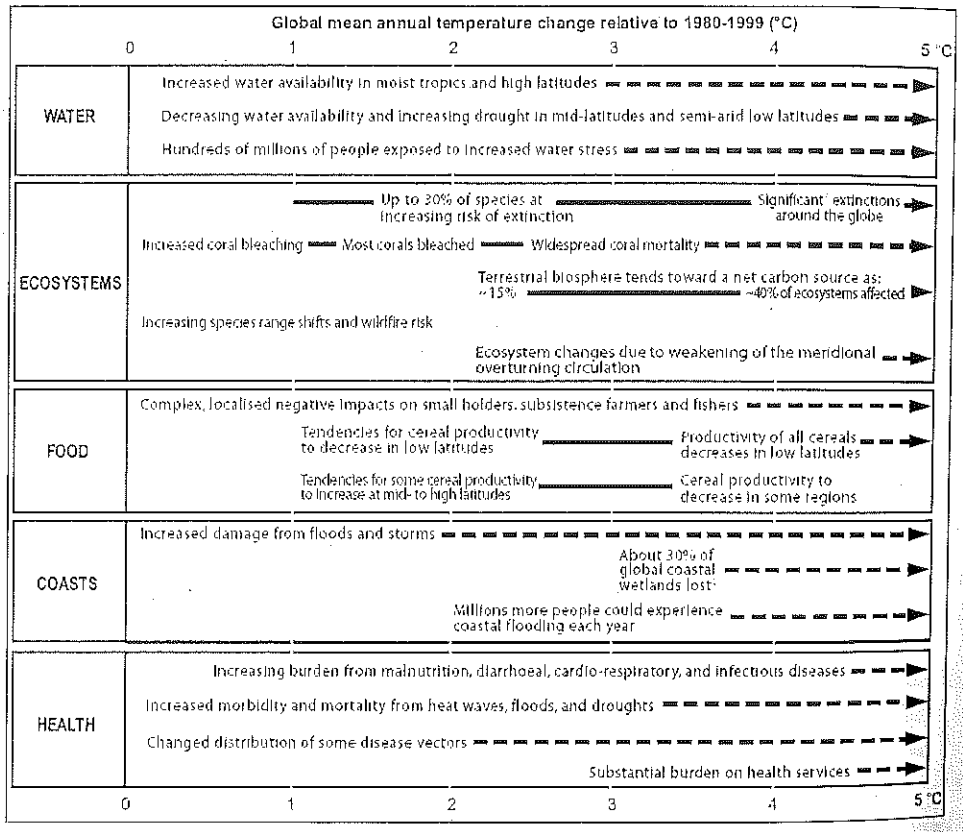
widespread political instability and the likelihood of failed states." THE CNA CORPORATION, NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE (2007).

The chart below from the IPCC vividly summarizes projected future impacts from climate change:

KEY IMPACTS AS A FUNCTION OF INCREASING GLOBAL AVERAGE TEMPERATURE CHANGE

(Impacts will vary by extent of adaptation, rate of temperature change, and socio-economic pathway.)



Source: IPCC, 2007: SUMMARY FOR POLICYMAKERS, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY. CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 16 (M.L. Parry, et al. eds., 2007).

C. The Disproportionate Impacts of Climate Change

1. The International Context

Global warming's impacts, while widespread and severe, will not affect everyone equally. As the Chair of the IPCC has stated, "[i]t is the poorest of the poor in the world, and this

includes poor people even in prosperous societies, who are going to be the worst hit." The adverse impacts often will fall hardest on people of color and poor people the world over because they are concentrated in areas that will bear the ecological brunt of climate change, and because they are often the least able financially to deal with its impacts.

The materials below explore in more detail how harm from climate change is likely to be most severe for poorer countries. The first excerpt summarizes some of the major impacts projected for developing regions of the world. The second describes some of the limitations in adaptive capacity faced by these countries and how climate change could dramatically impede development efforts.

M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden & C.E. Hanson, eds, IPCC, 2007: Summary for Policymakers

Climate Change 2007: Impacts, Adaptation and Vulnerability.
Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (2007)

Industry, settlement and society....

The most vulnerable industries, settlements and societies are generally those in coastal and river flood plains, those whose economies are closely linked with climate-sensitive resources, and those in areas prone to extreme weather events, especially where rapid urbanisation is occurring.

Poor communities can be especially vulnerable, in particular those concentrated in high-risk areas. They tend to have more limited adaptive capacities, and are more dependent on climate-sensitive resources such as local water and food supplies....

Africa

By 2020, between 75 million and 250 million people are projected to be exposed to increased water stress due to climate change. If coupled with increased demand, this will adversely affect livelihoods and exacerbate water-related problems.

Agricultural production, including access to food, in many African countries and regions is projected to be severely compromised by climate variability and change. The area suitable for agriculture, the length of growing seasons and yield potential, particularly along the margins of semi-arid and arid areas, are expected to decrease. This would further adversely affect food security and exacerbate malnutrition in the continent. In some countries, yields from rain-fed agriculture could be reduced by up to 50% by 2020.

Local food supplies are projected to be negatively affected by decreasing fisheries resources in large lakes due to rising water temperatures, which may be exacerbated by continued overfishing....

Asia....

Glacier melt in the Himalayas is projected to increase flooding, and rock avalanches from destabilised slopes, and to affect water resources within the next two to three decades. This will be followed by decreased river flows as the glaciers recede. Freshwater availability in Central, South, East and South-East Asia, particularly in large river basins, is projected to decrease due to climate change which, along with population growth and increasing demand arising from higher standards of living, could adversely affect more than a billion people by the 2050s.... Coastal areas, especially heavily-populated megadelta regions in South, East and South-East Asia, will be at greatest risk due to increased flooding from the sea and, in some megadeltas, flooding from the rivers.

Climate change is projected to impinge on the sustainable development of most developing countries of Asia, as it compounds the pressures on natural resources and the environment associated with rapid urbanisation, industrialisation, and economic development....

Endemic morbidity and mortality due to diarrhoeal disease primarily associated with floods and droughts are expected to rise in East, South and South-East Asia due to projected changes in the hydrological cycle associated with global warming. Increases in coastal water temperature would exacerbate the abundance and/or toxicity of cholera in South Asia....

Latin America....

By mid-century, increases in temperature and associated decreases in soil water are projected to lead to gradual replacement of tropical forest by savanna in eastern Amazonia. Semi-arid vegetation will tend to be replaced by arid-land vegetation.... In drier areas, climate change is expected to lead to salinisation and desertification of agricultural land. Productivity of some important crops is projected to decrease and livestock productivity to decline, with adverse consequences for food security.... Changes in precipitation patterns and the disappearance of glaciers are projected to significantly affect water availability for human consumption, agriculture and energy generation.

Polar Regions....

For human communities in the Arctic, impacts, particularly those resulting from changing snow and ice conditions, are projected to be mixed. Detrimental impacts would include those on infrastructure and traditional indigenous ways of life.... Arctic human communities are already adapting to climate change, but both external and internal stressors challenge their adaptive capacities. Despite the resilience shown historically by Arctic indigenous communities, some traditional ways of life are being threatened and substantial investments are needed to adapt or relocate physical structures and communities.

Small Islands

Small islands, whether located in the tropics or higher latitudes, have characteristics which make them especially vulnerable to the effects of climate change, sea-level rise and extreme events. Deterioration in coastal conditions, for example through erosion of beaches and coral bleaching, is expected to affect local resources, e.g., fisheries, and reduce the value of these destinations for tourism. Sea-level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards, thus threatening vital infrastructure, settlements and facilities that support the livelihood of island communities....

* * *

Kevin Watkins, United Nations Development Programme

Human Development Report 2007/2008
Fighting Climate Change: Human Solidarity in a Divided World
(2007)

Across developing countries, millions of the world's poorest people are already being forced to cope with the impacts of climate change.... [I]ncreased exposure to drought, to more intense storms, to floods and environmental stress ... will undermine international efforts to combat poverty....

How the world deals with climate change today will have a direct bearing on the human development prospects of a large section of humanity. Failure will consign the poorest 40 percent of the world's population—some 2.6 billion people—to a future of diminished opportunity. It will exacerbate deep inequalities within countries. And it will undermine efforts to build a more inclusive pattern of globalization, reinforcing the vast disparities between the 'haves' and the 'have nots.' ...

While the world's poor walk the Earth with a light carbon footprint they are bearing the brunt of unsustainable management of our ecological interdependence. In rich countries, coping with climate change to date has largely been a matter of adjusting thermostats, dealing with longer, hotter summers, and observing seasonal shifts.... By contrast, when global warming changes weather patterns in the Horn of Africa, it means that crops fail and people go hungry, or that women and young girls spend more hours collecting water....

Climate shocks: risk and vulnerability in an unequal world....

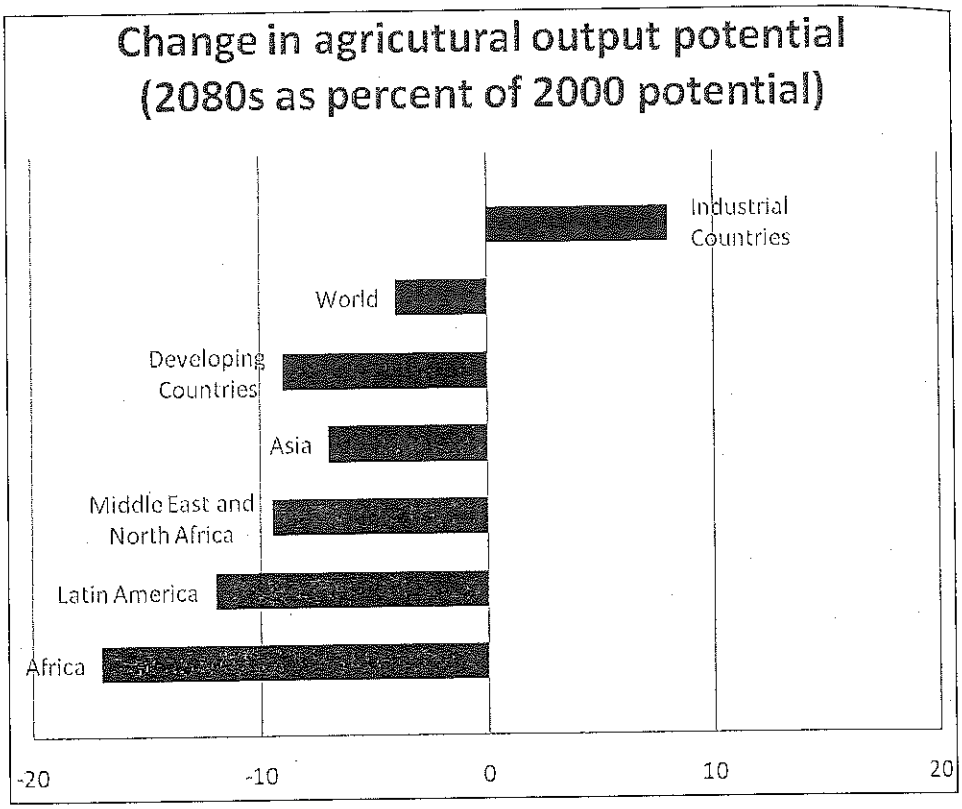
Vulnerability to climate shocks is unequally distributed.... [C]limate disasters are heavily concentrated in poor countries. Some 262 million people were affected by climate disasters annually from 2000 to 2004, over 98 percent of them in the developing world. In the Organisation for Economic Co-operation and Development (OECD) countries one in 1,500 people was affected by climate disaster. The comparable figure for developing countries is one in 19—a risk differential of 79.

High levels of poverty and low levels of human development limit the capacity of poor households to manage climate risks. With limited access to formal insurance, low incomes and meagre assets, poor households have to deal with climate-related shocks under highly constrained conditions....

In Ethiopia and Kenya, two of the world's most drought-prone countries, children aged five or less are respectively 36 and 50 percent more likely to be malnourished if they were born during a drought. For Ethiopia, that translates into some 2 million additional malnourished children in 2005. In Niger, children aged two or less born in a drought year were 72 percent more likely to be stunted. And Indian women born during a flood in the 1970s were 19 percent less likely to have attended primary school....

[C]limate change will steadily increase the exposure of poor and vulnerable households to climate-shocks and place increased pressure on coping strategies, which, over time, could steadily erode human capabilities. We identify [several] key transmission mechanisms through which climate change could stall and then reverse human development:

- *Agricultural production and food security.* Climate change will affect rainfall, temperature and water availability for agriculture in vulnerable areas. For example, drought affected areas in sub-Saharan Africa could expand by 60–90 million hectares.... The additional number affected by malnutrition could rise to 600 million by 2080. [The impacts in agricultural output by region are depicted in the chart below from the report. Eds.]



Source: WILLIAM R. CLINE, GLOBAL WARMING AND AGRICULTURE: IMPACT ESTIMATES BY COUNTRY (2007)

• *Water stress and water insecurity.* Changed run-off patterns and glacial melt will add to ecological stress, compromising flows of water for irrigation and human settlements in the process. An additional 1.8 billion people could be living in a water scarce environment by 2080....

• *Rising sea levels and exposure to climate disasters.* Sea levels could rise rapidly with accelerated ice sheet disintegration. Global temperature increases of 3–4°C could result in 330 million people being permanently or temporarily displaced through flooding. Over 70 million people in Bangladesh, 6 million in Lower Egypt and 22 million in Viet Nam could be affected.... Warming seas will also fuel more intense tropical storms. With over 344 million people currently exposed to tropical cyclones, more intensive storms could have devastating consequences for a large group of countries. The 1 billion people currently living in urban slums on fragile hillsides or flood prone river banks face acute vulnerabilities....

• *Human health.* Rich countries are already preparing public health systems to deal with future climate shocks, such as the 2003 European heat wave and more extreme summer and winter conditions. However, the greatest health impacts will be felt in developing countries because of high levels of poverty and the limited capacity of public health systems to respond. Major killer diseases [such as malaria] could expand their coverage....

Adapting to the inevitable: national action and international cooperation

[E]ven the most stringent mitigation [action to prevent climate change, such as decreasing GHG emissions] will be insufficient to avoid major human development setbacks.... For the first half of the 21st Century there is no alternative to adaptation to climate change.

Rich countries.... are investing heavily in the development of climate [defense] infrastructures.... The United Kingdom is spending US $1.2 billion annually on flood [defenses]. In the Netherlands, people are investing in homes that can float on water. The Swiss alpine ski industry is investing in artificial snow-making machines.

Developing countries face far more severe adaptation challenges. Those challenges have to be met by governments operating under severe financing constraints, and by poor people themselves. In the Horn of Africa, 'adaptation' means that women and young girls walk further to collect water. In the Ganges Delta, people are erecting bamboo flood shelters on stilts. And in the Mekong Delta people are planting mangroves to protect themselves against storm surges, and women and children are being taught to swim....

Responding to climate change will require the integration of adaptation into all aspects of policy development and planning for poverty reduction. However, planning and implementation capacity is limited:

- *Information.* Many of the world's poorest countries lack the capacity and the resources to assess climate risks. In sub-Saharan Africa, high levels of rural poverty and dependence on rainfed agriculture makes meteorological information an imperative for adaptation. However, the region has the world's lowest density of meteorological stations. In France, the meteorological budget amounts to US $388 million annually, compared with just US $2 million in Ethiopia.

- *Infrastructure.* In climate change adaptation, as in other areas, prevention is better than cure. Every US $1 invested in pre-disaster risk management in developing countries can prevent losses of US $7. In Bangladesh, research among impoverished populations living on *char* islands shows that adaptation against flooding can strengthen livelihoods, even in extreme conditions. Many countries lack the financial resources required for infrastructural adaptation....

- *Insurance for social protection....* Social protection programmes can help people cope with [climate change] risks while expanding opportunities for employment, nutrition and education.... While social protection figures only marginally in current climate adaptation strategies, it has the potential to create large human development returns....

[T]he international response on adaptation has fallen far short of what is required.... Total financing to date has amounted to around US $26 million.... For purposes of comparison, this is equivalent to one week's worth of spending under the United Kingdom flood [defense] programme....

It is not just the lives and the livelihoods of the poor that require protection through adaptation. Aid programmes are also under threat.... [C]limate change is contributing to a diversion of aid into disaster relief. This has been one of the fastest growing areas for aid flows, accounting for 7.5 percent of total commitments in 2005....

* * *

Notes and Questions

1. The disproportionate burdens that developing countries face seem particularly unjust because they are least responsible for climate change. From 1850 to 2004, the developed world—U.S., Europe, Canada, Australia and Russia, approximately 17% of the world's population—caused close to 70% of the world's cumulative greenhouse gas emissions. J. ANDREW HOERNER & NIA ROBINSON, ENVTL. JUSTICE AND CLIMATE CHANGE INITIATIVE, A CLIMATE OF CHANGE: AFRICAN AMERICANS, GLOBAL WARMING, AND A JUST CLIMATE POLICY FOR THE U.S. 7 (2008). What does this historical distribution suggest about how the responsibility for addressing climate change should be allocated? Should past contributions be more important than current capability (or weighted at all)? These questions are explored in more detail below.

2. Note that the anticipated severity of impacts from climate change are closely linked to the wealth and adaptive capabilities of nations. Does this mean that climate change efforts should only proceed in tandem with development efforts?

3. As the readings indicate, developing countries face a double, if not triple, whammy from climate change, stemming from geography, limits in adaptive capacity, and potential impacts on the stability of their political regimes. While the costs of adaptation are uncertain and vary dramatically based on emissions scenarios, under any circumstance they are likely to be very large, with estimates for developing countries ranging from $10 billion to $100 billion per year. Karoline HÆgstad Flåm & Jon Birger SkjÆrseth, *Does Adequate Financing Exist for Adaptation in Developing Countries?*, 9 CLIMATE POL'Y 109, 110 (2009). The IPCC estimates that for Africa, the cost of adaptation could amount to at least 5–10% of Gross Domestic Product (GDP). IPCC, 2007: SUMMARY FOR POLICYMAKERS, WORKING GROUP II, *supra*, at 13. Does this suggest that massive aid from the developed to developing world to pay for adaptation programs is needed?

2. Impacts in the United States

The U.S. will experience many of the same devastating impacts from climate change as other regions of the world, although these impacts will be less severe than in some parts of the world due to geographic advantages and greater resources available for adaptation. As discussed below, however, these impacts will hit the poor and communities of color in the U.S. the hardest.

Congressional Black Caucus Foundation, African Americans and Climate Change: An Unequal Burden (2004)

[T]here is a stark disparity in the United States between those who benefit from the causes of climate change and those who bear the costs of climate change....

Health Effects:

It is clear that African Americans will disproportionately bear the substantial public health burden caused by climate change. Health effects will include the degradation of air quality, deaths from heat waves and extreme weather events, and the spread of infectious diseases....

Air pollution is already divided down racial lines in this country, with over seventy percent of African Americans living in counties in violation of federal air pollution standards. The number of people affected will increase as the higher temperatures of global warming are expected to further degrade air quality through increased ozone formation. In every single one of the 44 major metropolitan areas in the U.S., Blacks are more likely than Whites to be exposed to higher air toxics concentrations....

Similarly, at present, African Americans are at a greater risk of [dying] during extreme heat events. The most direct health effect of climate change will be intensifying heat waves that selectively impact poor and urban populations. Future heat waves will be most lethal in the inner cities of the northern half of the country, such as New York City, Detroit, Chicago, and Philadelphia, where many African American communities are located.

African Americans may also be disproportionately impacted by the increased prevalence of extreme weather events and the spread of infectious diseases, such as malaria and dengue fever, primarily in Southern states.... All of these problems are compounded by the fact that Blacks are 50% more likely than non-Blacks to be uninsured.

Economic Effects

African American workers are likely to be laid off disproportionately due to the economic instability caused by climate change. In general, economic transitions strike hardest at those without resources or savings to adapt. In the United States, drought, sea level rise, and the higher temperatures associated with global warming may have sizeable impacts on several economic sectors including agriculture, insurance, and buildings and infrastructure....

In contrast to the burden of climate change, responsibility for the problem does not lie primarily with African Americans. African American households emit twenty percent less carbon dioxide than white households. Historically, this difference was even higher....

* * *

Notes and Questions

1. The report explains that heat-related deaths are more likely to be concentrated in urban areas because concrete and asphalt surfaces there help create the urban "heat island effect," and also because these areas often have worse air quality, and elevated pollution is often associated with heat waves. In addition, the authors note, "poverty is also an important factor in heat-related vulnerability. The poor are less likely to have adequate access to well-insulated housing or air-conditioning due to the combination of capital costs and utility bills. The [2000] National Assessment [of the U.S. Global Research Program] found that, 'High risk subpopulations include people who live in the top floors of apartment buildings in cities and who lack access to air-conditioned environment.' As of 1995, only a quarter of housing units in the Northeast were furnished with air-conditioning." UNEQUAL BURDEN, *supra,* at 20–21. Professor Maxine Burkett notes that "[h]eat stress has already been a public health nightmare for the poor and of-color. As an example, older black males living alone with poor health status suffered a disproportionate share of excess fatalities after the 1996 heat wave in Chicago." Maxine Burkett, *Just Solutions to Climate Change: A Climate Justice Proposal for a Domestic Clean Development Mechanism*, 56 BUFF. L. REV. 169, 177 (2008).

2. Recall the discussion in Chapter 2 that vulnerability to disasters is a function of both proximity to natural hazards and the social and economic characteristics of a community. As the readings above illustrate, the impacts of global warming experienced by minority and poor communities will be exacerbated because these groups are often the least able to

adapt. Poor people also typically have less access to home and renter's insurance and less money to move away from droughts, floods, and fires caused by global warming. Other impediments to adaptation include the following, discussed in this report about California:

> • *Lack of Health Insurance*: People without health insurance are vulnerable to ailments that timely and continual access to health care could minimize. These access disparities exist for different income, geographic and racial groups in California.... [For example,] Hispanics are three times more likely to lack health insurance than Whites. [Furthermore,] Californians in the lowest income category, below the federal poverty level, are five times more likely to be uninsured than those in the highest income category.
>
> • *Energy and Water Costs*: Climate change threatens to limit basic resources such as water and electricity. Supply reductions and demand increases together will increase water and energy prices.... Higher energy and water costs will hit low-income households the hardest because these costs make up a larger proportion of their expenditures—almost double the proportion of the highest income families.

ROBERT CORDOVA, ET AL., REDEFINING PROGRESS, *Executive Summary of* CLIMATE CHANGE IN CALIFORNIA: HEALTH, ECONOMIC AND EQUITY IMPACTS 3–6 (2006).

3. To what extent are the disproportionate impacts likely to result from climate change part of the larger pattern of disparate environmental harms seen in Chapter 2? What do the similarities/differences suggest about how domestic climate policies should be crafted?

4. The Congressional Black Caucus report notes that poor Americans, regardless of race, also are far less responsible for carbon dioxide emissions than wealthier Americans, "with the average household in the wealthiest decile emitting roughly seven times as much carbon dioxide as the average household in the bottom expenditure decile." UNEQUAL BURDEN, *supra*, at 70. What implications does this have for efforts to control carbon emissions, including the likely political support for such programs? Do you think that poor individuals will be less willing to accept higher costs for controlling GHG emissions because they contribute relatively less to the problem? Will rich citizens be willing to make greater sacrifices?

D. Climate Justice in the International Context

1. International Responses to Date

The international community first addressed climate change with the 1992 United Nations Framework Convention on Climate Change (UNFCCC). The parties to the treaty (which now has been ratified by 192 countries, including the United States), agreed to stabilize greenhouse gas concentrations in the atmosphere with the goal of "preventing dangerous anthropogenic interference with Earth's climate system," although no numerical targets for GHG emissions reductions were set. The Framework recognizes that nations have "common but differentiated responsibilities," reflecting the view that developed countries bear a greater historical responsibility for the problem of climate change and have a greater capacity to take action. In particular, Article 3(1) of the UNFCCC provides that

> The Parties should protect the climate for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly,

the developed country Parties should take the lead in combating climate change and the adverse effects thereof.

In 1997, the Kyoto Protocol to the Framework Convention (Kyoto) was negotiated. The major industrialized countries (so called "annex I" countries) collectively committed to reducing their average annual greenhouse gas emissions between the years 2008 and 2012 to 5.2% below their 1990 levels. Developing countries (so called "non-annex I" countries) were not required to limit their emissions (and nearly all refused to consider such limits during the negotiations).

During the final negotiations period, the U.S. Senate by a 97–0 vote adopted a resolution directing that the president sign a treaty only if it included limits on emissions from developing countries within the same compliance period as for developed nations. In 2001, shortly after George W. Bush became president, the U.S. repudiated the treaty. Kyoto went into force in 2005 when it was ratified by Russia. (Kyoto required states representing fifty-five percent of developed countries emissions to ratify in order to go into force, meaning that it could not become effective without either the U.S. or Russia's participation. The U.S. still is not a party to Kyoto).

Kyoto provides for three flexible compliance mechanisms. First, it allows for trading of emission allowances among the industrialized countries that have reduction obligations under the treaty. Second, it allows industrialized countries or private parties to obtain emission credits by carrying out emission reduction projects in other industrialized countries (known as the "joint implementation" provision, and geared toward projects in Russia and other former communist countries in Europe). Third, its most significant (and controversial) trading provision is the "clean development mechanism" (CDM), which authorizes industrialized countries and private parties to obtain emission credits through mitigation projects undertaken in developing countries, which, as noted above, have no obligations under Kyoto. (The latter two programs often are referred to as offset programs.)

The CDM was designed to fund sustainable development efforts in developing countries, and also to provide a source of low-cost emission reductions for developed countries. CDM projects must result in emission reductions "additional to any that would otherwise occur." In other words, an applicant for funding must show that but for the funding provided by parties in developed countries wishing to "offset" their emissions, the mitigation project—such as developing new renewable power, capturing methane from animal waste, planting trees to serve as "sinks" that remove carbon from the atmosphere—would not have occurred. The CDM has grown rapidly since its inception in 2004. In 2007, the value of the CDM market was nearly $13 billion and as of October, 2008, included more than 3,800 projects either approved or awaiting approval. The CDM, however, has been sharply criticized on a number of grounds.

First, the CDM largely has failed to generate projects that promote cleaner energy production and sustainable development in the developing world. As Professor David Driesen notes, through mid-2007, the lion's share of emission credits (64%) were for projects that imposed end-of-the-pipe controls on non-carbon GHG emissions. Only 17% were for renewable energy, and 10% for energy efficiency. David M. Driesen, *Sustainable Development and Market Liberalism's Shotgun Wedding: Emissions Trading Under the Kyoto Protocol*, 83 IND. L.J. 21, 40–41 (2008).

Additionally, the very poorest developing nations—those in the greatest need—have received relatively little in CDM funding. China and India have received over half of all project investment; conversely, countries in Africa and the Middle East have received little in-

vestment, and only ten CDM projects have been registered in what the U.N. defines as "least developed countries." U.S. GEN. ACCOUNTABILITY OFFICE, INTERNATIONAL CLIMATE CHANGE PROGRAMS: LESSONS LEARNED FROM THE EUROPEAN UNION'S EMISSIONS TRADING SCHEME AND THE KYOTO PROTOCOL'S CLEAN DEVELOPMENT MECHANISM 35–36 (2008).

Moreover, many emission reduction credits have been sold to parties for much more than the cost of achieving those reductions—the price having been set by the market for emission credits—and the CDM correspondingly has created perverse incentives to increase GHG-generating activity in order to generate profitable emission credits. Professors Michael Wara and David Victor illustrate this with an example. Much of the CDM's early activity involved controls of an extremely potent gas called HFC-23, produced mainly as a waste product during the manufacture of another gas that is used in some air conditioners and as a feedstock for plastics. However,

> the sale of credits generated from HFC-23 capture is far more valuable than production of the refrigerant gas that leads to its creation in the first place. Thus, refrigerant manufacturers were transformed overnight by the CDM into ventures that generated large volumes of CERs (Certified Emission Reductions), with a sideline in the manufacture of industrial gases.

Moreover, HFC-23 abatement was "a startlingly inefficient means for achieving emissions reductions in the developing world. Payments to refrigerant manufacturers, the Chinese government ... and to carbon market investors by governments and compliance buyers will in the end total approximately €4.7 billion while estimated costs of abatement are likely less than €100 million." Michael W. Wara & David G. Victor, *A Realistic Policy on International Carbon Offsets* 11–12 (Stan. U. Program on Energy & Sustainable Dev. Working Paper No. 74, 2008).

Finally, numerous reports have pointed out the potential for serious abuses in the CDM process, in considerable part because of the lack of adequate monitoring and the difficulty of determining whether projects truly are "additional." One U.N. official estimates that up to twenty percent of the emission credits generated by CDM did not represent actual reductions in GHGs; other commentators place the number much higher. *See* Jonathan Leake, *The Fool's Gold of Carbon Trading,* SUNDAY TIMES (U.K.), Nov. 30, 2008.

To implement their collective emission reduction targets, countries in the European Union (EU) created a cap-and-trade program for carbon dioxide emissions known as the European Union Emissions Trading Scheme ("EU ETS"). The program covers more than 10,000 energy intensive facilities in the twenty-seven countries comprising the EU, which collectively emit about forty-five percent of the EU's carbon dioxide emissions. The first trading period—phase I—ran from 2005 to 2007; the second phase runs from 2008 to 2012.

The EU system also has come under heavy criticism, particularly for its overallocation of emission allowances, and because of its decision to distribute allowances for free rather than to auction them. The overall emissions cap exceeded actual emissions by more than three percent in the first phase, contributing to a collapse in the price of allowances two years into the program. Investigators report that it is unclear to what degree the first phase of trading has achieved real emissions reductions, because of a lack of adequate baseline emissions data. CONGR. RES. SERVICE, CLIMATE CHANGE AND THE EU EMISSIONS TRADING SCHEME (ETS): KYOTO AND BEYOND 5–6 (2008). A harsher assessment in 2008 contends that the plan "unleashed a lobbying free-for-all that led politicians to dole out favors to various industries, undermining its environmental goals. Four years later, it is becoming clear that the system has so far produced little noticeable benefit to the climate—but generated a multibillion-dollar windfall for some of the Continent's biggest polluters."

James Kanter & Jad Nouawad, *Pipe Dreams and Politics—Money and Lobbyists Hurt European Efforts to Curb Gases*, NY TIMES, Dec. 11, 2008 at B1.

In 2007, parties to the Kyoto Protocol and the UNFCCC met in Bali, Indonesia to discuss an agenda for negotiating a new agreement to succeed the Kyoto Protocol when it expires in 2012. After a contentious session and sharp disagreements, particularly between developing countries and the U.S. (as well as between the EU and the U.S.), the parties agreed to an "action plan" or "roadmap" to guide future negotiations, which the parties aim to conclude by the end of 2009. The roadmap did not include any firm targets for emission reductions, but the parties agreed that "deep cuts in global emissions" were needed (and referred, albeit in a footnote due to U.S. opposition, to cuts of 25–40% below 1990 levels by 2020). Future negotiations will proceed on four tracks, dealing with mitigation, adaptation, technology, and financing.

The Bali action plan made progress in that developing nations agreed to play a more significant role in addressing climate change, while developed countries committed to providing them with more resources to do so. Both groups agreed to take future steps that are "measurable, reportable and verifiable"—developing countries agreed to future "actions," supported by developed country assistance in technology financing and capacity-building, while developed countries agreed to future "commitments or actions." However, the hard decisions about how the nations actually would share the burden of cutting emissions were left for future talks. The action plan also strengthens an existing adaptation fund for developing countries that is financed by a two percent tax on CDM transactions. The fund is currently worth over $30 million and is expected to grow to an estimated $80–$300 million by 2012. (Recall that adaptation costs for developing countries are estimated to be from $10 to $100 billion annually.) The agreement includes commitments by developed nations for technology transfer to aid developing countries to grow sustainably, and to address for the first time the issue of deforestation (which is responsible for one-fifth of the world's greenhouse gases).

Notes and Questions

1. Critics have suggested numerous reforms for the CDM, including restricting projects eligible for generating credits to a small number of projects that promote energy and avoid deforestation and that would almost certainly be uneconomical without financial support from investors seeking to purchase credits. They also argue that instead of the CDM trading scheme, it would preferable to have a climate fund administered by an international institution that invests directly to help developing countries achieve low carbon development. Which is more preferable—direct assistance to developing nations or the CDM scheme, and why?

2. What do you think the principle of "common but differentiated responsibilities" articulated in the U.N. Framework Convention on Climate Change means in practice? As a general matter, do you think differentiated responsibility is a workable and desirable rule for addressing international environmental problems? Implementing this approach in the context of climate change is explored in the section below.

2. Designing an International Response

Determining the appropriate apportionment of responsibility in an international climate treaty raises very vexing questions, and the answers suggest a variety of approaches.