for work on biodiversity and conservation. However, the World Bank has used its role as an implementing agency for the GEF to effectively leverage IDA and IBRD financing. It is now clear that biodiversity is one of the planetary systems most threatened by environmental degradation and climate change, and clients keen to stem the tide of extinction and loss of biological diversity are asking to work more with the World Bank on these efforts. The work on WAVES will help to establish the true value of biodiversity and the Global Partnership for Oceans will help the World Bank to scale up its conservation of marine protected areas. But the World Bank will also strive to do more on biodiversity linked to forests and agriculture as clients look more at landscape approaches.

THE LENDING PROGRAM FOR BIODIVERSITY AND CONSERVATION WILL BE EXPANDED. Clients are asking for more support on protected areas management, ecotourism, biosafety, wildlife protection, and conservation. The World Bank is learning to further leverage GEF financing on landscape management and make better use of GEF resources to develop programs for biodiversity protection. In addition, the World Bank will seek to build partnerships with a large array of organizations to scale up our work on biodiversity and conservation. Client countries are setting aside more areas for conservation and seeking sustainable financing for parks and park systems. Ecotourism, which has become the fastest-growing and most profitable segment of the tourism industry in the area, is providing alternative incomes.

FUNDING PARTNERSHIPS, LEARNING, IMPROVED DATA, AND INNOVATIVE FINANCE FOR BIODIVERSITY WILL RECEIVE EVEN MORE ATTENTION. Programs such as the Critical Ecosystem Partnership Fund, Save Our

Species, and the Global Tiger Initiative have provided interesting experience on different approaches to conservation. They have allowed the World Bank to gain knowledge on wildlife corridors, payment for ecosystem services, and wildlife monitoring. The WBG will try to find more innovative approaches to conservation finance, leveraging our work on forests, land, oceans, and private sector development.

RESOURCING FOREST COUNTRIES TO PROTECT THEIR NATURAL ASSETS REMAINS A PRIORITY. Client demand for assistance in managing forests is strong, and the WBG will continue to address this demand through lending and knowledge generation for sustainable forest management. The World Bank has gained valuable experience on concession management, community forestry, value-added wood industries, log tracking, and other approaches to sustainably managing productive forests. Various climate financing instruments, including the Forest Investment Program under the CIFs and the Forest Carbon Partnership Facility (FCPF) are aiding the financing of afforestation and avoided deforestation. Of the 48 countries under the Forest Investment Program that expressed strong interest in becoming pilot countries, only eight were selected, due to limited resources. The WBG will strive to help all countries seeking assistance in managing forests. Last year, six countries—Burkina Faso, Democratic Republic of Congo, Ghana, Indonesia, Lao PDR, and Peru—received grants of around \$250,000 through CIFs for investment programs in sustainable forestry.

TECHNICAL AND FINANCIAL ASSISTANCE TO COUNTRIES TO BECOME “READY FOR REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION (REDD+)” WILL CONTINUE. Responding to a mandate from the 2007 Group of Eight Summit, the World Bank established the FCPF to help countries address challenging issues of deforestation and forest degradation. Depending on their institutional capacity and financial resources, tropical and subtropical forest countries—or REDD+ countries—will vary in how long they will take to be “ready for REDD.” Through the FCPF Readiness Fund, selected countries are developing the necessary systems, such as for monitoring, and putting in place policies that help them get access to the Carbon Fund and

prepare for other REDD+ programs. Truly sustainable capture of carbon, just like sustainable forest management, will require addressing the challenging governance, land management, and benefit-sharing mechanisms. The World Bank will continue to work with its partners to develop forestry in the carbon markets and ensure that it is a rigorous capture of carbon and also of co-benefits. The World Bank will also contribute through policy dialogue, DPLs, and sector investment loans. In the private sector, support will be aimed at reducing forest conversion and improving access to certification, global standards, and carbon markets. Efforts to accelerate payment for environmental services programs will be expanded. Similarly, the WBG will look at the potential for trust funds, bonds, infrastructure offsets, carbon premiums, private-public partnerships, and other tools that can scale up financing for conservation.

THE WORLD BANK WILL FURTHER DEVELOP THE “WILDLIFE PREMIUM” AS PART OF ITS CLIMATE FINANCE WORK. Building on the concept that World Bank Group President Robert Zoellick launched at the Convention on Biodiversity COP in Nagoya in 2010, the wildlife premium idea recognizes that lowering carbon emissions is only one part of measuring the benefits of sequestering carbon by protecting forests and other natural habitats. “Co-benefits” linked to simultaneously protecting wildlife and biodiversity are more difficult to value and are not yet traded on an international market. The “wildlife premium” on carbon trades that protect habitats will test the market’s willingness to pay for these co-benefits.

SUPPORT TO GOVERNANCE AND INSTITUTIONAL REFORMS FOR IMPROVED NATURAL RESOURCE MANAGEMENT AND BIODIVERSITY PROTECTION WILL CONTINUE. Recognizing the importance of natural resources for livelihoods and for fiscal revenues (from oil, gas, minerals, timber, fisheries, freshwater, and coastal resources), the WBG will continue to work with clients to explore better ways to manage this wealth to sustain growth. This includes improving accountability and transparency in revenue management through the Extractive Industries Transparency Initiative (EITI). Tools like Strategic Environmental and Social Assessments and Country Environmental Analyses will help inform client decision making by

identifying environmental priorities and the institutional and governance gaps that need to be closed so that enforcement of policies linked to conservation or the sustainable management of natural resources can be more rigorous.

WILDLIFE CRIME HAS BECOME BETTER ORGANIZED AND MORE VIOLENT, BUT PROTECTION MEASURES ARE ALSO

ADVANCING. Further work is needed on law enforcement for forests, wildlife and fisheries management, and revenue or benefit sharing at the local level in sectors such as forestry, hydropower, and mining. In South Asia and in the Mekong Basin, the World Bank is supporting regional cooperation for protection of wildlife in Bangladesh and Nepal by helping governments to strengthen joint capacity, institutions, knowledge, and incentives to collaborate in tackling illegal wildlife trade and other threats to habitats in border areas.

THE WORLD BANK IS JOINING FORCES WITH OTHER PARTNERS TO FIGHT ENVIRONMENTAL CRIME.

Under the International Consortium on Combating Wildlife Crime, the World Bank will work with INTERPOL, the U.N. Office of Drugs and Crime, the World Customs Organization, and CITES to reduce wildlife crime. Within the World Bank, a Community of Practice on Environmental Crimes has been established and is implementing an action plan that will diagnose environmental crime and provide a business case for addressing it as a critical development issue; give priority to select operational activities, such as in the areas of customs reform and forest governance; and identify discrete opportunities for advancing the agenda through specific environmental law enforcement initiatives, for example through cross-border interdictions. The work will build on the World Bank's operational core competences and focus on countries and issues where the development impacts are the greatest.

PLANNING, MONITORING, AND EVALUATING ENVIRONMENTAL PROGRESS IN CLIENT COUNTRIES WILL BE

STRENGTHENED. Through its work in carbon finance, the World Bank will also continue to improve monitoring of carbon emissions, soil degradation, forest density, and water resources. As we propose to do with climate, wealth accounting, and oceans, the World Bank will also leverage knowledge on

biodiversity through support for the collection of better data, open access to the data, and the construction of a knowledge platform that allows clients and stakeholders to compare approaches and results. Embedding these tools into World Bank environment programs and strengthening their adoption will be an important focus.

POLICIES TO REMOVE BARRIERS TO GREEN, CLEAN, AND RESILIENT GROWTH

MARKET AND POLICY DISTORTIONS THAT LEAD TO BIASES AGAINST GREENING DEVELOPMENT NEED REFORM.

The WBG will explore opportunities for policy reform that would improve the efficiency and cost-effectiveness of environmental management, including reduction of subsidies and trade barriers to environmental goods and services. Through the Green Growth Knowledge Platform, research will focus on how to build greater support across national constituencies (for example, how to mitigate the effects of energy price increases on the poor and options to channel efficiency gains from reforms into broader opportunities). The trade-offs in making greener investment choices at the sector level will also be analyzed. Analytical work will assess how environmental co-benefits of actions to mitigate or adapt to climate change can be identified and maximized in projects. Understanding barriers to the transfer and use of win-win technologies and practices (such as environment and health; energy efficiency, energy cost, and GHG emissions; ecosystem protection and improved livelihoods for the rural poor) will be key to this effort.

MARKET-BASED MECHANISMS AND SUSTAINABLE SUPPLY

THE CREATION OF INCLUSIVE, ENVIRONMENTALLY SUSTAINABLE, AND EFFICIENT MARKETS WILL BE A KEY

FOCUS. The WBG will work with private sector firms to address market barriers to business practices and decisions that lead to profitable commercial outcomes while creating environmental or social value. IFC's Advisory programs will focus on climate-related investments and sustainable supply chains and look toward environmental and social value creation. Conservation NGOs are increasingly realizing that they cannot succeed in protecting species without a focus on the drivers of deforestation, landscape

degradation, and overfishing. They are reaching out to form partnerships with the private sector on greening supply chains, and the WBG will partner with them in these efforts.

CLEANER PRODUCTION AND SUSTAINABLE SUPPLY CHAIN EFFORTS WILL BE EXTENDED. The WBG plans to extend its work on sustainable supply chains to new industries. As an example, work is progressing on the development of new standards for forest harvesting and marketing activities, including tracking wood products from the standing tree to the timber product at the point of export. Monitoring the origin and destination of legally harvested wood products serves to promote better forest management. Similarly, the IFC seeks to green supply chains in various industries through investment and advisory work at project and sector levels. The WBG will also promote sustainable land use and alternative livelihoods in the rain forest through dissemination of soy and beef standards, reforestation of degraded lands, forestry licenses and concessions, and inclusive supply chains for small cash crops.

Many countries lack alignment between environmental management and industrial competitiveness policies. Linking development goals (like maximizing public welfare and enhancing competitiveness) means linking pollution management approaches to management of environmental risks. In the Europe

and Central Asia Region, for example, effective approaches to cleaner production programs are aligned with EU environmental policies, making a critical contribution to sustainability.

PRIVATE SECTOR CLIENTS WILL BE ASKED TO DEVELOP STEPS TO SCREEN AND MONITOR FOR SUPPLY CHAIN RISKS.

For example, IFC's Performance Standard 6—Biodiversity Management and Sustainable Management of Living Natural Resources—has been expanded to include requirements for clients to assess whether their primary suppliers are contributing to degradation or conversion of natural and critical habitats. If so, clients would either shift their purchasing to suppliers who are not doing this or would work with their suppliers to stop conversion of sensitive habitats. Where this is not possible, the IFC will expect the client to shift suppliers over time.

UPDATING AND CONSOLIDATING THE SAFEGUARDS

THROUGH ITS SAFEGUARDS UPDATE AND CONSOLIDATION PROCESS, THE WORLD BANK WILL CONTINUE TO MOVE BEYOND A "DO NO HARM" APPROACH. A process is under way to update the World Bank's safeguard policies to address emerging issues, incorporate lessons learned, and meet the changing needs of clients. This will allow World Bank policies to better support environmentally and socially sustainable



development and provide for their more effective, efficient, and timely application. The goal is to make the policies more performance-oriented and implementable by clients at the national and subnational level. The updating and consolidation process will seek opportunities for use of a greater range of instruments to assess potential environmental and social impacts and risks. As the process moves forward, it will involve a program of stakeholder consultations on a global level that will include a diversity of parties.

The World Bank is also applying its safeguards to new climate finance instruments like the FCPF, which builds on REDD+ readiness programs in selected countries. REDD+ activities will be subject to Strategic Environmental and Social Assessments. The World Bank will work with the other MDBs and relevant U.N. agencies in REDD+ activities to ensure a coherent approach to applying safeguards to these activities. The World Bank will also continue working with clients to strengthen their own systems of environmental safeguards.

Supporting the Clean Agenda

As the world strives to green growth, a central part of the challenges and the solution will be cleaning up the impact on air, land, and water of earlier growth patterns. The WBG will focus its clean agenda on pollution management, carbon mitigation and low-emission development, and carbon and climate knowledge and finance.

FINDING ANSWERS, PROVIDING RESOURCES IN THE FIGHT AGAINST POLLUTION

THE WORLD BANK GROUP WILL BUILD ON LESSONS FROM SUCCESSFUL POLLUTION MANAGEMENT POLICIES AND PROJECTS TO PROVIDE INNOVATIVE SOLUTIONS.

Particularly during the last decade, many developing countries have established environmental institutions, developed environmental policies and regulations, and increased their general awareness about environmental issues. Through such efforts, pollution levels in some of those countries have begun to level off. The WBG will assist in further

accelerating and expanding such positive developments and will share constructive results and experiences across developing countries, for example through South-South collaboration and environmental awareness events.

Significant lessons have been gathered from specific pollution abatement projects in all Regions, such as from the \$1.5 billion project to clean up India's vast Ganges River. Similarly, the Gulf Environmental Partnership and Action Program in the Middle East and North Africa Region builds on lessons from earlier regional programs, such as the Mediterranean Environmental Technical Assistance Program, which strengthened the environmental management capacity and policies of riparian countries of the Region. New operations will build on these types of lessons, with an eye to innovation and leveraging. In the Philippines, a large programmatic approach consisting of a cluster of advisory services and lending operations is being undertaken to address pollution management in the Manila Bay area.

Through *Green Growth, Firm Competitiveness and Pollution Management: A Sourcebook of Policy Tools for Governments, Private Sector, Financial Institutions, Civil Society and the Judiciary*, the WBG will disseminate lessons learned from more than 10 years of experience. Analytical work to support countries' decision-making processes in integrating environmental management, social inclusion, and growth objectives will continue (see Box 5.3).

PRIORITY EFFORTS WILL FOCUS ON AIR POLLUTION. With many fast-growing economies now facing increased environmental health costs associated with air pollution, demand for cleaner production and improved air quality is growing. The World Bank will focus on helping clients manage air pollution by strengthening environmental health valuation analysis to help identify priority actions for reducing pollution through a better understanding of where pollution comes from and how to cost-effectively reduce the most critical sources. Also, it will provide analytical and advisory support to enhance the environmental governance frameworks and policy tools for improved air quality in client countries, particularly in Asia and the Middle East and North Africa. Air pollution is usually generated from a

BOX 5.3

Strengthening the knowledge base on structural change and green inclusive growth in Pakistan

The government of Pakistan recognizes that transportation and trade logistics efficiencies are prerequisites for economic stabilization, sustained growth, and competitiveness. The transportation sector plays an important role in linking other sectors in the economy, contributes to both domestic and international trade, and helps facilitate the spatial transformation occurring in Pakistan. However, reforms and investments in the trade and transportation sectors could stymie poverty reduction efforts in some regions, aggravate environmental problems like urban air pollution and greenhouse gas emissions, and affect women or contribute to social conflict. The Bank's Strategic Environmental, Poverty, and Social Assessment identifies cost-effective ways to improve the efficiency of the freight transport system to meet goals of enhancing export competitiveness, decreasing spatial inequality, reducing environmental degradation, and developing interventions to support those who might be affected by reforms, particularly the poor, women, and other vulnerable groups.

variety of sources, including energy, transportation, various industries, natural dust, and so on, which implies that often a multisectoral approach has to be developed in order to substantively reduce overall pollution levels. The World Bank, through its transportation sector, will address fuel quality and the phasing out of highly polluting vehicles. Through its energy sector, the WBG will address cleaner energy options, and through the application of the new sourcebook on pollution management, it will address pollution from a number of industrial sectors.

THE WORLD BANK WILL FOCUS ON LEGACY POLLUTION AND WATER BASIN CLEANUP. Building on lessons from the last 10 years, the World Bank will continue to support countries in Europe and Central Asia in

their efforts to address pollution legacies. It will also support countries in East Asia and the Pacific, Africa, and Latin America. These regions are expanding industrial development and need to manage the resulting pollutants. Work will focus on mitigating public health risks from legacy pollution and past industrial activities and on river cleanup projects in Europe and Central Asia, Latin America, and South Asia (see Box 5.4). In Africa, the World Bank will support new analytical work on hazardous waste, pesticides, and persistent organic pollutants.

Agriculture is a major source of river pollution in many countries, including those with smallholder-intensive agriculture. The World Bank is assisting countries with improved nutrient management and control of agricultural runoff. In China, where promotion of environmentally sustainable agriculture is a strategic priority, operations are under way to address these issues. These include the Jilin Food Safety and Agricultural Technology Project and the Eco-farming and Henan Yellow River Ecological projects.

The World Bank will also focus on the increased challenge of marine pollution by working on ways to address critical pollution sources, such as land-based discharges, atmospheric inputs, marine transportation, dumping, and oil spills. In particular, this work will focus on controlling the main sources of nutrient, petroleum, and solid waste pollution.

EXPANSION OF THE USE OF CLEAN COOKSTOVES WILL BE SUPPORTED. The World Bank will work with its partners and carbon finance funds to scale up use of a new generation of stoves to help reduce indoor pollution, benefit women and girls, and reduce pressure on the environment. The WBG's draft energy strategy also highlights the role of sustainable biomass energy in meeting cooking and heating needs, especially in Africa and South Asia. It emphasizes the importance of sustainable wood-fuel production and processing along the value chain.

GLOBAL TRANSBOUNDARY IMPACTS OF HAZARDOUS CHEMICALS WILL CONTINUE TO BE A PRIORITY. With Multilateral Fund, GEF, and other support, the WBG will continue to help countries fulfill their obligations to address global pollution risks. With the



BOX 5.4 Cleaning up rivers, improving health and livelihoods

ARGENTINA—Matanza-Riachuelo Basin Sustainable Development Project. The Matanza-Riachuelo, a tributary of the Rio de la Plata, is the most contaminated river basin in Argentina and the country's most visible environmental issue. Over the past 100 years, the river basin—home to 3.5 million people, including Argentina's largest concentration of urban poor—has been used as a sewage sink for Buenos Aires. More than 4,000 industrial facilities are located within the basin, and many of these discharge untreated effluents directly or indirectly into the river. The poorest populations living alongside the river are in constant contact with contaminants, including untreated organic waste and toxic industrial chemicals. This comprehensive \$840-million Bank-financed cleanup project supports the government's Integrated Basin Cleanup while improving sanitary conditions along the banks of the La Plata River and providing a long-term and cost-effective solution for safe disposal of wastewater from the Buenos Aires Metropolitan Area. The project includes investments in modern sanitation infrastructure to reduce flows of sewage effluent, improved environmental monitoring and enforcement of environmental targets for industry, and financing of cleaner production investments so that small and medium-size enterprises comply with environmental standards.

INDIA—The National Ganga River Basin. This transformative project is helping the government of India clean up its iconic Ganga River. At \$1.5 billion, it is the largest investment made by the World Bank in

the environment sector. It will help build the capacity of the recently formed National Ganga River Basin Authority, with the medium-term goal that no untreated municipal or industrial wastewater will be allowed to flow into the main stem of the river after 2020. The project will help fund priority investments in four key sectors critical for reducing pollution in the river: wastewater collection and treatment, industrial pollution control, solid waste management, and riverfront management. It promotes clean development and drives innovation by piloting the use of new wastewater treatment plant technologies, establishing the Ganga Knowledge Center, and building the capacity of central- and state-level institutions.

KAZAKHSTAN—Nura River Cleanup. From the 1950s until 1997, a former Carbide factory used mercury in the production of synthetic rubber. The factory's original wastewater treatment plant was not designed to remove mercury from process water, so mercury flowed to the factory's discharge channel and then to the Nura River. The \$91.6-million Bank-financed Nura River Cleanup Project supports the government to provide access to safe and reliable water by cleaning up the mercury pollution at the former factory site and in the Nura River basin and by rehabilitating a nearby dam. Cleanup measures that bring river water quality into line with international standards for mercury concentration are essential for improving water quality and safety.

Montreal Protocol engaged in the phaseout of hydrochlorofluorocarbons through 2030, it is viewed as a key partner in addressing climate change. The WBG will promote alternatives to the use of ozone-depleting substances that also maximize climate benefits through adoption of climate-benign substances where feasible and improvement of energy efficiency in related equipment. The World Bank will help developing country partners worldwide reduce and phase out both the production and use of ozone-depleting substances. Legacy issues associated with persistent organic pollutants, including in relation to brownfield redevelopment, will be addressed, and the reduction of future releases will be given priority through interventions across sectors. Recognizing the environmental and human health impacts of global mercury contamination, and the worldwide consensus to phase out its use and reduce its environmental releases, the WBG will seek to integrate mercury reduction into its investment programs.

WORK WILL CONTINUE TO HELP DEVELOPING COUNTRIES ADDRESS THEIR ENVIRONMENTAL HEALTH CHALLENGES.

Through the last decade, it has become clear that analysis of the physical and economic costs of pollution, particularly health costs, has become a very important tool for raising awareness and convincing governments and the public of the need for effective pollution management. The World Bank will continue to develop understanding of the health effects of pollution and help countries to identify and implement the most cost-effective interventions for improving environmental health outcomes, by taking a cross-sectoral approach and focusing on the most polluting sources.

WORK WILL CONTINUE TO REDUCE THE WORLD BANK GROUP'S INTERNAL ENVIRONMENTAL FOOTPRINT. The WBG has committed to reducing the environmental impacts of its day-to-day operations through the WB Corporate Responsibility Program and the IFC Footprint Program. The WBG continues to strengthen its corporate GHG management program by ensuring alignment with international standards and best practice. The WBG will also support its sustainability efforts by formalizing a corporate sustainability vision statement, establishing a management framework with specific performance

indicators (in line with those of the United Nations Environmental Management Group and international standards such as ISO 14001), increasing efforts to promote staff engagement, and expanding communications to external audiences on WBG efforts to reduce its corporate environmental impact. The WBG is also actively working with country offices and clients to demonstrate corporate sustainability initiatives globally.

RAMPING UP SUPPORT FOR LOW-EMISSION DEVELOPMENT

WORK ON CLIMATE MITIGATION WILL BE EXPANDED.

Given the prospect of continuing rapid urbanization in developing countries, and the resulting growth in energy and transport services, the WBG will continue to support planning efforts and policy and institutional reforms that promote low-carbon growth and improved pollution management. More than 90 countries have registered their 2020 plans to address GHG emissions with the UNFCCC, including 51 developing countries.

Support and capacity are needed to design, plan, and implement low-emissions policies, to enhance coordination across ministries and engage on Nationally Appropriate Mitigation Actions at national and subnational levels, to improve data streams and access to information, to develop the monitoring, reporting, and verification (MRV) frameworks necessary to secure international support, and to obtain finance for implementation of low-emission plans. The WBG is well placed to support this process. Low-carbon growth studies have been completed for Brazil, China, India, Mexico, South Africa, Indonesia, and Poland; additional studies are under way in Nigeria, Morocco, Tunisia, Macedonia, Colombia, Uruguay, Vietnam, and Costa Rica. In Mexico, for example, the study contributed to obtaining \$500 million from the Clean Technology Fund and \$401 million for a World Bank financed DPL on low-carbon development. Knowledge and lessons learned are being exchanged across these activities.

SUPPORT TO LOW-EMISSION DEVELOPMENT INVESTMENT PROGRAMS WILL INCREASE. Clean energy development and access to electricity services are key strategic

directions for the WBG energy program. The renewable energy portfolio more than doubled from \$2.9 billion over FY06–08 (18 percent of total WBG energy financing in the period) to \$6.6 billion in FY09–11 (22 percent), and it is projected to rise to 30 percent of total energy investments in FY12. Investments in hydropower are targeted to be at least \$1 billion annually (see Box 5.5). In addition to funding this through IDA and IBRD, the WBG will use the Energy Sector Management Assistance Program, CTF, and the Scaling Up Renewable Energy Program (SREP). Currently, the CIFs have \$4.5 billion committed under the CTF that can leverage another eight times that amount from public and private sources. With SREP, the CIFs will improve focus on low-income countries and bring together energy access with clean and resilient development. Although the MDBs have taken the first steps toward innovative partnerships and finance in CIFs, many challenges remain as implementation gets under way. Extracting the lessons from early implementation will be key.

CITIES ARE AT THE FOREFRONT OF LOW-EMISSION ACTION.

C40, a group of 40 major cities from developed and developing countries, has joined forces with the WBG, the Clinton Climate Initiative, and Local Governments for Sustainability to create a common international standard for measuring GHG emissions and tracking progress on targets. Developed country cities—among them London, Madrid, New York, Sydney, Tokyo, and Toronto—have set a GHG emission reduction target of around 10–30 percent below 1990 levels by 2030. Developing countries have similar reduction targets below 2000 emission levels. São Paulo set an ambitious target of 30 percent below 2003 levels by 2012 (C40 Cities 2011). As part of the new partnership with C40, the WBG will provide knowledge from its recent work with developing country cities and help increase climate finance for cities. A “one-window access” for funding and knowledge support is being explored. At the same time, the WBG’s Eco² Cities program is promoting cities that are ecologically and economically sustainable. This approach begins with an Eco² audit that diagnoses potential efficiency gains and emissions reductions as a basis for interventions that include retrofitting of infrastructure and buildings coupled with introducing new technologies.

BOX 5.5 The strategic value of hydropower

Situated at the nexus of water and energy, hydropower currently supplies 84 percent of the world’s electricity derived from renewable sources and is increasingly important to a low-carbon energy future. It is also vulnerable to projected climate change. As a climate change mitigation measure, hydropower strengthens a region’s ability to regulate and store water, thereby increasing resilience to flood and drought shocks. The WBG can help maximize the strategic value of hydropower in four key ways:

- **Scale up financing:** This would include measures to improve the environment for private sector participation and getting access to carbon credits. The use of WBG instruments to address loan tenures, local currency financing, and similar financial challenges would also be supported.
- **Promote good practice:** Important actions here include promoting transparent contractual arrangements, carrying out baseline studies early on, adapting to risks during implementation, and getting the institutional arrangements and policy incentives right.
- **Strengthen planning:** These measures include supporting governments in basin-wide and cross-sectoral planning, improving data collection and analysis, mainstreaming hydropower into climate change programs, and addressing climate impact management in hydropower design.
- **Leverage regional development:** Key mechanisms include promoting multipurpose projects, enhancing multicountry power pools, exploring synergies among complementary projects, and sharing revenue.

ENGAGEMENT IN URBAN TRANSPORT WITH A NEW GENERATION OF PROJECTS IS DEMONSTRATING THE BUS RAPID TRANSIT AS A LOW-COST GREEN ALTERNATIVE. The introduction of these bus systems as part of a more integrated public transportation system has been piloted in a number of countries (including Mexico, Colombia, and China), helping to make public transportation more efficient, affordable, and reliable. Countries like India are realizing that there are many growing cities with no formal bus system as yet. The WBG plans to support expanding these pilots to include components that enhance the “clean” elements of a comprehensive urban transportation program, such as an air quality monitoring and management plan, and its complementary measures (for example, vehicle emission inspection and maintenance programs).

WORK TO STRENGTHEN CAPTURE OF CO-BENEFITS BETWEEN GREENHOUSE GAS AND LOCAL POLLUTION EMISSION REDUCTION INITIATIVES WILL CONTINUE. Many developing countries are aiming to reduce both GHG and local pollution emissions. Studies for China indicate that measures that lower air pollution and greenhouse gas emissions simultaneously are much more cost-effective than those that focus only on air pollution control measures to mitigate negative health impacts. A smart mix of measures (such as energy efficiency improvements, cogeneration of heat and power, fuel substitution, and so on) that include actions that reduce energy consumption can cut air pollution control costs and achieve lower GHG emissions (Amann et al. 2008). The WBG will continue efforts to identify and capture such co-benefits.

THE CO-BENEFITS AGENDA WILL BE EXTENDED TO ALSO ADDRESS SHORT-LIVED CLIMATE FORCERS. The emerging scientific evidence on the climate impacts of short-lived climate forcers (SLCFs) such as black carbon and ozone, which were until recently considered just local air pollutants, also provides a good opportunity to address climate change through WBG operations. It is increasingly evident that addressing SLCF emissions from transport, energy, and agriculture can help “buy time” for climate actions, given the short atmospheric life span but very high warming potential of such emissions.

CARBON FINANCE

Carbon finance remains a key tool in the effort to mitigate carbon emissions. Overall, carbon markets are fragile due to the uncertainty of the future of the Kyoto Protocol. However, as the world waits for resolution on revision of the protocol and on a global climate deal, there is a strong need to continue developing the breadth and depth of the markets as much as possible.

The Need for Carbon Markets

The U.N. Secretary General’s High Level Advisory Group on Climate Finance states that carbon markets are key in climate policy and that they must play an increasing role in the future. Carbon markets can provide a price signal for GHG emissions, directing long-term investments toward clean technologies and creating incentives for least-cost abatement activities. A large part of climate finance for developing countries can be mobilized through carbon markets and channeled toward developing countries through instruments leveraging further flows of private capital. In this context, the Clean Development Mechanism (CDM) is expected to achieve 1.2 billion tons of CO₂ emissions reductions by 2012. This represents 40 percent of the emission reductions expected to finally result from the Kyoto Protocol (excluding the United States). It is estimated that financial flows to developing countries of \$27 billion have been committed to date through emissions reductions purchasing agreements (including post-2012 credits). This figure does not include any underlying investment finance flows.

Role of the World Bank Group

Different from other markets, carbon markets are in themselves a policy instrument, depending entirely on policy making and regulation. They can only be implemented if bridges can be built between the climate policy process and the operational requirements of concrete mitigation activities. This bridging function is the role of the WBG in carbon markets, but, equally important, the World Bank is working to ensure that its low-income clients have access to carbon finance.

The World Bank has pioneered carbon markets and facilitated market access for developing countries



since 1999, when it started activities to launch the Prototype Carbon Fund. The Carbon Finance Unit of the World Bank currently has under its management 12 carbon funds and two technical assistance trust funds, with a combined capital that surpasses \$2.7 billion. The existing carbon offset project portfolio of the Carbon Finance Unit includes 160 projects that will purchase more than 200 million tons CO₂-equivalent emissions reductions.

The WBG has catalyzed the market and helped to pull in the private sector, including by developing new methodologies (such as carbon accounting standards) and releasing them as public goods for project developers to use (to date contributing to 52 such methodologies in 12 different sectors). Working with partners, the World Bank has also been a key innovator in developing new concepts for carbon crediting, such as programmatic CDM, and in broadening carbon crediting into new areas, such as land use, land use change, and forestry (LULUCF) and REDD+.

The World Bank's Carbon Market Strategy

Developing access to carbon finance for low-income countries will be the centerpiece of the WBG's strategy. The main challenge for the current carbon market is how to rapidly move forward to a scaled-up market. The WBG's strategic response is threefold: First, it is important for the World Bank to encourage

and advance the policy and regulatory process to simplify rules and accelerate speed to market. Second, the World Bank will support a continuation of carbon market activity to assure that developing countries retain their existing capacity, technical knowledge, and carbon market infrastructure. Third, the Bank will support building up the potential supply for a scaled-up future carbon market in order to facilitate decision making on extended commitments and avoid possible future market dysfunctions resulting from supply shortages.

Achieving the WBG's objectives will require inputs to CDM reform, conceptualization of new market mechanisms, and potential bilateral piloting. Meanwhile, the WBG must further participate in the pioneering work to create innovative ways to use public finance to bridge the current period of uncertainty and to overcome market imperfections. This includes using public finance not only for the development of scaled-up carbon crediting schemes but also for initiating pilot purchases as an effective way of performance-based public spending, with the option of recycling public funds by selling generated assets in a future compliance market. Implementation will be met through a range of concrete new operational initiatives, including:

- *Carbon Partnership Facility (CPF)*: A fund to scale up investment in clean technology through programmatic and sector-based approaches, CPF

uses programmatic approaches to scale up emission reduction programs, which are included in integrated financing packages linked to World Bank lending operations.

- *Forest Carbon Partnership Facility*: The FCPF is a partnership and transparent platform for meaningful exchanges on REDD+ issues, as well as for the generation of a new type of asset based on avoided deforestation. It builds capacity and knowledge, preparing forest countries to participate in REDD+ by defining “readiness” and piloting financial incentives.
- *Partnership for Market Readiness (PMR)*: The PMR is a facility created to provide grant financing for building components of market readiness and to prepare for piloting new market instruments. It provides a forum for knowledge sharing, technical discussions, and collective innovation on new market instruments, including development of domestic carbon markets. Increasingly, the PMR is also a platform for examining the possibilities for carbon trading between domestic markets on a bilateral or multilateral basis.
- *BioCarbon Fund Tranche 3 (BioCF T3)* (next generation): The BioCF T3 will continue its engagement in the forestry and agriculture carbon markets as well as expand on-the-ground implementation experience and the lessons learned from its predecessors in forest and agriculture carbon finance activities. The BioCF will continue developing new methodologies by pioneering activities in areas that have not yet been tested for land use but that have significant GHG mitigation potential.
- *Carbon Initiative for Development (CI-Dev)*: The CI-Dev is currently taking stock of lessons learned with the carbon market experience in micro-projects and least developed countries from its predecessor, the Community Development CF, in order to continue promoting the development of carbon markets with an emphasis on Africa. The initiative will identify and develop the emission reductions assets and ensure the programs included will have a solid financial architecture by providing resources for capacity building, technical assistance, and financing to the seller entities behind the programs.
- By supporting readiness for new areas and new market mechanisms, the World Bank can help

clients ensure that carbon finance is consistent with development planning. The new initiatives are designed to address all categories of developing countries (middle-income, low-income, forest-rich countries) and to support all relevant carbon market developments (new mechanisms, including potential bilateral pilot phases and reformed CDM, LULUCF, and REDD+).

CLIMATE FINANCE

Although carbon markets are one part of the solution to financing climate mitigation, they are not sufficient for mitigation and do not address adaptation. At the UNFCCC COP 16 meeting in Cancun, the world agreed to move toward greater financing of climate action with Fast Start Finance and a pledge to increase funding to \$100 billion per year by 2020. Those attending the meeting also endorsed the establishment of the Green Climate Fund (GCF) to channel this funding to developing countries. In Durban, at COP 17, the platform adopted gave the GCF legal status and stipulated that the Board would be selected by March 2012 with an interim secretariat in Bonn managed by UNFCCC and GEF. In addition, the Durban platform agrees that the GCF should include a private sector facility and that bids for the permanent secretariat should be prepared by April 2012. In the advent of the GCF, the World Bank will continue to work with other MDBs to pilot programs for climate action through the CIFs. In addition, the WBG will continue to help policy makers and global leaders think about how to raise the funding necessary for climate mitigation and adaptation. Together with the United Nations Development Programme (UNDP), the World Bank has developed a Climate Finance Options Platform with the objective of helping developing countries understand financing opportunities for climate action. The Bank also prepared a paper for the Group of 20 on climate finance, examining the possibilities for raising funds through fiscal policy, tax policy, and transfers.

The WBG has also committed itself to track its own contributions to climate finance more accurately. The system for coding contributions to mitigation and adaptation was developed by an MDB task force in 2011. It is essential that all MDBs are using the same parameters for tracking investments in

mitigation and adaptation, so that investments are comparable. The World Bank is providing training to staff in all regions to assist with future coding of projects linked to climate finance. Projects were retroactively coded for FY11 and, starting in FY12, all projects will be coded for contributions to mitigation and adaptation through the Bank's business management system.

THE IFC IS INTEGRATING CLIMATE CONSIDERATIONS INTO ITS ACTIVITIES ACROSS ALL INDUSTRIES AND REGIONS AND SETTING AMBITIOUS TARGETS FOR ITS CLIMATE-FRIENDLY INVESTMENTS.

The IFC goal is 20 percent of investments by FY13, with an aspiration of up to 25 percent. The climate change share of overall climate-focused advisory project expenditure is expected to increase to 22 percent by FY13 and 26 percent by FY14, from 9 percent in FY10. While the IFC's investment and advisory work in energy efficiency, renewable energy, and resource efficiency will remain the mainstay of its climate change activities, it also aims to grow its Cleantech venture investment portfolio.

The IFC is working on several initiatives to mobilize commercial and concessional funding to support private sector climate investments in the form of equity, debt, and technical assistance. These complement continuing work with the CIFs and the GEF. The IFC will continue to build on its innovative carbon finance mechanisms, including through the recently launched €150 million IFC Post-2012 Carbon Facility that will mobilize funds from European utilities and energy companies to help extend carbon markets beyond 2012.

UNDERSTANDING AND MANAGING THE WORLD BANK GROUP'S ENVIRONMENTAL IMPACT

The WBG has taken great strides to ensure that its own environmental impact is minimized and offset. These efforts will be rolled out to encompass all country offices—that is, each office will strive to make its use of water and electricity more efficient and to measure its carbon emissions. As with the headquarters, the carbon emissions of country offices will also be offset, along with emissions from staff travel.

WORK TO MEASURE GHG EMISSIONS FROM THE WORLD

BANK GROUP'S PORTFOLIO WILL CONTINUE. The WBG is advancing work on GHG analysis of investment projects. A corporate commitment to better understand the GHG "footprint" of the WBG portfolio is articulated in the Strategic Framework on Development and Climate Change (SFDCC). The SFDCC makes provision for the IFC to start portfolio-level assessments and for the World Bank to initiate pilot work on GHG analysis in energy, transport, and forestry sectors.

The IFC has been expanding GHG accounting and analysis of its portfolio and projects. As of February 2009, the IFC requires GHG emissions for all new, real-sector projects (but not for FIs and advisory services). Gross, or actual, project GHG emissions are calculated. This approach has enabled the IFC to collect core data for all types of projects and to focus on integrating this work into the project cycle, automating data collection, and conducting monitoring and evaluation. In addition, as of FY12, the IFC will assess the GHG reductions of its climate-related projects. The IFC's approach is based on definitions, methodologies, and tools developed within IFC in consultation with other multilateral financial institutions. The purpose is to evaluate the climate impacts of IFC mitigation projects in real sector projects, FIs, and advisory services.

In parallel, GHG analysis is being piloted in select energy, transport, and forestry sector projects at the World Bank, identifying methodologies that could potentially be applied to a majority of the Bank's lending portfolio across the three sectors. A number of technical issues remain to be resolved, including the need to agree on assessment of net or gross emissions and definitions of project baselines and boundaries. Additional work will be undertaken to test methodologies and tools in parallel with technical consultations. The World Bank will begin conducting GHG emissions analysis in mid-FY13 for all energy, transport, and forestry projects that have agreed methodologies and tools, while continuing to test and develop approaches for additional sectors. It is envisaged that GHG assessments for investment lending operations will be phased in as a World Bank business requirement over two years starting in mid-FY13.

Supporting the Resilience Agenda

THE WORLD BANK GROUP WILL INTEGRATE RESILIENCE INTO DEVELOPMENT. In a world undergoing accelerated climate change and other sources of environmental and social stress, sustainable development requires a stronger focus on resilience. The WBG will emphasize the importance of considering resilience and adaptation in all policy dialogue, sector investments, and knowledge work. This will require additional analysis on disaster risk management, resilient infrastructure, and adaptable agriculture and a particular focus on small island states. Fully consistent with this approach, the World Bank's FY2012–2015 Country Partnership Strategy for Belize is entirely focused on supporting the government's efforts to achieve inclusive and sustainable natural resource-based growth and enhanced climate resilience that benefits all Belizeans. The strategies for Tonga and the Maldives also have strong elements of climate change.

STRENGTHENING THE FOCUS ON DISASTER RISK MANAGEMENT

Climate change is increasing the frequency and intensity of severe weather and changing the patterns of rainfall. This has led to more-frequent extreme events such as heatwaves, droughts, and floods (IPCC 2011), which can in turn exacerbate

poverty and environmental challenges. Climate change adaptation and disaster risk reduction are complementary and mutually reinforcing actions that promote better risk management. The Global Facility for Disaster Reduction and Recovery is already adopting climate adaptation as integral to its business plans, and it supports 14 countries to formulate action plans integrating disaster risk reduction and climate adaptation. A 2010 joint World Bank Group–United Nations report showed that investing in preventive measures can lower vulnerability to natural hazards. That investment typically costs countries significantly less than relief and rebuilding after disasters hit. Prevention is all the more needed given that the number of people exposed to natural hazards in large cities could double to 1.5 billion by 2050 (World Bank and UN 2010).

In its approach to disaster risk management, the WBG will work with clients to assess how to minimize the damage of natural disasters in terms of loss of life and structural damage. For example, it might involve adapting infrastructure to floods with drainage systems that are more robust or to droughts by checking that dams or irrigation systems can withstand lower water levels. The Bank will also expand the use of instruments such as Deferred Drawdown Options to provide help recovering from natural disasters. In addition, the WBG is pioneering work related to climate risk insurance (such as Mongolia livestock insurance).



Finally, revamping social protection systems, investing in women, and building social capital in communities are also essential for building resilient communities that can endure a natural disaster and recover quickly.

WORK ON INSTITUTIONAL AND POLICY REFORM IN CROSS-SECTOR AREAS ESSENTIAL FOR CLIMATE-RESILIENT DEVELOPMENT WILL EXPAND. As climate becomes more variable, the WBG will support policy and institutional reforms to ensure that climate-related risks are adequately and continually addressed. The World Bank's Social Development Department and Innovative Financing Unit are collaborating in a review of evidence from weather-based insurance schemes to find out if they are promoting greater social and livelihood resilience in practice. Climate resiliency is incorporated in multiple sectors—including agriculture, water resource management, and forests—in Indonesia, Vietnam, Brazil, and Mexico.

THE WORLD BANK GROUP WILL SUSTAIN EFFORTS TO MOBILIZE ADDITIONAL RESOURCES FOR CLIMATE ADAPTATION. The enormous financing gap for adaptation means that resource mobilization efforts need to be expanded, particularly for the poorest and most vulnerable countries. One recent funding source is the CIF's Pilot Program for Climate Resilience. With more than \$900 million endorsed for 11 PPCR programs (and the remaining 7 forthcoming), these pilots are gathering momentum. The program operates in nine pilot countries and two regional programs in the Pacific and Caribbean, which cover an additional nine countries (see Box 3.6 in Chapter 3). In coming years, effective implementation, monitoring, and distillation of lessons and sharing of experiences will be critical to inform the demonstration and scale-up—both within and beyond these countries. There is already compelling evidence that governance arrangements that have been put in place in these programs through highly consultative and inclusive processes are worthy of replication.

The World Bank will work with partners to deliver on the pilot experiences supported by the PPCR in 18 countries and will seek to expand these through additional transfers and by leveraging local development finance, considering the complementarities

between adaptation and good development programs. These include expanding work on risk-pooling instruments through insurance schemes, domestic savings from boom years to endow disaster funds, domestic taxes, and international transfer payments.

THE WORLD BANK GROUP WILL USE A RANGE OF INSTRUMENTS AND FINANCING OPPORTUNITIES TO IMPROVE GOVERNANCE AND SOCIAL ACCOUNTABILITY FOR ENHANCED CLIMATE RESILIENCE. In addition to the grants and concessional loans of PPCR, the World Bank is using DPLs and investment lending to support climate resilience. With all IDA Country Assistance and Partnership Strategies expected to address climate vulnerabilities, there will be stronger strategic dialogues for addressing climate resilience as part of countries' development planning. The World Bank has initiated some work through DPLs at the city-wide level—for example in Mexico City, where a DPL is helping to finance the city's movement toward local climate-resilient development. In Vietnam, the World Bank is working with local governments pioneering the use of social accountability approaches to ensure that incremental climate finance is put to effective use. In Mozambique, a recent DPL combines adaptation, mitigation, and disaster risk management and brings together different financial flows for multiple sectors, such as agriculture, coastal zone management, and water resource management. In the private sector, adaptation strategies for key sectors will be developed. Finally, in sub-Saharan Africa, clients are requesting a focus on capacity building and improved policies. The World Bank will seek to translate its work on resilience into concrete contributions to the planned medium-to-long-term National Adaptation Programs under the UNFCCC. It will continue to work with partners within programs it administers, such as PPCR, and where a joint results-matrix is effective for clients, the Bank, and donors, as in the Pacific Island countries.

STRENGTHENING CLIMATE ADAPTATION INITIATIVES, TARGETING AGRICULTURE

SUPPORT TO GREEN, CLEAN, AND RESILIENT AGRICULTURE WILL BE SCALED UP. With a 70-percent increase in food production needed by 2050, World Bank

support for agriculture will increase from an average of \$2.9 billion in 2006–08 to \$4.5–6.4 billion from 2012 and beyond. This will include a specific focus on agricultural programs that address the green, clean, and resilient dimensions. In Africa, the focus is on enhancing productivity and land and water management. In Kenya, for example, programs include support to community-based flood and watershed management, arid lands management, weather and climate services, agricultural productivity and commercial agriculture, and pilot investments on agriculture and forest carbon. In the densely populated countries of South and East Asia, the focus is on sustainable intensification, value-added enhancement, and diversification. In Bangladesh, one of the most vulnerable countries to extreme climate events, support emphasizes technological innovation, including salinity and flood-tolerant rice in coastal areas, drought-tolerant rice, and water productivity approaches. In Brazil, the emphasis is on balancing sustainable productivity increases with integrated soil fertility management, addressing land and forest degradation (including GHG emissions from land use change), and improved livestock management.

SUPPORT FOR ADAPTATION PROGRAMS BY MAINSTREAMING AND BUILDING FROM PILOT EXPERIENCES WILL EXPAND. With GEF support over the last decade, the World Bank has backed projects that will serve as the basis for expanding support in tropical countries, islands, and drought-prone regions. In Latin America, for example, a number of pilot projects are improving information systems and capacity to anticipate extreme weather events. This has included improved tropical storm monitoring systems and early warning systems. Involving local communities in planning for climate resilience in Kiribati in the Pacific region has improved the country's capacity to deal with extremes like storm surges. This approach has also been adopted in arid areas (see Box 5.6), meeting food security and land and water management needs. In some conflict and fragile countries where changing climate is an added stress, such as Somalia, Haiti, Afghanistan, and some countries in the Middle East, preliminary discussion is included in Interim Strategy Notes. As part of the Bank's broader work on climate change, vulnerability assessments will be prepared as part of

country climate profiles to provide better information for decisions on climate-resilient development.

CO-BENEFITS WITH THE GREEN AND CLEAN AGENDAS WILL BE SOUGHT. The “triple-win” of climate-smart agriculture contributing to resilience, low-carbon growth, and food security implies important synergies between adaptation and mitigation that need to be considered when designing and planning climate actions and evaluating their results. For example, forest carbon projects (reforestation and forest protection) that can be funded using incentives for climate change mitigation can also contribute to adaptation by increasing the resilience of local environments and communities. They contribute to strengthening the natural capital of rural communities participating in projects by recovering severely degraded lands, protecting water resources, and conserving biodiversity. The African Union has committed to integrating climate-smart agriculture into the Comprehensive African Agricultural Development Program, an approach to agricultural strategy and investment planning that has been endorsed by African Heads of State (AU and NEPAD 2010). Similar triple wins are possible in the oceans agenda—for example, protecting mangroves can lead to coastal protection, more sustainable fishing for local communities, and biodiversity gains—and will be sought.

OPENING DOORS TO KNOWLEDGE AND LEARNING

THE WORLD BANK GROUP WILL CONTINUE TO MAKE THE LATEST KNOWLEDGE AND QUALITY DATA AVAILABLE FOR ACCELERATING RESILIENT DEVELOPMENT. Through the Climate Change Knowledge Portal (CCKP) (<http://climateknowledgeportal.worldbank.org>), the World Bank will continue to provide access to climate information; climate risk screening tools; adaptation options at specific location, country, and sectoral levels; and e-learning aimed at development professionals. The portal allows policy makers to layer potential climate impacts for their countries, and to gain access to experiences of other countries in planning and adapting. The World Bank will partner with relevant specialized climate service agencies and organizations, such as the World Meteorological

Organization and the U.K. Meteorological Office, to reinforce the site with data and models that are accessible to everyone and to provide examples of how that information and knowledge can be used in decision making. Several countries, including Mexico and Malawi, are also interested in having access to local versions of the CCKP in order to validate and upload local datasets and use of a global platform.

The WBG is implementing a comprehensive Open Climate Data Initiative, led by a partnership of its Sustainable Development Network, Development Economics Data Group, and the Global Facility for Disaster Reduction and Recovery, to facilitate access to state-of-the-art climate data and innovative tools and frameworks for analyzing and managing climate change risk. The Open Data Climate Initiative, which includes the CCKP and the launch of The Little Climate Data Book, allows for easy access to climate and climate-related data, including the latest country socioeconomic datasets to support vulnerability and impact assessments. An associated competition (Apps4Climate) has already engaged app developers to bring in innovative ideas on how to use the data more effectively and through mobile and web technologies. In addition, the Open Climate Data Initiative will promote inclusion of country and client experiences in the need for climate services. One example of this is the technical assistance and its finding in the Sundarbans mangrove system in India and Bangladesh. Linking clients that have used climate information for decision making for resilient development in these mangrove systems with others in similar situations will be an important knowledge-brokering role for the Bank. Other examples include climate resiliency in agriculture and water sectors—both of importance to many low- and middle-income countries.

SUPPORT FOR CAPACITY BUILDING, KNOWLEDGE GENERATION, AND LEARNING-BY-DOING ON CLIMATE CHANGE ADAPTATION WILL INCREASE. The World Bank has a growing portfolio on climate adaptation, including through engagement with other MDBs on the PPCR. These projects and programs include components supporting knowledge generation, targeted research, and improved data gathering, access, and management. In the coming decade, systematic



BOX 5.6 Supporting climate-resilient Development in the Sahel and West Africa

In 2011, the GEF Council approved the Sahel and West Africa multisector program for \$108 million. The program addresses major land degradation challenges common across the region. These include economic issues, such as food security, and environmental concerns like climate change. The countries in the program include those in the Sahel/Sahara region (Burkina Faso, Chad, Ethiopia, Mali, Mauritania, Niger, Nigeria, Senegal, and Sudan, as well as Benin, Togo, and Ghana) that have important savannah and forest systems linked to the Sahel/Sahara region. The goal is to expand sustainable land and water management in targeted landscapes and in climate-vulnerable areas in West African and Sahelian countries through expansion of investments in sustainable land and water management technologies, thus improving land use spatial planning at the watershed scale. It will use a spatial approach called the “mosaic approach,” which links productive landscapes, rangelands, parks, reserves, and communal lands and considers increased productivity, adaptation and mitigation to climate change, and improved livelihoods. The focus will be on managing trade-offs between multiple uses, such as demand for rich floodplains for grazing or crops or woodlands’ value for firewood and the need to retain watershed functions and protected areas.



Shutterstock

drawing of lessons and sharing of experiences across countries will support preparedness for managing climate risks. The goal is to improve knowledge exchanges, for example on ecosystem-based adaptation; hydro-meteorological services; integrated climate risk management approaches that link climate, disaster, and food security risks; and climate risk insurance mechanisms, including risk transfer, risk pooling, and strategies to enhance resilience of specific groups, such as women, who have been shown to be vulnerable to the impacts of climate.

REGION-SPECIFIC RESILIENCE WILL BE A KEY FOCUS.

Given the challenges of water scarcity in the Middle East and in Arab countries, the WBG has scaled up its technical assistance work on adaptation linked to water for that region. New knowledge and approaches to dealing with the risks of changing climate on livelihoods, ecosystems, and economies are also being explored. Learning and information exchange is being fostered between arid countries in the Middle East and countries in Latin America, for example, where growing demands require that better strategies for water management be planned.

SMALL ISLAND STATES: MICROCOSMS FOR GREEN, CLEAN, AND RESILIENT DEVELOPMENT

THE SMALL ISLAND STATES ARE AMONG THE MOST VULNERABLE TO ENVIRONMENTAL AND ECONOMIC SHOCKS DUE TO CLIMATE VARIABILITY AND ENERGY-PRICE VOLATILITY.

They present challenges and opportunities. With respect to climate shocks, many small islands are examining what they can do to protect their coastlines against erosion and rising sea levels. They are also facing the need for more resiliency in disaster management, infrastructure, agriculture, and energy. High expenditure on fossil fuel translates into high energy prices of 20–40 cents per kilowatt-hour, making renewable sources of energy cost-competitive and offering the prospect of fiscal savings that could be redirected toward development and climate resilience. Although their small size, remote location in cyclone-prone latitudes, small economies, and low-lying coastlines contribute to their vulnerability, these factors may also potentially contribute to their success as exemplars of green, clean, and resilient development as they

provide a relatively low-cost, high-value option for demonstrating multisectoral sustainable development policy implementation at work. The regional programs in the Pacific and the Caribbean under PPCR provide a start, and in both cases the World Bank is working with other partners to scale up efforts in multiple countries. Work includes programs on climate-resilient infrastructure and on ecosystem and community-based adaptation, especially in coastal areas.

THROUGH IDA AND THE PPCR, THE WORLD BANK AND ITS PARTNERS ARE WORKING REGIONALLY TO ASSIST THE CARIBBEAN ISLANDS IN ADDRESSING THESE ISSUES, BUT THIS WORK MUST BE SCALED UP TO INCLUDE ALL ISLAND STATES. During IDA 15, the Regional Disaster Vulnerability Reduction Project was approved by the Board under a single project for Grenada and Saint Vincent and the Grenadines, which was the largest project ever supported by the World Bank in these countries.

SMALL ISLAND STATES, IN PARTICULAR ARCHIPELAGIC STATES, COMMAND DISPROPORTIONATELY LARGE EXCLUSIVE ECONOMIC ZONES (EEZ); THEY ARE “GREAT OCEAN STATES” AND NATURAL PARTNERS FOR THE BANK’S INITIATIVE ON A GLOBAL PARTNERSHIP FOR OCEANS. For example, Tonga—a Pacific island state consisting of 150 islands and a population of 100,000—has a land mass of 688 km² and an EEZ of 700,000 km², which is a 1:1000 ratio. This is equivalent to the EEZ of the United Kingdom, which has a land mass of 243,000 km² for a population of 62 million (a land mass to EEZ ratio of approximately

1:3). The WBG will therefore partner with small island states in its Global Partnership for Oceans to ensure that these nations are helping to set the agenda on oceans while extracting the maximum sustainable value from their marine resources to meet their development needs. This could include support for partnering on global advocacy, regional and national policy frameworks for better governance of their EEZ, better management of seascapes and marine protected areas, reduction of land-based pollution, investment options for alternative livelihoods of traditional fishers (including aquaculture), and coastal zone management harnessing (for example, blue carbon revenues).

THE SIDS DOCK PROGRAM EXEMPLIFIES GREEN, CLEAN, AND RESILIENT APPROACH TO DEVELOPMENT. The SIDS DOCK Support Program, developed by the Alliance of Small Island States, supported by a \$29.5 million envelope from Denmark and Japan and facilitated by UNDP and the World Bank, assists with the introduction of renewable energy and energy efficiency among small island developing states. It is focused on improving the enabling environment, removing barriers, and implementing policy reforms and business models with potential for scale up. A growing project pipeline valued at over \$25 million is leading to a wide-ranging and exciting portfolio of innovative and socially inclusive developments, including a regional energy regulatory authority to overcome barriers, interisland power-supply interconnectors to broaden energy markets, off-grid solar for remote atolls to improve energy access, and achievement of Millennium Development Goals.



Environmental Actions and Commitments from World Bank Group Regions

Africa

THE GREEN AGENDA IN AFRICA

CHALLENGE. Africa presents both the biggest challenge and the biggest opportunity for green action. While the continent has seen average annual deforestation rates fall to 0.5 percent in 2000–10, down from 0.6 percent in the previous decade, a considerable number of countries continue to experience annual losses of forests and savannah woodlands of over 2 percent.

As tropical forests and large savannahs are lost to agriculture and other developments, Africa's biodiversity is also disappearing. This not only affects environmental services on which much of the population depends, but it threatens the nature-based tourism that is critical for employment and foreign exchange earnings in many African countries.

The challenge for Africa in managing its forests is to cope with the poor governance issues plaguing the forestry sector and the fragmentation of external funding. Pressures from agriculture, mining, and human settlements mix with the tempting money from illegal logging and wildlife trade. Together with weak regulatory and enforcement institutions, these factors create significant governance challenges. Many of the newer funding sources for forestry, including the multidonor funds the Congo Basin Forest Fund, FCPF, Forest Investment Program, and REDD, have focused on the global public goods role of forests rather than the domestic economic and local public goods role. And these sources have come with complex requirements for

monitoring, reporting, and donor coordination that many countries find hard to meet.

Currently, Africa is home to less-developed coastlines that still harbor intact ecosystems that protect coastal cities and infrastructure from flooding and provide protection for fisheries and shelter for juvenile fish. However, seascapes are increasingly threatened by human pressure. Destruction of coastal mangrove forests has increased the vulnerability of coastal settlements to flooding, and poor governance of fisheries has led to broad overexploitation of Africa's commercial marine fisheries.

RESPONSE. Africa has 14 countries with REDD+ readiness processes in place, including a country-wide and a regional coordination mechanism. The World Bank Group's strategy in the Region will be to work within these mechanisms, focusing on helping monitor progress by working with countries on the establishment of baseline measurements and MRV; helping clients plan at the micro level for extractive industries, associated infrastructure, and land management; and helping set up rational protected areas management to safeguard biodiversity.

On deforestation, the World Bank will focus on improved management of forests, woodlands, and farmland at a landscape level to contribute to rural and urban economies and employment and to provide the ecosystem services that local people depend on. The key to realizing the sustainable development potential of Africa's forests and woodlands is improved governance at all levels: enhancing the demand for good forest governance from the private sector and local communities as



well as building the political will and the capacity of governments at national and decentralized levels to fulfill regulatory and enabling functions.

Natural resources governance will be addressed through development policy lending, technical assistance, and the Extractive Industries Transparency Initiative, while other tools will continue to be pursued through partnerships as sector-wide approaches or as part of larger multi-sector policy loans.

To stem the tide of biodiversity loss, the focus will be on various types of sustainable land and water management production systems that have significant biodiversity benefits, such as shade coffee, cacao and tea plantations with native forest buffers, wetland rice, and livestock and game ranching on

natural grazing lands. Within the coastal zone, the Africa Region will pursue activities that maintain sustainable livelihoods of coastal communities. For fisheries specifically, the focus will be on strengthening governance, adopting rights-based management, and enhancing value-added in fisheries, coastal zone management, and aquaculture.

THE CLEAN AGENDA IN AFRICA

CHALLENGE. Africa is dealing with the pollution impacts of a long history of mining for gold, diamonds, uranium, chromium, nickel, bauxite, cobalt, and coal. The mining sector is a major source of employment and foreign exchange, yet years of unsafe and environmentally destructive mining practices have polluted land and water bodies and

threatened human health. This is a particularly difficult challenge in the artisanal mining sector, which is a major source of employment in the Region.

Many of Africa's largest mineral reserves remain unexploited and are located in the heart of the Congo Basin or in other isolated, forest-covered lands or protected savannah. Its rivers also remain relatively unexploited for hydropower. Despite the potential threats to these important ecosystems, Africa needs to carefully develop its hydropower and mineral resources to finance growth for development. The challenge is doing this in a sustainable manner.

A major challenge and opportunity comes from Africa's fast-growing cities. Some 62 percent of Africa's urban population lives in slums, where and poor sanitation, drainage, and solid waste management pose substantial health risks and contribute to urban flooding, pooling of stagnant water, and associated waterborne diseases. Low-lying coastal cities are especially vulnerable to coastal flooding and climate change. Untreated industrial and urban waste and wastewater is increasingly contaminating rivers, reducing the quality and availability of water for productive purposes.

RESPONSE. Managing the sustainable development of mining, oil, and gas (non-renewable natural resources), including social and environmental considerations and corporate social responsibility, through extractive industries projects and technical assistance will continue to be a priority of the WBG's Africa Region.

Enhancing the enabling environment for responsible private sector investment will also be important. Through technical assistance, the Africa Region aims to ensure that transparent environmental regulatory frameworks and competent institutions for monitoring environmental compliance are available.

New analytical work on hazardous waste, persistent organic pollutants, and the clean agenda overall will be undertaken. Projects that assist countries to meet safeguards policy requirements will continue.

Urban environmental sanitation upgrading will be piloted in a few countries, initially in South Africa and Ghana, while traditional financial support and technical assistance will be pursued in other countries. The Region will continue to support the Lighting Africa initiative, a joint IFC and World Bank program that helps develop commercial off-grid lighting markets in sub-Saharan Africa as part of the WBG's wider efforts to improve access to energy. Lighting Africa is mobilizing the private sector to build sustainable markets to provide safe, affordable, and modern off-grid lighting to 2.5 million people in Africa by 2012 and to 250 million people by 2030.

THE RESILIENCE AGENDA IN AFRICA

CHALLENGE. The biggest challenge for Africa's resilience rests in addressing its land and soil degradation, an increasingly severe problem that affects at least 485 million people in sub-Saharan Africa. About 25 percent of the continent's land area faces high to very high rates of soil degradation. Agricultural productivity is dependent on underlying soil fertility and availability of sufficient, good-quality water. Soil degradation reduces fertility and productivity and reduces resilience by making these degraded soils more vulnerable to the impacts of drought, flood, and heat stress.

Water scarcity is another major challenge. More than half of Africa's people live in areas facing water scarcity or stress. And even though rivers are abundant in much of the continent, sound watershed and river basin management is urgently needed.

RESPONSE. The TerrAfrica partnership provides a vehicle for addressing bottlenecks, creating an enabling environment for mainstreaming and financing effective nationally driven sustainable land management strategies through coalition building, knowledge management, and investments. In parts of Mali, Niger, and Burkina Faso, there has been a massive greening, due in large part to farmer-managed regeneration of tree cover as well as local innovations such as "zai" planting pits.

Through the CIFs, the Pilot Program for Climate Resilience aims to pilot and demonstrate ways in

which climate risk and resilience may be integrated into core development planning and implementation. The pilot programs and projects implemented under the PPCR are country-led and build on National Adaptation Programs of Action and other relevant country studies and strategies.

Coastal zone and flood mitigation is expected to become an area of increased investment, through mainstreaming resilience into infrastructure and subnational regional projects or through specific operations such as the proposed Senegal Flood Prevention and Drainage Project. The World Bank's Africa Region will continue to provide assistance to river basin programs; new areas of intervention include country-specific water assistance strategies.

East Asia and the Pacific

Rapid economic growth, urbanization, and industrialization combined with an unsustainable use of the natural resource base are leading to degradation of air, water, land, and their related environmental services in the East Asia and the Pacific (EAP) Region. This is threatening sustainable economic development and affecting people's health and livelihoods. Policy, institutional, and related governance elements have not evolved rapidly enough to cope with rapid changes, nor has the implementation and enforcement capacity of existing systems developed fast enough. Global and regional environmental



externalities have rapidly intensified, resulting in a major environmental footprint of the Region

As part of the overall strategy to address these challenges, the World Bank's EAP Region will provide analytical support and technical assistance, and facilitate knowledge creation, including South-South collaboration; further develop the regional lending portfolio of environmental and natural resources management operations; expand and deepen the mainstreaming of environmental management in the regional sector lending program; facilitate financing through a combination of global environmental programs, lending products, and other leveraged sources of environmental finance, including GEF; and further develop the regional climate change portfolio with attention to synergies between emissions reduction, climate adaptation, and disaster risk management.

THE GREEN AGENDA IN EAST ASIA AND THE PACIFIC

CHALLENGE. The “green” challenges facing the EAP Region are significant and affect all ecosystems. In most countries in the Region, deforestation and forest degradation have been significant in the past 10 years. There has also been significant degradation of the Region's vast coastal and marine habitats, including overexploitation of coastal and marine resources, resulting in unsustainable aquaculture practices and a significant loss of productivity of capture fisheries. Watershed degradation has increased dramatically, leading to large-scale impacts on the availability and quality of land and water resources. These stresses combined with demand for wildlife and other natural products have taken a toll on biodiversity.

RESPONSE. WBG activities to promote the green agenda in EAP will include both demonstration and scale-up projects. The Region will have a stronger forestry and sustainable forest management portfolio, reflected in increased climate and biodiversity focus, particularly in China, Lao PDR, Indonesia, and Vietnam. Expanded partnerships with NGOs, donors, and global programs, notably through the Greater Mekong Subregion Program and the broader REDD+ and Global Tiger Initiative, will be a priority.

The coastal and marine resource conservation and management portfolio will further develop with combined attention to the recovery and sustainability of the resource base. Priorities will include Indonesia, Vietnam, the Philippines, and the Pacific Islands. Engagement in water-basin management will continue, following an integrated land and water management approach, with larger-scale national-level interventions in China, Vietnam, and the Philippines and at the regional level through the integrated Mekong river basin management project.

THE CLEAN AGENDA IN EAST ASIA AND THE PACIFIC

CHALLENGE. The EAP Region is an important source of GHG emissions and a major producer and consumer of ozone-depleting substances. Some of its cities have the worst air pollution in the world. Many rivers are heavily polluted, resulting in direct impacts on livelihoods, health, and the sustainability of activities like agriculture and fisheries. Rapid population growth, increased income levels, and urbanization are triggering rapidly growing waste production.

RESPONSE. The EAP Region will expand its GHG emission reduction projects, with increased emphasis on sustainable urban development and sustainable transportation. Renewable energy and energy efficiency will remain a strong part of the regional portfolio, with large investment programs and an active policy and institutional dialogue in most countries.

The Region will expand policy dialogue, technical assistance, and advisory services for the development of carbon markets and for the mobilization of other sources of climate and green finance. It will pilot work on technology transfer and MRV. The Region will complete the transition from chlorofluorocarbons to hydrochlorofluorocarbons, with projects in China, Vietnam, Indonesia, and Thailand to support the implementation of the Hydrochlorofluorocarbon Phase-out Management Plan.

Addressing water pollution will be a major priority through a large urban and rural water sanitation program and broader approaches, such as water

basin pollution reduction in China and Vietnam. The East Asia Seas programmatic GEF platform will contribute to these efforts.

THE RESILIENCE AGENDA IN EAST ASIA AND THE PACIFIC

CHALLENGE. The Region is highly vulnerable to short- and longer-term climate risks. Most countries in the Region (from the Pacific Islands to the Philippines, Vietnam, and Mongolia in particular) are extremely vulnerable to climate variability and the associated increased frequency and impacts of natural disasters. The resilience of water and coastal systems and related urban and rural livelihoods present countries with some of their most critical challenges.

RESPONSE. To meet the resilience challenge, climate risk is increasingly reflected in the WBG's lending portfolio through expanded mainstreaming in sectoral lending operations in most countries. In the Philippines, Vietnam, and the Pacific Islands, attention will focus on linking disaster risk reduction and climate adaptation through joint programs and platforms. In the Pacific, priorities will include scaling up and enhancing effectiveness of partnerships, alignment, and harmonization. Mainstreaming of adaptation in agriculture and coastal infrastructure will be a growing line of activity, with large operations expected in China, Vietnam, and the Philippines. Ecosystem-based adaptation will be promoted in several countries through analytical work and pilot projects in Vietnam, Lao PDR, and the Philippines.

Europe and Central Asia

THE GREEN AGENDA IN EUROPE AND CENTRAL ASIA

CHALLENGE. The challenge for the Europe and Central Asia (ECA) Region will be maximizing wealth creation from natural resources and the sustainability of natural resource-based economic activities. Forest resources are a major source of employment, timber, and ecological services in ECA.

RESPONSE. A principal focus of ECA is sustainable forest management, with an emphasis on governance, the role of communities and the private sector, and conservation and environmental services, including carbon sequestration. In addition to a portfolio of forest investments, the program is supporting institutional reforms and capacity building through improving Forest Law Enforcement & Governance, innovative financing for sustainable forest management (such as payment for environmental services in Albania and Kosovo), afforestation and carbon finance (in Bulgaria, Central Asia, Poland, Czech Republic, and Latvia), and systems of forest inventories and tracking, as well as certification.

THE CLEAN AGENDA IN EUROPE AND CENTRAL ASIA

CHALLENGE. Relative to GDP, carbon emissions in ECA are among the highest in the world. So the Region faces dual challenges of managing its energy security while maximizing options for cleaner energy. Russia is one of the world's largest carbon dioxide emitters, and other countries in the Region have significant emission levels as well. But the region also faces a potential energy crunch. While the financial crisis has provided some breathing room to address the potential energy constraints, countries need to act quickly to take advantage of this window of opportunity by promoting an attractive climate for investment.

Pollution management with shifting attention to new models for managing industrial pollution continues to be a major challenge in ECA. Meeting this challenge will involve addressing current and future pollution flows and associated risks, as well as legacy pollution and brownfield regeneration. The cleanup, containment, and remediation of land, ground, and surface water pollution remain important priorities in many countries. For EU member states and accession countries, the EU requires adherence to community environmental standards and practices, as well as incentives for governments to put in place adequate policies and build capacity for mitigating existing damage and preventing future harm.



RESPONSE. The ECA Region is engaged in a large and multifaceted program of energy supply augmentation and modernization, with a significant focus on clean energy options. In a number of countries, new “green economy” studies are being undertaken to assess the implications of implementing EU policies on cleaner production and consumption as well as climate change. In Turkey, the Private Sector Renewable Energy and Energy Efficiency Project is helping increase privately owned and operated renewable energy production within a market-based framework. And in the Ukraine, a new project is supporting investments in energy-saving measures in industrial companies, municipalities, and municipally owned enterprises and energy service companies.

Efforts to address legacy pollution include a major project in Kazakhstan to prevent the further

migration of historical industrial pollution to residential areas. In Moldova, the Persistent Organic Pollutants Stockpiles Management & Destruction Project safely managed and disposed of stockpiles of POPs, contaminated pesticides, and polychlorinated biphenyls (PCBs) from obsolete stockpiles and old electrical equipment. And in Belarus, the Integrated Solid Waste Management Project includes a POPs component to address PCBs and obsolete POPs pesticides in meeting the requirements of the Stockholm Convention.

THE RESILIENCE AGENDA IN EUROPE AND CENTRAL ASIA

CHALLENGE. Much of the adaptation needed to make ECA more resilient to climate change has substantial co-benefits. Improved water resource management, better performing water utilities and

energy systems, and upgraded transportation infrastructure are needed, independent of climate change. The gains from improved agricultural practices would be many times more significant than the changes expected from climate change. Similarly, cleaning up environmental hotspots, stepping up disaster management, and renewing investment in hydro-meteorological services would benefit individual welfare and economic output.

RESPONSE. The Region has launched programs for the modernization of hydro-meteorological services in Russia, Moldova, and the countries of Central Asia. These programs also target enhanced emergency preparedness and planning and better institutional coordination in flood-prone river basins.

In Turkey, after 15 years of investments in traditional watershed rehabilitation, the World Bank's ECA Region is supporting the development of a National Basin Management Strategy to inform the government's longer-term investment program in watershed rehabilitation and water management. In Tajikistan (one of the most vulnerable countries to climate change in Central Asia), the PPCR is providing focused financing to mainstream climate resilience across all development activities.

Improved pasture management is also helping build climate resilience with projects in Tajikistan, the Kyrgyz Republic, and Kazakhstan.

Latin America and the Caribbean

THE GREEN AGENDA IN LATIN AMERICA AND THE CARIBBEAN

CHALLENGE. The unique and rich biodiversity resources of the Latin America and Caribbean (LAC) Region continue to be under threat from settlements, inappropriate agriculture, logging, and mining, as well as from inadequate protected areas management.

LAC still has the world's highest forest cover. However the LAC Region made the highest contribution to global GHG emissions from deforestation and forest degradation between 2000 and 2010 as

large-scale afforestation in China offset the emissions from deforestation and degradation in Asia.

The Region's long coastlines and wetlands, extensive chain of biodiversity-rich coral reefs, and some of the world's largest fisheries (in Peru and Chile) are also under pressure. Threats from unsustainable resource mining and pressures from coastal real estate, pollution, infrastructure, and tourism development are further exacerbated by climate change impacts (including more-frequent hurricanes, floods, and sea-level rise).

RESPONSE. LAC is strengthening its green agenda by undertaking analytical work to underpin the economic value of functioning ecosystems, investing in biodiversity protection, and mobilizing innovative sources of financing, including through the linkage between biodiversity and climate change. Through participation in the WAVES partnership, this work includes shifting toward greater recognition of the economic value of ecosystems and biodiversity services and of the high economic costs of their loss. It also supports the management of protected areas (Brazil, Peru, Bolivia, and the Organisation of Eastern Caribbean States), the integration of biodiversity conservation into productive landscapes (Uruguay, Mexico, Brazil, and Panama), and the use of payments for environmental services (Costa Rica, Mexico, and Brazil). Work will also be stepped up to meet the growing interest in forest carbon partnerships (REDD+, for example in Mexico and Costa Rica) and forest investment programs (Mexico, Peru, and Brazil) to build institutional capacity, forest governance, and information, as well as investments in forest mitigation efforts.

THE CLEAN AGENDA IN LATIN AMERICA AND THE CARIBBEAN

CHALLENGE. The LAC Region continues to be plagued by persistent environmental health risks from urban air pollution, indoor air pollution, and inadequate access to improved water sources and sanitation, all of which result in higher health costs.

Rising industrial pollution combined with weak monitoring and enforcement further compounds the



contamination of air, water, and soil from emissions and effluent discharges. The increase in prices of key metals and higher fuel prices are exacerbating pollution and the negative environmental legacies of the mining and hydropower sectors.

Several countries have weak environmental institutions and poor environmental governance. Despite progress made to strengthen legal and regulatory frameworks, monitoring and enforcement remain a challenge, and incentives to improve environmental management are inadequate. Fiscal constraints in the aftermath of the financial crisis compound this challenge and make environmental enforcement budgets tighter.

RESPONSE. LAC is the most urbanized region in the world, so support for countries to move toward a cleaner development path is a high priority for the

region. Priorities in this area include supporting countries like Peru and Colombia to strengthen their health evaluation analysis capacity in order to help identify priorities for action. Supporting countries like Argentina and Uruguay to strengthen their industrial pollution abatement and cleaner production processes is another key priority, while for Brazil, encouraging “green cities” by incorporating environmental considerations into urban planning and design is a key focus.

THE RESILIENCE AGENDA IN LATIN AMERICA AND THE CARIBBEAN

CHALLENGE. Some of the countries most vulnerable to the effects of climate change, sea-level rise, and natural disasters are found in this Region. In many countries in LAC and in the Region as a whole, GHG emissions from the transportation and energy

sectors are expected to rise in tandem with rising motorization rates.

RESPONSE. LAC is increasingly addressing the need for enhanced climate resilience by boosting work in adaptation, mitigation, and disaster risk management, using a variety of instruments.

Examples of this work include:

- Pioneering and developing low-carbon growth strategies through changes in land use (including smart agriculture) and in the energy, transportation, and waste management sectors (Mexico, Brazil, and Colombia)
- Using Carbon Finance-Assist to help countries and subnational entities develop low-carbon growth strategies (Rio de Janeiro, Brazil)
- Providing support in the Nationally Appropriate Mitigation Actions process to help governments identify new and country-driven mitigation opportunities (Mexico, Chile, Colombia, and Costa Rica)
- Developing climate change adaptation strategies at subnational levels (Mexico and Brazil's north-eastern region)
- Supporting renewable energy and energy efficiency investments (such as appliance efficiency in Mexico and Argentina, distributional efficiency in Brazil, wind and solar energy in Mexico, and small hydro through various carbon finance projects).

Middle East and North Africa

THE GREEN AGENDA IN THE MIDDLE EAST AND NORTH AFRICA

CHALLENGE. The long-term green challenge for the Middle East and North Africa (MENA) Region is to sustainably maximize wealth creation from fragile natural resources. MENA countries have always been water-scarce, and climate change only increases the scarcity. Despite growing urban populations, an average of 88 percent of MENA's water resources are allocated to the agriculture sector, with only 7 percent going toward domestic consumption. As urban and industrial consumption increases with standards of living, less water will be available for irrigation. Water scarcity is

aggravated by increased degradation of water quality, which primarily affects the region's poor.

High population densities and economic and population growth concentrated in a narrow coastal strip have accentuated the pressures on natural resources and environmentally sensitive ecosystems, putting further stress on water and land especially. This is posing risks for future generations, undermining the resource base that underpins growing economies, and raising the costs of mitigating negative environmental impacts, especially in coastal zones that are degraded due to overurbanization, industrialization, overfishing, and tourism development.

RESPONSE. MENA is responding to these challenges in a variety of ways. One approach is through the Region's shared seas programs, which support environmental management capacity building of the riparian countries to address pollution reduction, improved water and marine resources management, renewable energy, and sustainable fisheries. This approach follows the successful implementation of a number of projects, such as the Red Sea Strategic Action Program, the Mediterranean Technical Assistance Program, and the most recent Mediterranean Large Marine Ecosystem Strategic Partnership.

The Region's shared seas include the Mediterranean, the Red Sea and the Gulf of Aden, and the Arabian Gulf, and programs are under preparation for each of these.

The MENA-Desert Ecosystems and Livelihoods Program is a 10–15 year program, with multiple building blocks, that aims to enhance livelihoods from desert ecosystems by harnessing their value in an environmentally and socially sustainable manner. It focuses on the Region's natural deserts, which have unique and highly adapted ecosystems, rich with opportunities to improve livelihoods and preserve biodiversity.

THE CLEAN AGENDA IN THE MIDDLE EAST AND NORTH AFRICA

CHALLENGE. Air-, land-, and marine-based pollution threaten MENA's cities, waterways, and shared seas.



Pollution-related health problems, particularly in urban and industrial centers, are a significant challenge. Hazardous waste and POPs also pose a challenge in the Region. The economic cost of environmental degradation in MENA ranges from 2.1 percent in Tunisia up to 11 percent in Iran, as estimated by the World Bank in 2001 (World Bank 2001).

Coastal zones also continue to deteriorate as a result of increased population coupled with unregulated development. These threats add to sources of untreated pollution and damage the natural habitats that remain, degrading critical habitats and affecting the well-being of vulnerable coastal communities and industries, such as fisheries.

RESPONSE. MENA is taking a three-pronged approach to tackling the challenges to the clean agenda in the Region: a regional seas approach with other regional and development partners, supporting shifts to cleaner energy sources, and helping make the shift to cleaner and smarter industrial and urban development. Under

the regional seas programs, work includes the Mediterranean Environmental Sustainable Development Program aiming to integrate environment within southern and eastern Mediterranean country economic development agendas. The GEF has committed \$50 million, and the Bank is supporting the preparation of projects to be submitted under the International Waters Program.

The Gulf Environmental Partnership and Action Program aims to support environmental management capacity building and enhanced environmental cooperation among governments, the private sector, and civil society through knowledge development and investments promotion.

Continued commercialization of low-carbon, renewable energy options is another important goal for the Region. Concentrated solar power is closest to economically viable energy storage. It is therefore in a strong position to become a long-term renewable energy option, without the need for fossil

fuel backup. The World Bank is working with the African Development Bank and other partners to accelerate its expansion in the Region.

Smarter urban design and development is also a priority. Building codes that drive greater water and energy efficiencies, smart approaches to urban transport to reduce congestion, and integrated solid waste management that also reduces leaching and resulting groundwater contamination are important areas of focus.

THE RESILIENCE AGENDA IN THE MIDDLE EAST AND NORTH AFRICA

CHALLENGE. Managing vulnerability to climate change impacts like drought is a key challenge. Countries in this Region have been living with drought and water scarcity for generations, but climate change increases the need for countries to better understand the potential impacts and to integrate response mechanisms into existing institutional frameworks.

RESPONSE. The WBG is responding by generating and sharing knowledge about impacts and potential solutions. A report entitled “Adaptation to a Changing Climate in the Arab Countries” provides guidance on adaptation for all 22 Arab countries. The background documents for this report will provide input to the Fifth Assessment Report by the Intergovernmental Panel on Climate Change scheduled for 2013–14.

Also, the WBG is supporting countries by generating knowledge and providing technical assistance and investment support for water resource management. The Region has experience in efficient use of water for agriculture and wastewater reuse that can be shared. Understanding better the existing sources of water and using these more efficiently to maximize productivity gains is crucial. Efforts to map groundwater resources and increase the use of treated wastewater, and to analyze the economic costs and environmental implications of desalination, are under way.

Third, the WBG is supporting individual countries to better understand and address climate change,

climate variability, and climate impacts as part of their broader development challenges. For example, Yemen has opted to be one of nine Pilot Program for Climate Resilience countries to plan and facilitate a national transition toward a climate-resilient development path.

South Asia

THE GREEN AGENDA IN SOUTH ASIA

CHALLENGE. The Environment Sustainability Index shows that the environmental performance of countries in the South Asia Region (SAR) lags behind other countries at similar per capita income levels. The poorest areas of the Region overlap with the most environmentally stressed regions, with high levels of soil erosion, highly variable rainfall, and degraded forests.

About 80 percent of South Asia’s poor live in rural villages and depend on natural resources. Stubborn rural poverty is often a consequence of declining resource productivity and poor natural resource management, resulting in overgrazed pastures, soil erosion, and watershed and forest degradation. Recognizing the linkages between natural resource management and rural livelihoods, most countries have introduced policies to improve the sustainability of natural resource use, though policy implementation remains uneven.

The environmental impacts of forest degradation are of heightened international concern. Most of South Asia’s endemic mammals and all its charismatic species (such as Royal Bengal tigers, Asian elephant, and Asiatic rhinoceros) are classified as either threatened or endangered. Loss of productivity as a result of natural resource degradation is associated with significant economic impacts. Land degradation across the region leads to annual losses amounting to at least 7 percent of the value of output, which is sufficient to offset the gains from innovation and infrastructure improvements.

RESPONSE. The SAR Region is supporting the promotion of environmental mainstreaming in key natural resource sectors and regional approaches to



biodiversity conservation. Some examples include the following:

- *Analytical Work:* The Bhutan Country Sustainable Development Analysis measures the country's wealth, including natural, human-made, human, and social capital. The analysis links natural resource management policies and the development agenda, such as scope for valuing and paying for ecological services. The study on promoting nature-based tourism for the management of protected areas and elephant conservation in Sri Lanka explores how Sri Lanka's exceptionally well endowed natural assets can be used to generate revenue for conservation.
- *Safeguards Support:* Support for the Pakistan Punjab Irrigation DPL led to reforms aimed at strengthening the capacity of the Punjab Irrigation Department for assessing and

mitigating environmental risks. A Social and Environmental Management Unit was set up within that department. With safeguard support from the World Bank, the National Road Development Agency in India established a transformative approach in the expansion of the rural road network to prevent ecosystem fragmentation and reinstating connectivity.

- *Lending:* An Adaptable Program Loan on Strengthening Regional Cooperation for Wildlife Protection in Asia supports the conservation and protection of wildlife species in Bangladesh, Bhutan, and Nepal. The project will help participating governments build or enhance shared capacity, institutions, knowledge, and incentives for tackling illegal wildlife trade and other regional conservation threats to habitats in border areas. The government of Himachal Pradesh in

India has embarked on a program to make a transformational shift toward a model of sustainable economic growth, at the core of which is the objective to become carbon-neutral by 2020.

THE CLEAN AGENDA IN SOUTH ASIA

CHALLENGE. Environmental health impacts are exerting a heavy toll on economies in SAR. According to World Bank estimates, environmental degradation costs between 5 and 10 percent of GDP in India, Bangladesh, Nepal, and Pakistan. The largest share of these costs is associated with environmental health impacts, accounting for about 20 percent of the total burden of disease in the Region, comparable to malnutrition.

Environmental standards have emerged as one of the key factors determining global competitiveness, particularly in the pollution-intensive sectors that abound in the region (such as extractive industries, textiles, leather, and pharmaceuticals). Globalization has created further incentives to harness environmental gains. The reputational risks associated with environmental issues, coupled with the need for exporters to comply with international environmental norms, have highlighted the importance of environmental issues to policy makers.

New industrial policies and innovative public-private partnerships are key to fostering socially and environmentally compliant industrialization and sustainable growth, to enhancing competitiveness on world markets, and to avoiding irreversible impacts on the environment.

RESPONSE. The SAR approach to the clean agenda in the region includes promoting structural transformations for reducing the costs of environmental degradation on human health and reducing pollution from key sources. For example:

- *Analytical Work:* Structural Change and Green Industrial Growth in Pakistan identified opportunities to integrate environmental management into Pakistan's industrial growth policies, reduce the costs of environmental degradation, spur technological innovation, enhance product quality, reduce firms' pollution-related financial and reputational risks, and create new business

opportunities. The Bank led the first comprehensive study to improve the brick-making sector in Bangladesh and to introduce alternative technologies that consume less energy and emit lower level of pollutants and greenhouse gases.

- *Safeguards Support:* The India: Punjab Rural Water Supply and Sanitation Project financed investments in rural water supply and drainage improvement schemes to serve Punjab's rural populations. It incorporated requirements for contractors to comply with regulations aimed at mitigating negative environmental impacts of such projects. The client commissioned environmental impact studies in terrestrial biodiversity, managed river flows and archeological and cultural resources, and conducted a review of the cumulative impact assessment of hydropower development.
- *Lending:* The National Ganga River Basin Project is the largest World Bank investment loan in the environment sector. The project aims at cleaning and conserving the Ganga River through a multisector program, with the medium-term goal that no untreated municipal or industrial wastewater will flow into the main stem of the river after 2020.

THE RESILIENCE AGENDA IN SOUTH ASIA

CHALLENGE. The SAR region is expected to face increased vulnerability to extreme climatic events, including more-intense weather, floods, and drought. Climate change is also expected to reduce agricultural productivity, potentially increasing malnutrition, decreasing water availability in many areas, and affecting people's livelihoods negatively.

An estimated 750 million people (more than 50 percent of the Region's population) have been affected by a natural disaster over the last 20 years, resulting in more than 230,000 deaths and about \$45 billion in damages. Livelihoods are highly susceptible to climate change impacts, due to high levels of poverty and population density, heavy reliance of the economy on the monsoon, and susceptibility to natural disasters.

Sea-level rise is another critical threat, particularly for coastal India, the Maldives, Bangladesh, and Sri

Lanka. Severe impacts are expected to challenge the region to undertake further adaptation measures that are consistent with, and enhance, the region's development objectives of accelerating growth and improving living standards and incomes.

RESPONSE. SAR's approach to the resilience agenda includes increasing the resilience of ecosystems, infrastructure and highly vulnerable areas.

Examples of interventions include:

- *Analytical Work:* Results from the report *Climate Change Adaptation, Biodiversity Conservation and Socio-Economic Development in the Sundarbans* areas of West Bengal, India, and Bangladesh enabled investments of more than \$1 billion by the government of India in West Bengal. The technical assistance also promoted a platform for dialogue between West Bengal and Bangladesh regarding the Sundarbans region.
- *Safeguards Support:* One of several actions that was part of the safeguards support to enhance the Sindh Education Sector Reform Project's positive environmental effects included hiring specialists to assess the flood and earthquake risks in the area. Their work led to interventions that included school seismic resistance structures and guidelines to reduce the vulnerability of schools to floods, earthquakes, and other natural disasters.
- *Lending:* The India Integrated Coastal Zone Management Project helps build the appropriate institutional arrangements, capacity, and advanced knowledge systems for mapping and delineation of hazard lines and ecologically sensitive areas, setting up a world-class national center for sustainable coastal zone management, and preparing integrated coastal zone management plans. The project will also help pilot this approach in three coastal states—Gujarat, Orissa, and West Bengal.



From Actions to Results



Results Measurement

A FOCUS ON RESULTS IS AT THE HEART OF THE WORLD BANK GROUP'S APPROACH TO DELIVERING PROGRAMS AND POLICY ADVICE. Environmental and natural resources management is no exception. Measuring, monitoring, and demonstrating environmental sustainability results of projects and programs the WBG supports is critical for greener, cleaner, more resilient growth and to make the best use of scarce development finance.

The results framework presented here is geared to support the Environment Strategy to deliver on measurable results. It is organized in a structure that groups indicators along the results chain. The results framework maps the actions discussed in Chapter 5 to output and outcome results and proposes a number of indicators to track progress over time at the project level (see Table 7.1). These indicators may be refined over time as the World Bank Group continues to standardize core sector indicators. (A core indicator is an output or outcome indicator that can be easily measured and monitored at the project level and that can be aggregated across projects and countries; core indicators form part of the project's results framework.) As appropriate, baseline indicators of outcome and output results will be established during the first year of the Strategy implementation, considering that the main purpose of the results framework is to measure the contribution of WBG-supported actions to achieving green, clean, resilient growth during the 10-year period of Strategy implementation.

Guiding the Bank Group's actions are country and global level environmental outcomes that cannot be

attributed to the actions of the World Bank Group alone. Indicators for these global outcomes and the baseline are detailed in Table 7.2. Finally, Table 7.3 sets input indicators and baselines that will help to monitor, at an aggregate level, the efficiency and effectiveness of the World Bank Group's actions. The results framework for the WBG Environment Strategy contains 61 indicators: 20 global indicators, 34 output and outcome indicators, and 7 input indicators.

Implementation Risks

CHANGE OF GLOBAL ENVIRONMENTAL PRIORITIES. Implementation of the Strategy will require the commitment of substantial resources from donor countries. However, the global financial crisis that has recently evolved into an economic crisis has not only put the eurozone in jeopardy, it may also lead to another recession, which could compromise the commitment of developed countries to a strong environmental and climate change agenda such as that proposed in the Strategy. Politically, the crisis may result in more-conservative donor governments that focus on reducing fiscal deficits, further constraining their capacity to support developing countries and resulting in reprioritization of national and global environmental issues and policies. To address these risks, the WBG would need to sharpen its analytical and policy work to strengthen the promotion of greening growth. The business case of the environment strategy would be to demonstrate how a green economy can create jobs and open new opportunities for technological innovation globally. This would require the WBG to strengthen existing partnerships and develop new ones with MDBs, U.N.

agencies, civil society, and particularly the private sector. Client countries may have an opportunity in pushing forward the technological and political frontiers around greening growth.

INSTITUTIONAL AND GOVERNANCE WEAKNESSES.

Institutional and governance weaknesses can constrain the results achieved in client countries. The WBG will seek to help countries become more strategic in addressing environmental issues. Managing institutional and governance risks in client countries will require an approach that focuses on a few but critical priorities, that fosters

inclusive participation in growth and environmental policies, that attracts capital and entrepreneurial capacity for green business, and that facilitates free access to information and social accountability. Making the environmental agenda a key component of an inclusive growth agenda could be particularly fruitful in countries plagued by the natural resource curse or affected by conflicts. Under the Strategy, the WBG will give priority to supporting countries so that they can realize the value of their environmental and ecosystem services through participating in emerging markets and enhancing management of natural resources and rents.



TABLE 7.1
Results framework: Project-level results

STRATEGIC DIRECTION	ACTIONS	OUTPUT AND OUTCOME RESULT	RESULT INDICATOR
1. GREEN	Support countries on valuation of ecosystem services and wealth accounting, including health of oceans and marine biodiversity	Incorporated environmental accounts in national account systems	<ul style="list-style-type: none"> Number of countries supported by the WBG in wealth accounting that estimate comprehensive wealth in their national account systems
	Leverage work on oceans, fisheries, marine ecosystems, and coastal resources	<p>Partnerships to harmonize approaches to seafood certification and mobilize “blue carbon” financing</p> <p>Strengthened enforcement and regulatory capacity for fishing and coastal zone management</p> <p>South-South collaboration facilitated through knowledge platforms on oceans</p>	<ul style="list-style-type: none"> Number of partnerships including South-South collaboration agreements with financial contribution by the WBG for sustainable development of fisheries, marine ecosystems, and coastal resources Marine areas brought under biodiversity protection (ha) Coastline and freshwater brought under biodiversity protection (km)
	Expand financial and policy reform support for natural resource management and biodiversity	<p>Increased client capacity to access financial resources for landscape and forest management and for biodiversity protection</p> <p>Attached “wildlife premium” to climate finance</p> <p>Improved accountability and transparency of revenue management through EITI</p> <p>Strengthened systems to protect biodiversity and combat illegal wildlife trade and wildlife crime</p>	<ul style="list-style-type: none"> Number of countries supported by WBG in carbon finance newly accessing forest carbon markets or receiving “wildlife premiums” Number of countries brought under EITI compliance as a result of WBG support Number of countries supported by the WBG in controlling wildlife crime that enforce CITES or in other ways control wildlife crime
	<p>Strengthen capacity in strategic environmental assessment and country environmental analysis, including analysis on ecosystem services</p> <p>Coordinate with MDBs, GEF, and U.N. agencies to ensure a coherent approach for environmental and social safeguarding of REDD+ activities</p> <p>Revitalize program focusing on pricing biases, subsidies, and market and trade barriers to environmental goods and services; promotion of sustainable supply chains</p> <p>Update and consolidate WB safeguard policies</p>	<p>Improved effectiveness in protecting the environment, conserving biodiversity, and reducing poverty and inequality in WBG-supported projects</p>	<ul style="list-style-type: none"> Areas brought under enhanced biodiversity protection (ha) New areas outside protected areas managed as biodiversity-friendly (a) (ha) Area restored, afforested, or reforested with support of the WBG (ha) Number of forest officials trained with support of the WBG A harmonized approach for applying environmental safeguards to REDD+ activities established Number of target population with land use or ownership rights recorded Target land area with use or ownership rights recorded (ha) Number of countries supported by the WBG on environmental policy, economic tools, and technological development that have established marketable permits and have reduced or eliminated harmful subsidies or barriers to transfer and to using win-win technologies Number of IFC clients that monitor degradation or conversion of critical natural habitats

STRATEGIC DIRECTION	ACTIONS	OUTPUT AND OUTCOME RESULT	RESULT INDICATOR
2. CLEAN	Support pollution management by strengthening environmental health valuation analysis, enhancing environmental governance frameworks and policy tools, and addressing environmental legacies Support improved nutrient management and control of agricultural runoff	Reduced pollution sources Expanded use of clean cookstoves Increased bus rapid transit systems as a low-cost green alternative Reduced river pollution	<ul style="list-style-type: none"> ● Number of new sewer connections constructed under the WBG project ● Number of people trained to improve hygiene behavior or sanitation practices under the WBG project ● Number of people in urban areas provided with access to regular solid waste collection under the project
	Continue support to addressing legacy pollution and water basin cleanup	Reduced public health risks from legacy pollution and past industrial activities, including enhanced management of persistent organic pollutants	<ul style="list-style-type: none"> ● Number of households benefiting from project components that reduce indoor air pollution
	Increase support to low-carbon development	Improved access of clients to renewable energy Enhanced technical knowledge, capacity, and carbon market infrastructure of clients Increased climate change co-benefits	<ul style="list-style-type: none"> ● Percentage of trips conducted using public transport that were facilitated by WBG support ● Volume (mass) of biological oxygen demand pollution load removed by treatment plant outlets financed under WBG projects (tons/year) ● Persistent organic pollutants and POPs-containing waste disposed of in an environmentally sound manner (b) (tons) ● Amount of GHG emissions reduction generated with support of WBG special climate change finance instruments ● Number of people newly gaining access to renewable electricity under the project by household connections ● Generation capacity of renewable energy constructed (MW)
	Establish a WBG corporate environmental management framework and accountability structures	Reduced environmental footprint of WBG corporate activities	<ul style="list-style-type: none"> ● Sustainability targets and progress metrics for WBG internal processes are set

STRATEGIC DIRECTION	ACTIONS	OUTPUT AND OUTCOME RESULT	RESULT INDICATOR
3. RESILIENT	<p>Facilitate access to knowledge, learning, and data on climate information and climate risk assessment</p> <p>Support policy and institutional reforms to promote resilient development and incorporate climate-related disaster risk management</p> <p>Pioneer work on climate risk insurance</p>	Increased capacity of clients, small island states, and local communities to adapt to climate change and to manage climate-related disaster risks	<ul style="list-style-type: none"> ● Number of people provided with access to improved water sources by WB operations incorporating climate resilience ● Percentage of hydropower projects supported by the WBG that address river basin planning and water use management in planning and design ● Number of countries supported by the WBG on natural disaster management and response
	Scale up support to agriculture to enhance soil fertility and land, forest, and water management	Enhanced productivity, value-added, and diversification in agricultural production (smart-climate agriculture)	<ul style="list-style-type: none"> ● Area provided with new/improved irrigation and drainage services (ha) ● Number of beneficiaries who have adopted improved technologies in agriculture operations that incorporate climate resilience ● Land area brought under sustainable land management practices (c) (ha) ● Number of land users, supported by the WBG project, who have adopted sustainable land management practices

(a) This indicator measures the number of terrestrial hectares outside protected areas where, as a result of the World Bank operation, the site is managed at least in part to obtain biodiversity gains. An area defined as biodiversity-friendly complies with social and environmental standards in a way that respects civil and indigenous rights, maintains or enhances social and environmental conservation values, prohibits highly hazardous pesticides and invasive planting, and uses harvesting methods that meet national laws and international treaties on biodiversity signed by the country in which the site is located.

(b) Persistent organic pollutants are defined by the Stockholm Convention. Associated guidance on environmentally sound manner is in line with international good practice. For example, the implementation of the Basel Convention is supported by the "Updated General Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with Persistent Organic Pollutants (POPs)."

(c) Sustainable land management (SLM) includes the management of soil, water, vegetation, and livestock resources through the following activities: preserving and enhancing the productive capabilities of cropland, forestland, and pastures/grazing land; sustaining productive forest areas and forest reserves; maintaining the integrity of water conservation zones and watersheds for water supply and hydropower generation; protecting the ability of aquifers to serve the needs of farm and other productive activities; and rehabilitating degraded lands. SLM practices include approaches and technologies to enhance land quality.

TABLE 7.2
Results framework: Country-level and global results

GLOBAL OUTCOME INDICATORS	WORLD BASELINE
GREEN	
Change in natural capital per capita (% , 1990–2005)	9
Adjusted net savings (% of GNI)	6
Forest area (% of land area)	31.1
Deforestation (average annual % , 1990–2010)	0.1
Terrestrial protected areas (% of land area)	12.5
Marine protected areas (% of world oceans, 2010) (a)	1.17
Bird species threatened (b)	571
Mammal species threatened (b)	1207
Plant species (higher) threatened (b)	4295
CLEAN	
CO ₂ emissions per capita (tons)	4.6
CO ₂ emissions per unit of GDP (kg/1000 of 2005 PPP \$)	485.4
Electricity generated using fossil fuel (% of total)	67.2
Energy from biomass products and waste (% of total energy)	9.8
Particulate matter 10 microns (PM10) (micrograms per cubic meter; urb-pop, weighted-aver)	46
Annual freshwater withdrawals (% of internal resources)	9.0
Under-five mortality rate (per 1000)	61
RESILIENT	
Access to improved sanitation (% of total population)	61
Access to improved water source (% of total population)	87
Cereal yield (kg per ha)	3,566
Adjusted net national Income per capita of small island states (2009 \$)	3,798

Source: World Bank 2011a, 2011b; (a) IUCN 2010, Table 3.1; (b) IUCN 2011, Table 4a. Unless otherwise indicated, the global indicators are for 2011.

TABLE 7.3
Results framework: Operational effectiveness—input indicators

GENDER PARAMETER (A)	IDA BASELINE FY2007–09	IDA PERFORMANCE STANDARD FY2012–14	IBRD BASELINE FY2007–09	IBRD PERFORMANCE STANDARD FY2012–14
Percentage of projects (mapped to Environment) with gender analysis, gender-inclusive consultation, or both	36	100	0	100
Project preparation speed (b)	IBRD-IDA baseline FY 2011		IBRD-IDA FY 2015	
Investment lending speed in months – project concept development to approval	10			
IEG satisfactory/successful rating	World Bank ^c baseline FY 2002-2008	World Bank FY 2015	IFC ^d baseline FY 2007-09	IFC FY2015
Percentage of projects rated satisfactory or better	77		65	
Internal learning	World Bank baseline FY 2011		World Bank FY 2015	
Participant hours of environment mapped staff (e)	7622			
AAA satisfactory/successful rating	World Bank baseline FY 2010		World Bank FY 2015	
Percentage of Analytical and Advisory Activities' objectives largely accomplished (f)	75			
Climate change parameters	World Bank baseline		World Bank FY 2015	
Number of CASs that discuss climate change vulnerabilities	Data to be reported starting in 2012			
	World Bank Group baseline FY 2010		World Bank FY 2015	
GHG emissions in internal processes (tons of carbon dioxide equivalent) (b)	220,403 (carbon-neutral)			

Source:

(a) Annex 1, Targets for Monitoring Progress in Gender Integration in Operations: Approach for the Sustainable Development Network, internal World Bank document, May 6, 2010.

(b) World Bank.

(c) Table E.5, IEG 2009. The percentage is of World Bank projects mapped to Environment. They are rated moderate, satisfactory, or highly satisfactory.

(d) IEG 2011. A four-point scale is used to rate environmental and social effects (ESE) of IFC's projects as unsatisfactory, partly satisfactory, satisfactory, or excellent. ESE is an indicator of environmental effectiveness that measures project performance in meeting IFC's requirements and performance standards as well as their expected environmental and social impacts.

(e) World Bank.

(f) World Bank, based on Activity Completion Summary completed (89%) for Economic and Sector Work/Technical Assistance tasks mapped to the Environment Sector.





Annex 1: Actions by World Bank Group Sectors Addressing Environmental Sustainability

SECTOR	PRIORITY ACTIONS
<p>AGRICULTURE AND RURAL DEVELOPMENT</p> <p>Agriculture accounts for about 75% of global water withdrawals, about 25% of global GHG emissions (15% from livestock and crops and about 10% from deforestation for crop area expansion), and about 50% of global emissions of nitrous oxide and methane. (a)</p>	<p><i>Reduce land degradation, improve agricultural water management, and sustain forest production to enhance sustainability of natural resource management by supporting: (b, c)</i></p> <ul style="list-style-type: none"> ● Sustainable intensification of agriculture on high-potential land with restoration of watersheds and biodiversity (including forested) landscapes, use of new technologies ● Crop breeding for heat, flood, and drought-resistant varieties and enhanced productivity and agricultural diversification ● Increasing the productivity of water use, addressing drainage and salinity, and controlling water pollution from agricultural runoff ● Waste and loss reduction throughout the production and value chains ● Integrated approaches to maintain and enhance organic matter/carbon content in the soil and aboveground biomass and to reduce water use ● Multipurpose management of forests, woodlands, and rangelands that also help reduce GHG emissions and sequester carbon ● Identification and promotion of best practices in forest processing to minimize carbon emissions ● Value chains to enhance value added and productivity per unit of land, forests, and water ● Improved access to and productivity of agricultural water and water for fisheries while maintaining adequate environmental flows and reducing GHG emissions ● Enhanced food safety and food quality measures <p><i>Enhance sustainable livestock and fisheries management by:</i></p> <ul style="list-style-type: none"> ● Managing livestock and supporting animal breeding, feeding, and husbandry, with manure management and biogas generation to conserve animal and human health and animal welfare and to reduce GHG emissions, pollution, and disease risks ● Maintaining and protecting critical habitat for fish spawning ● Strengthening governance, adopting rights-based management, and enhancing value-added in fisheries and aquaculture sectors <p><i>Support price (for instance, for energy and water) and other policy measures that ensure moderate use of inputs while favoring sustainable land and water management</i></p>
<p>WATER</p> <p>About 15% of the world's population does not have access to safe drinking water, and about 40% does not have access to basic sanitation. The cost of water pollution and excessive withdrawals is not insignificant – estimates are 2–7% of GDP in the Middle East and North Africa Region. Projected changes from climate change are likely to increase the frequency and severity of floods and droughts, adding to the pressures on the reliability of and access to clean water. Other pressures are likely to mean an increase in prevalence and extent of water- and vector-borne diseases and increased malnutrition.(d)</p>	<p><i>Sustainably manage rivers, lakes, and groundwater systems and increase access to basic sanitation with specific actions that would include:</i></p> <ul style="list-style-type: none"> ● River basin, watershed, and integrated water resources management ● Re-engagement in high-risk infrastructure to invest in water storage ● Reuse of treated wastewater ● Water conservation ● Policy and institutional reform ● Capacity building to scale up demand-driven sanitation approaches and strengthen sanitation supply ● Investment in new technologies and innovation that improves efficiency of water use and increases availability of clean water and sanitation to poor populations ● Investments in early-stage water efficiency and water quality technologies and enterprises ● Water allocations for environmental use ● Management of water pollution ● Management of invasive species

SECTOR	PRIORITY ACTIONS
<p>ENERGY</p> <p>Hundreds of millions of households – women and children among them – continue to rely on traditional use of solid fuels for cooking and heating and are exposed to dangerously high levels of harmful smoke. Energy-related GHG emissions are continuing to increase and affect many aspects of environmental sustainability. (e)</p>	<p><i>Improve access and reliability of energy supply and facilitate the shift to more environmentally sustainable energy through:</i></p> <ul style="list-style-type: none"> ● Improving end-use energy efficiency and energy conservation ● Increasing supply and demand side efficiencies ● Considering high-efficiency measures and renewable energy ● Reducing indoor air pollution from household fuel use by identifying and deploying clean cooking and heating solutions ● Reducing air, water, and soil contamination ● Protecting the ecosystem by strengthening and enforcing environmental standards and regulations ● Investing in new technologies that improve the performance and lower the cost of clean energy alternatives ● Helping adopt low-carbon technologies through capacity building, examination of alternatives, identifying and obtaining financing to buy down the incremental costs of low-carbon technology development, and adoption of new clean energy technologies ● Establishing new targets on renewable energy and energy efficiency ● Assessing vulnerability of hydropower to rising temperature, of energy infrastructure to extreme weather conditions, and of wind and solar to the effects of climate change; developing adaptation options to minimize adverse impacts
<p>OIL AND GAS POLICY (SEGOM)</p> <p>The petroleum industry is a major environmental factor, with effects on the atmosphere, groundwater, coastal zones, and oceans.</p>	<ul style="list-style-type: none"> ● Reduce natural gas venting and flaring, including reduction of un-combusted petroleum (particulates and ground contamination) by improving flaring policy and regulation through SEGOM-administrated Global Gas Flaring Reduction public-private partnership. ● Reduce groundwater contamination and improve hazardous waste management within petroleum operations. ● Build environmental governance capacity in oil-producing developing countries. ● Reduce GHG emissions from power generation by building government capacity to adopt policy, govern, and regulate new natural gas developments for alternative supply to higher carbon-based power generation facilities and to reduce deforestation caused by use of biomass and charcoal as fuel. ● Reduce risk of environmental damage by improving spill prevention and response. ● Improve government policy on use of natural gas and liquefied petroleum gas for home heating and cooking. ● Support private sector and national agencies' capacity to respond to oil and gas emergencies.
<p>TRANSPORTATION</p> <p>Motor vehicles generate 90% of urban air pollution. An estimated 800,000 people die annually due to exposure to urban air pollution. The transportation sector accounts for about 15% of global GHG emissions. (f)</p>	<p><i>Reduce urban air pollution by:</i></p> <ul style="list-style-type: none"> ● Phasing out highly polluting vehicles; ● Improving public transportation, including inland railways and waterways; ● Urban road traffic demand management; ● Support for non-motorized transport; and ● Management of vehicular emissions. ● Support a mix of policies to influence changes in travel behavior, logistics decisions, technology choices, and transportation modes. ● Establish the governance, strategies, policies, and services that will deliver transportation that is economically, financially, environmentally, and socially sustainable.

SECTOR	PRIORITY ACTIONS
<p>URBAN</p> <p>Given that almost half of the world's population lives in urban areas, many urban issues are also the same as those for water, energy, and transportation. An estimated 1.7 million deaths worldwide are attributed to unsafe water, sanitation, and hygiene, particularly in densely populated urban and peri-urban areas. The urban poor living in high-density slum settlements experience higher exposure to a number of health, environmental, and disaster-related risks associated with poor drainage and solid waste management, indoor air pollution, and proximity to often environmentally unsafe areas. An estimated 70% percent of GHG emissions come from cities. About 360 million people live in urban areas in coastal zones and are vulnerable to the impacts of climate change. (g)</p>	<p><i>Promote a safe, sustainable urban environment and inclusive governance for all residents by:</i></p> <ul style="list-style-type: none"> ● Fostering policy reforms and investments in solid waste management and urban air and water quality ● Promoting a holistic approach to economic and ecological cities (Eco²) ● Encouraging greater public awareness and adoption of broader metrics on sustainable cities <p><i>Reduce per capita GHG emissions and lower emissions of other air pollutants by:</i></p> <ul style="list-style-type: none"> ● Advancing an international standard for measuring city GHG emissions, as part of an "urban metabolism" diagnostic ● Supporting city-wide approaches to carbon finance that integrate multiple sectors ● Implementing the Energy Efficient Cities Initiative (Energy Sector Management Assistance Program) <p><i>Given the large proportion of people in cities and the impacts of climate change and other disasters:</i></p> <ul style="list-style-type: none"> ● Develop tools for analyzing urban risks and vulnerability, such as Urban Risk Assessment ● Build knowledge and capacity among cities on adaptation, service delivery, and the urban poor ● Support investments in hard infrastructure and other measures to increase resilience
<p>SOCIAL DEVELOPMENT</p> <p>People affect the environment they live in, and that environment has an effect on people. Human-induced climate change threatens the long-term resilience of societies and communities. Climate change is associated with complex social responses, such as migration, conflict, and human security. Pro-poor climate change adaptation needs to consider the human dimension, understanding the social differences (including gender and generational issues) and the influence of climate change on the most vulnerable. The growing importance of reducing emissions through preventing deforestation and degradation has become a major element in planning the global response to climate change and maximizing local livelihoods and local development co-benefits. (h)</p>	<ul style="list-style-type: none"> ● Coherence at the level of policy and strategy between climate change, social protection, and disaster risk management in addressing social resilience ● Guidance based on knowledge sharing with Task Teams that are working on community driven development and social protection on pro-poor climate resilience outcomes ● Guidance based on interaction and engagement with Task Teams on poverty and social impacts analyses linked to development policy operations that address climate change ● Guidance on benefit-sharing arrangements and gender aspects of REDD+ and Community Bio-carbon Fund
<p>MANUFACTURING</p> <p>The manufacturing sector is one of the world's most GHG-intensive industries. It is estimated that 22 percent of global GHG emissions come from the manufacturing sector. Many companies are facing rising energy prices or energy access issues. Industries that invest in projects to reduce emissions, enhance energy efficiency, utilize renewable energy sources, and reuse waste are therefore netting tangible business benefits through reduced operating costs and lower GHG emissions.</p>	<ul style="list-style-type: none"> ● Promote cleaner production through improvement of operational processes to make more-efficient use of raw materials, energy, and water along a value chain among IFC's Cleaner Production Lending Facility clients. ● Promote benchmarking of good/best practice for major industrial sectors. ● Identify potential sources of financing for resource efficiency investments

SECTOR	PRIORITY ACTIONS
<p>MINING</p> <p>Demand from emerging markets is expected to keep commodity prices at high levels at least over the next few years. There is a global movement on transparency (the Extractive Industries Transparency Initiative, for example, and the Natural Resources Charter), opening opportunities for developing tools and creating the space for governance reforms.</p>	<p>Reduce water and soil pollution.</p> <p>Minimize land take, protect against loss of habitat and biodiversity (directly and indirectly), and optimize rehabilitation through:</p> <ul style="list-style-type: none"> ● Strengthened oversight capacity ● Design and broad-based implementation of best practices ● Long-term mechanisms to ensure post-mine pollution protection <p>Reduce energy intensity and decrease GHG emissions through increased efficiency of energy use, increased use of renewable energy, and recycling of materials.</p>
<p>INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT)</p> <p>It is estimated that the ICT sector contributes 2-3 percent of global GHG emissions, though the share is growing and may already be much higher.⁽ⁱ⁾ ICTs affect the level of GHGs emitted within the sector, but their larger influence lies in enabling energy efficiencies (mitigating actions) in other sectors, reducing and in some cases eliminating GHG emissions in a given process or facility. As an enabler in other sectors, ICTs are estimated to deliver carbon savings five times larger than the total emissions from the entire ICT sector in 2020. By virtue of the efficiency and logic that comes from automation and the use of computer processors and digital networks and devices, ICTs can facilitate reductions in GHG emissions and energy consumption in all walks of life (such as energy smart grid/metering, smart home, Intelligent Transport Systems, and satellite remote sensing and monitoring).</p>	<p>Encourage the use of ICTs in energy, transportation, agriculture, and water resource management sectors to derive efficiencies that in turn deliver carbon savings and reduced GHG emissions:</p> <ul style="list-style-type: none"> ● Develop sector strategies for the use of ICTs in these sectors, with a focus on efficiency gains (these sector strategies will be captured in the new ICT Strategy as concise background papers). This will cover use of ICTs for smart metering systems, grids, utility payments, logistics, and motors. ● Develop with partners the concept of CleanTech incubators (identification and development of climate change adaptation applications and green technology applications by local developers/entrepreneurs for local and global relevance). ● Provide policy guidance on the gathering and treatment of e-waste.
<p>INFRASTRUCTURE</p> <p>Several external and internal trends are shaping the future of the WBG infrastructure agenda, bringing new opportunities for change. Lack of access and aspirations for growth continue to fuel the expansion of demand for infrastructure, while the challenges of today's world—including climate change and environmental concerns—call for more complex and interconnected infrastructure solutions. The core of the Strategy lies in the WBG's ability to maintain its level of commitment in infrastructure sectors in light of these trends.</p>	<p>Continue the WBG's core infrastructure business with its focus on access and growth, while maintaining a strong record on managing the environmental impacts and risks associated with infrastructure projects:</p> <ul style="list-style-type: none"> ● Maintenance of the core business will be guided by sector-specific interventions detailed in individual sector strategies, with a focus on increased effectiveness and selectivity at the country level. <p>Use environmental considerations as an entry point to infrastructure project design, generating co-benefits between infrastructure and environment in support of "Green Growth" (green projects).</p> <ul style="list-style-type: none"> ● Examples of green infrastructure projects include green buildings, which incorporate energy- and water-efficiency features and use green materials; integrated utility management, which reuses sludge and organic waste as biogas and fertilizer; and renewable energy, which reduces GHG emissions through displacement of more polluting forms of energy. ● Several regions have identified the environment as a key priority for infrastructure going forward, including renewable energy investments, low-carbon infrastructure and sustainable urban systems in EAP, projects and knowledge addressing environmental and social sustainability in LAC, and a programmatic approach to green growth and climate change in SAR.

Sources:

(a) World Bank 2009b, (b) World Bank 2003, 2009b, (c) AU and NEPAD 2009, (d) World Bank 2010c, (e) World Bank 2009a, (f) World Bank 2008b, (g) World Bank 2010e, (h) World Bank 2011c, (i) Gartner 2007. This widely cited estimate is based on research published in 2007 but carried out in 2005, and is in turn based on data from the Intergovernmental Panel on Climate Change (IPCC) third assessment report. These reports are carried out at intervals of approximately five years, and the IPCC is currently working on the fifth assessment report, suggesting the estimate is in urgent need of updating.

References

- Ahmad, N., N. Diamond, M. Clarke, and N. Adams. 2010. *Gender and Environment*. Issues Paper, World Bank Group 2010 Environment Strategy Analytical Background Papers. Washington, DC: World Bank.
- Aburto-Oropeza, O., E. Ezcurra, G. Danemann, V. Valdez, J. Murray, and E. Sala. 2008. "Mangroves in the Gulf of California Increase Fishery Yields." *Proceedings of the National Academy of Sciences of the United States of America* 105: 10456–10459.
- Alstone, P., C. Niethammer, B. Mendonça, and A. Eftimie. 2011. *Expanding Women's Role in Africa's Modern Off-Grid Lighting Market*. Nairobi: Lighting Africa. http://www.esmap.org/esmap/sites/esmap.org/files/gender_lighting_highres_LOW%20RES.pdf.
- Amann, M., J. Kejun, H. Jiming, S. Wang, Z. Xing, W. Wei, D. Yi Xiang, L. Hong, J. Jia, Z. Chuying, I. Bertok, J. Borken, J. Cofala, C. Heyes, L. Höglund, Z. Klimont, P. Purohit, P. Rafaj, W. Schöpp, G. Toth, F. Wagner, and W. Winiwarter. 2008. *Scenarios for Cost-effective Control of Air Pollution and Greenhouse Gases in China*. Laxenburg, Austria: International Institute for Applied Systems Analysis.
- AMAP (Arctic Monitoring and Assessment Programme) and UNEP (United Nations Environment Programme). 2008. *Technical Background Report to the Global Atmospheric Mercury Assessment*. Oslo and Nairobi. http://www.chem.unep.ch/mercury/Atmospheric_Emissions/Technical_background_report.pdf.
- AU (African Union) and NEPAD (The New Partnership for Africa's Development). 2009. Sustainable Land and Water Management: The CAADP Pillar I Framework. *The AUC-NEPAD Agriculture Climate Change Adaptation-Mitigation Framework*.
- . 2010. *The AUC-NEPAD Agriculture Climate Change Adaptation-Mitigation Framework*.
- Bai, Z. G., D. L. Dent, L. Olsson, and M. E. Schaepman. 2008. *Global Assessment of Land Degradation and Improvement. 1. Identification by Remote Sensing*. Wageningen, Netherlands: ISRIC—World Soil Information.
- Balmford, A., A. Bruner, P. Cooper, R. Constanza, S. Farber, R. Green, M. Jenkins, P. Jefferiss, V.
- Jessamy, J. Madden, K. Munro, N. Myers, S. Naeem, J. Paavola, M. Rayment, S. Rosendo, J. Roughgarden, K. Trumper, and R. Turner, R. 2002. "Economic Reasons for Conserving Wild Nature." *Science* 297: 950–953.
- Barbier, E. B. 2012. "Chapter 9: Ecosystem Services and Wealth Accounting". In *Inclusive Wealth Report*. International Human Dimensions Programme on Global Environmental Change. Bonn, Germany.
- Butchart, S. H. M., M. Walpole, B. Collen, A. van Strien, J. P. W. Scharlemann, R. E. A. Almond, J. E. M. Baillie, B. Bomhard, C. Brown, J. Bruno, K. E. Carpenter, G. M. Carr, J. Chanson, A. M. Chenery, J. Csirke, N. C. Davidson, F. Dentener, M. Foster, A. Galli, J. N. Galloway, P. Genovesi, R. D. Gregory, M. Hockings, V. Kapos, J.-F. Lamarque, F. Leverington, J. Loh, M. A. McGeoch, L. McRae, A. Minasyan, M. H. Morcillo, T. E. E. Oldfield, D. Pauly, S. Quader, S. Revenga, J. R. Sauer, B. Skolnik, D. Spear, D. Stanwell-Smith, S. N. Stuart, A. Symes, M. Tierney, T. D. Tyrrell, J.-C. Vié, and R. Watson. 2010. "Global Biodiversity: Indicators of Recent Declines." *Science* 328 (5982): 1164–1168.
- C40 Cities. 2011. "C40: Participating Cities." <http://www.c40cities.org/cities>. Accessed June 10, 2011.
- CBD (Secretariat of the Convention on Biological Diversity). 2010. *Global Biodiversity Outlook 3*. Montréal. <http://gbo3.cbd.int/the-outlook/gbo3/biodiversity-in-2010.aspx>.
- Chavarro Vásquez, P. A. 2007. "Evaluación del Impacto del Análisis Ambiental de País (AAP) en las Políticas Gubernamentales y Percepción Públicas." Report commissioned by Latin America and the Caribbean Region, Washington, DC: World Bank.
- Chen, S., and M. Ravallion. 2008. *The Developing World Is Poorer Than We Thought, But No Less Successful in the Fight against Poverty*. August 2009 Revised Version. Development Research Group. Policy Research Working Paper 4703. Washington, DC: World Bank.
- De Schutter, O. 2010. Report of the Special Rapporteur on the Right to Food. Presented to the United Nations General Assembly, 65th Session, 11 August 2010.

- FAO (Food and Agriculture Organization of the United Nations). 2010a. *Global Forest Resources Assessment 2010. Main Report*. FAO Forestry Paper 163. Rome.
- . 2010b. *The State of World Fisheries and Aquaculture 2010*. FAO Fisheries and Aquaculture Department. Rome. <http://www.fao.org/docrep/013/i1820e/i1820e.pdf>.
- . 2011. *FAOSTAT: Forestry Trade Flows*. Accessed December 19, 2011.
- Fischer, G., M. Shah, F. Tubiello, and H. T. Van Velthuizen. 2005. "Socio-economic and Climate Change Impacts on Agriculture: An Integrated Assessment, 1990–2080." *Philosophical Transactions of the Royal Society B* 360 (1463): 2067–2083.
- Foresight. 2011. *The Future of Food and Farming: Challenges and Choices for Global Sustainability*. Government Office for Science, London. <http://www.bis.gov.uk/assets/bispartners/foresight/docs/food-and-farming/11-546-future-of-food-and-farming-report.pdf>.
- Gartner Newsroom. 2007. "Gartner Estimates ICT Industry Accounts for 2 Percent of Global CO₂ Emissions." Press release. April 26, 2007. <http://www.gartner.com/it/page.jsp?id=503867>.
- IEA (International Energy Agency). 2011a. "Prospect of Limiting the Global Increase in Temperature to 2°C is Getting Bleaker." May 30, 2011. http://www.iea.org/index_info.asp?id=1959.
- . 2011b. "World—Renewable and Waste Energy Supply (Ktoe)." IEA Renewables Information Statistics (database). Doi: 10.1787/data-00550-en. Accessed October 24, 2011.
- IFRC (International Federation of Red Cross and Red Crescent Societies). 2002. "Mangrove Planting Saves Lives and Money in Vietnam." June 19, 2002. Geneva.
- IEG (Independent Evaluation Group). 2009. *Annual Review of Development Effectiveness*. Washington, DC.
- . 2010. *Safeguards and Sustainability Policies in a Changing World: An Independent Evaluation of World Bank Group Experience*. Washington, DC.
- . 2011. *Annual Report 2011: Results and Performance of the World Bank Group*. Washington, DC.
- INPE (National Institute for Space Research, Brazil). 2011. "Taxas Anuais do Desmatamento—1988 até 2010." http://www.obt.inpe.br/prodes/prodes_1988_2010.htm. Accessed October 21, 2011.
- IPCC (Intergovernmental Panel on Climate Change). 2007. *Climate Change 2007: Synthesis Report*. Geneva.
- . 2011. "Summary for Policymakers." In *Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. Geneva.
- IUCN (International Union for Conservation of Nature). 2009. "Extinction Crisis Continues Apace." Press release. November 3, 2009. Gland, Switzerland. <http://www.iucn.org/knowledge/news/?4143/Extinction-crisis-continues-apace>.
- . 2010. *Global Ocean Protection, Present Status and Future Possibilities*. Gland, Switzerland.
- . 2011. *IUCN Red List of Threatened Species 2011.2*. Gland, Switzerland.
- Joint Monitoring Program. 2010. *Progress on Sanitation and Drinking-Water 2010 Update*. Geneva and New York: World Health Organization and UNICEF.
- Lawson, S. 2010. *Illegal Logging and Related Trade: Indicators of the Global Response*. July 2010. London: Chatham House.
- MA (Millennium Ecosystem Assessment). 2005. *Ecosystems and Human Well-being: Synthesis*. Washington, DC: Island Press.
- Nature Conservancy. 2011. "Coral Reefs: A Reef Resilience Toolkit Module: Ecological Impacts." http://reefresilience.org/Toolkit_Coral/C2c1_Ecological.html.
- Nellemann, C., S. Hain, and J. Alder (eds.). 2008. *In Dead Water—Merging of Climate Change with Pollution, Over-harvest, and Infestations in the World's Fishing Grounds*. Arendal, Norway: United Nations Environment Programme/GRID-Arendal.
- Nelson, G. C., M. W. Rosegrant, J. Koo, R. Robertson, T. Sulser, T. Zhu, C. Ringler, S. Msangi, A. Palazzo, M. Batka, M. Magalhaes, R. Valmonte-Santos, M. Ewing, and D. Lee. 2009. *Climate Change: Impact on Agriculture and Costs of Adaptation*. Washington, DC: International Food Policy Research Institute. <http://www.ifpri.org/sites/default/files/publications/pr21.pdf>.
- NOAA (National Oceanic and Atmospheric Administration) Ocean Acidification Steering Committee. 2010. *NOAA Ocean and Great Lakes Acidification: Research Plan Highlights*. <http://www.research.noaa.gov/pdfs/noaa-ocean-acidification.pdf>.
- Ocean Acidification Reference User Group. 2009. *Ocean Acidification: The Facts. A Special Introductory Guide for Policy Advisers and Decision Makers*. Villefranche-sur-mer, France: European Project on Ocean Acidification.
- OECD (Organisation for Economic Co-operation and Development). 2010. *Transition to a Low-carbon Economy: Public Goals and Corporate Practices*. Paris: OECD Publishing. <http://dx.doi.org/10.1787/9789264090231-en>.

- Oldeman, L. R., R. T. Hakkeling, and G. Sombroek. 1991. *World Map of the Status of Human-Induced Soil Degradation: An Explanatory Note*. Global Assessment of Soil Degradation. Wageningen, Netherlands. ISRIC—World Soil Information and United Nations Environment Programme. <http://www.isric.org/isric/webdocs/Docs/ExplanNote.pdf>.
- Pimm, S. L., G. J. Russel, J. L. Gittleman, and T. M. Brooks. 1995. "The Future of Biodiversity." *Science*: 269 (5222): 347–350.
- Prüss-Üstün, A. and C. Corvalán. 2006. *Preventing Disease through Healthy Environments: Towards an Estimate of the Environmental Burden of Disease*. Geneva: World Health Organization.
- Ramsar Convention on Wetlands. 2005. Background Papers on Wetland Values and Functions. <http://www.ramsar.org>.
- REN21. 2010. *Renewables 2010 Global Status Report*. Paris: REN21 Secretariat.
- Rockström, J., W. Steffen, K. Noone, Å. Persson, F. S. Chapin, E. F. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. J. Schellnhuber, B. Nykvist, C. A. de Wit, T. Hughes, S. van der Leeuw, H. Rodhe, S. Sörlin, P. K. Snyder, T. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J. A. Foley. 2009. "A Safe Operating Space for Humanity." *Nature* 461 (7263): 472–475.
- Sánchez-Triana, E. and Y. Awe. 2007. "Environmental Degradation and Environmental Health Policy in Peru." In *An Opportunity for a Different Peru: Prosperous, Equitable, and Governable*. Washington, DC: World Bank.
- Sánchez-Triana, E., K. Ahmed, and Y. Awe (eds.). 2007. *Environmental Priorities and Poverty Reduction: A Country Environmental Analysis for Colombia*. Directions in Development Series. Washington, DC: World Bank.
- Stockholm Convention on Persistent Organic Pollutants. 2011. "What Are POPs?" <http://chm.pops.int/Convention/ThePOPs/tabid/673/language/en-US/Default.aspx>.
- Stolton, S., Dudley, N. and Randall, J. 2008. Arguments for Protection: Natural Security Protected Areas and Hazard Mitigation. World Wildlife Fund.
- TRAFFIC. n.d. "Wildlife Trade: What Is It?" Accessed December 19, 2011. <http://www.traffic.org/trade>.
- UN (United Nations). 2010. *The Millennium Development Goals Report 2010*. New York. <http://mdgs.un.org/unsd/mdg/Resources/Static/Data/2010%20Stat%20Annex.pdf>.
- UNDP (United Nations Development Programme). 2006. *Human Development Report 2006. Beyond Scarcity: Power, Poverty and the Global Water Crisis*. New York.
- UNEP (United Nations Environment Programme). 1999. *Synthesis of the Reports of the Scientific, Environmental Effects, and Technology and Economic Assessment Panels of the Montreal Protocol*. Nairobi: UNEP Ozone Secretariat.
- . 2007. *Global Environment Outlook. GEO4: Environment for Development*. Nairobi. http://www.unep.org/geo/GEO4/report/GEO-4_Report_Full_en.pdf.
- UNESCO-WWAP (United Nations Educational Scientific and Cultural Organization—World Water Assessment Program). 2006. *Water: A Shared Responsibility. The United Nations World Water Development Report 2*. Paris. http://www.unesco.org/water/wwap/wwdr/wwdr2/table_contents.shtml.
- United Nations Framework Convention on Climate Change. 2007. *Report of the Conference of the Parties on Its Thirteenth Session, Held in Bali from 3 to 15 December 2007*. <http://unfccc.int/resource/docs/2007/cop13/eng/o6a01.pdf#page=3>.
- United Nations Population Division. 2011. *World Population Prospects: The 2010 Revision*. New York. <http://esa.un.org/unpd/wpp/index.htm>.
- Velders, G. J. M., S. O. Andersen, J. S. Daniel, D. W. Fahey, and M. McFarland. 2007. "The Importance of the Montreal Protocol in Protecting Climate." *Proceedings of the National Academy of Sciences of the United States of America* 104 (12): 4814–4819. <http://www.pnas.org/content/104/12/4814.full>
- Vörösmarty, C. J., P. B. McIntyre, M. O. Gessner, D. Dudgeon, A. Prusevich, P. Green, S. Glidden, S. E. Bunn, C. A. Sullivan, C. Reidy Liermann, and P. M. Davies. 2010. "Global Threats to Human Water Security and River Biodiversity." *Nature* 467: 555–561.
- WHO (World Health Organization). 2006. *Air Quality Guidelines: Global Update 2005. Particulate Matter, Ozone, Nitrogen Dioxide and Sulphur Dioxide*. Geneva.
- . 2011. *World Health Statistics 2011*. Geneva. http://www.who.int/whosis/whostat/EN_WHS2011_Full.pdf.
- World Bank. 2001. *Cost Assessment of Environmental Degradation (for Various MENA Countries)*. Washington, DC.
- . 2003. *Reaching the Rural Poor: A Renewed Strategy for Rural Development*. Washington, DC.
- . 2007a. *Cost of Pollution in China: Economic Estimates of Physical Damages*. World Bank and State Environmental Protection Administration, P. R. China. Washington, DC. http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/China_Cost_of_Pollution.pdf.

- . 2007b. *Healthy Development: The World Bank Strategy for Health, Nutrition, and Population Results*. Washington, DC.
- . 2007c. *World Development Report 2008: Agriculture for Development*. Washington, DC.
- . 2008a. *Environmental Health and Child Survival: Epidemiology, Economics, Experiences*. Washington, DC.
- . 2008b. *Safe, Clean, and Affordable...Transport for Development*. Washington, DC.
- . 2009a. *Energy Strategy Approach Paper*. Sustainable Development Network. Washington, DC.
- . 2009b. *Implementing Agriculture for Development: World Bank Group Agriculture Action Plan: FY 2010-2012*. Washington, DC.
- . 2009c. *Mongolia Air Pollution in Ulaanbaatar, Initial Assessment of Current Situation and Effects of Abatement Measures*. Washington, DC.
- . 2010a. *Economics of Adaptation to Climate Change: Synthesis Report*. Washington, DC.
http://climatechange.worldbank.org/sites/default/files/documents/EACC_SynthesisReport.pdf.
- . 2010b. *Convenient Solutions to an Inconvenient Truth: Ecosystem-based Approaches to Climate Change*. Washington, DC.
- . 2010c. *Sustaining Water for All in a Changing Climate: World Bank Group Implementation Progress Report of the Water Resources Sector Strategy*. Washington, DC.
- . 2010d. *Urban and Local Government Strategy*. Washington, DC.
- . 2010e. *Systems of Cities: Harnessing Urbanization for Growth & Poverty Alleviation: The World Bank Urban & Local Government Strategy*. Washington, DC.
- . 2010f. *World Development Report 2010: Development and Climate Change*. Washington, DC.
- . 2011a. *Little Green Data Book*. Washington, DC.
- . 2011b. *Little Data Book on Climate Change*. Washington, DC.
- . 2011c. *Social Development Strategy Mid-Cycle Implementation Progress Report*. Washington, DC.
- World Bank and UN (United Nations). 2010. *Natural Hazards, Unnatural Disasters: The Economics of Effective Prevention*. Washington, DC: World Bank.
- WTO (World Trade Organization). 2011. "Statistics Database." <http://stat.wto.org/Home/WSDBHome.aspx>. Accessed June 7, 2011.
- Wylar, L. S., and P. A. Sheikh. 2008. *International Illegal Trade in Wildlife: Threats and U.S. Policy*. CRS Report for Congress. Washington, DC: Congressional Research Service.







THE WORLD BANK GROUP

1818 H Street, NW

Washington, DC 20433, USA

Telephone: 202-473-1000

Facsimile: 202-522-1735

Internet: www.worldbank.org/environment

