Appendix I
Project Examples

Appendix I1: Water Efficiency in China

The Irrigated Agriculture Intensification Loan III (IAIL 3) approved in 2005 was designed to increase agricultural productivity and water efficiency in the Huang-Huai-Hai river basin in northern China. The project financed water-saving irrigation and drainage, agricultural institutional development and agro-ecological protection, and aimed to demonstrate these techniques as a model to be scaled up by Chinese agricultural agencies.

The project had not specifically considered climate change during preparation, but shortly after implementation the Bank successfully encouraged the addition of a climate change add-on. A set of climate change impact analysis studies were undertaken by international and domestic climate experts during preparation of the add-on, and the GEF-financed project on Mainstreaming Climate Change Adaptation in Irrigated Agriculture was approved in 2008. A consultative gap analysis undertaken as part of preparation of the adaptation project led to a new focus on demand-side water efficiency measures.

The project supported hydrological modeling of the basin under future climate scenarios. The studies improved understanding of the hydrological functioning of the basin and its response to different possible future conditions. Liu and others (2010), for instance, found that, in the absence of CO2 fertilization, both irrigated and rainfed maize and wheat yields would decline modestly for a +2°C increase and severely for a +5°C increase, with some moderation or exacerbation depending on precipitation trends. The climate change studies recommended a set of actions that were largely no-regrets measures that reduced vulnerability to current climate variability. The Bank claimed that the incorporation of demand-side water efficiency measures was motivated by the climate change technical studies—but the China Water Conservation project approved in 2000 had already undertaken similar measures.

Activities supported by the projects appear to have been highly successful; IAIL III reported a 27 percent increase in grain yields, a 75 percent increase in cash crop yields, and a 55 percent decrease in water use. The projects appear to have been successful in building institutional capacity in China, and in creating mobile expert teams that supported collaboration between national scientists, local experts, and extension agents. Water savings from improved infrastructure under IAIL 3 were
complemented by agronomic water savings from improved management and reduced evaporation due to methods piloted under the Mainstreaming project. The projects supported innovative measures for monitoring evapotranspiration through a combination of remote sensing and ground-based data collection. Demonstration mechanisms were directly incorporated into the projects, with experts from additional regions included in training and in creation of an online platform for result dissemination.

Appendix I2: Design and Maintenance Failures Associated with Emergency Projects

The rushed nature of emergency response projects makes them particularly vulnerable to design and institutional problems.

In an emergency flood project in Cambodia that closed in 2005, the project was successful in repairing flood control schemes, roads, and other infrastructure, but the repaired infrastructure was not sufficiently maintained. After only three years, many embankments were failing due to flood damage and were in need of repair, but no funds were available (IEG 2007a). An IEG evaluation noted that the institutional reforms needed to provide for maintenance were beyond the capacity of the emergency project to provide, and that a sustainable outcome would have required relationships and resources beyond those that are typically available in an emergency project (IEG 2007). An IEG evaluation of the Fourth Social Investment Fund Project in Honduras (IEG 2006c) noted that schools and a health center were reconstructed in a high flood risk zone and were likely to be destroyed again, and that drainpipes constructed by the project were of insufficient capacity and so houses and harvests were destroyed again by floods in the next rainy season.

In an emergency flood and earthquake recovery project in Turkey, a rushed disaster needs assessment meant that a significant amount of excess infrastructure was constructed, without considering likely beneficiary demand. Twice as many housing units were built as were needed, and the excess were wasted (IEG 2005). The rushed design process also overestimated the speed at which disbursements could be made, leading to many construction projects to start early and then stall when funds were not available.

An emergency recovery and disaster management program in St. Lucia was successful in building urban drainage systems and retaining walls along rivers, nontraditional efforts were largely unsuccessful. An attempt to reintroduce river meanders (and so to slow river flows) were not constructed correctly, pilot efforts at watershed management were not completed, bankside trees and grasses were not
planted and rural ditch systems were not completed. In all, 18 percent of the cost of flood works was lost when infrastructure proved to have insufficient disaster resistance. An IEG evaluation noted that “pressure to start reconstruction too soon after disaster led to inadequately analyzed designs and works implemented in a way that did not systematically reduce vulnerability to the next storm” (IEG 2005).

A water sector institutional strengthening project in Trinidad and Tobago was largely unsuccessful in both construction of flood control and drainage works and in its institutional reform because a hasty project preparation process that tried to combine rapid emergency assistance with long-term aid to the water sector resulted in insufficiently broad consultation and failed to appreciate the extent of political risks (IEG 2003).

Appendix I3: Completed Mangrove Projects with Coastal Protection Benefits

The Forest Resources Management project in Bangladesh (approved 1992, closed 2001) was originally intended to plant 32,900 hectares of mangroves to help consolidate newly accreted land in the Bay of Bengal, and was expected to provide protection against cyclonic storm surges. The mangrove target was revised downwards in 1996 to 26,000 hectares because of a reduction of siltation meant that less land was available to be planted. The revision was reversed after the 1998 floods brought a large accretion of sediment. Actual planted areas covered 32,900 hectares at an average coverage of 7,000 seedlings per hectare, with good initial survival rates. The project economic analysis claims that the mangrove component achieved a 12 percent ERR (compared to 24 percent at appraisal) and that this includes some protective benefits from mangrove planting, but details on how protective benefits were estimated were not available. The large reduction in ERR was due largely to lower-than-expected timber yields, due to growth rates being much slower than expected and to disease; planned rotation was changed from 17 years to 40 years.

The Coastal Embankment Rehabilitation project in Bangladesh (approved 1995, closed 1999) supported afforestation of embankment slopes and foreshore with mangroves and other vegetation as part of a disaster risk reduction program. The program had a target of 1900 hectares of afforestation on embankment slopes and 4,900 hectares on foreshore slopes. These were revised downwards to 850 and 2350 hectares, respectively. Actual achievements were only about 663 and 822 hectares, in part due to poor incentives. Local government owned the foreshore land intended to be planted, but could achieve higher financial returns by leasing the land out for shrimp or salt production rather than undertaking mangrove afforestation. Local government specified that 20 percent of leased land be used for afforestation, but many lessees did not agree or did not follow through, and government had little
ability to monitor or enforce afforestation. Considerable areas of foreshore planting were removed by fishermen and replaced by commercial fishing activities, and the areas where mangroves remain were often those where population and fishing pressure was relatively low (and so protective benefits may have also been low). Economic benefits were not separately estimated for afforestation and embankment work. Maintenance of the embankments was often poor, but embankments were in better shape in areas where afforestation had occurred.

The Andhra Pradesh Hazard Mitigation and Emergency Cyclone Recovery Project in India (approved 1997, closed 2003) supported shelter-belt plantations in coastal areas to provide protection from cyclonic storms and floods. Plantation targets were achieved, with 606 hectares of mangrove plantation achieved along with 3,581 hectares of casuarinas and 1,089 hectares of palmyra. Survival rates of planted mangrove seedlings were low—varying across plantations from 20 percent to 50 percent—which was attributed to use of poor-quality seeds.

The Coastal Wetlands Protection and Development Project in Vietnam (approved 1999, closed 2007) was designed to reestablish coastal mangrove wetlands in order to promote aquaculture and provide coastal protection. The mangrove planting component was initially expected to cost $13.9 million and to cover 26,400 hectares, but dramatic increases in land values in coastal areas meant that the opportunity cost of planting land with mangroves would have been higher than expected in many areas, and so the mangrove target was revised downwards to cover only 3,898 hectares. Mangrove plantations covering 5,876 hectares were achieved, focusing on barren areas in protected zones, at a cost of $3.8 million. Forest coverage in the project zones increased from 48 percent to 96 percent, and coastal erosion decreased (by 40 percent in one province) due to mangrove plantations, but the protective impact could not be attributed solely to the Bank project, since up to 80 percent of afforestation in the project provinces was accomplished by the separate government of Vietnam Program 661. Survival rates of plantations were very variable, due to the incidence of storms in newly planted areas, and the fact that many saplings were planted when still immature. In some zones, all mangroves were wiped out, despite multiple plantings.

The Andhra Pradesh Community Forestry Management Project in India (approved 2002, closed 2010) focused mainly on management 340,000 hectares of teak and other forests, but was redesigned after the 2004 tsunami to also allocate $5.5 million for the establishment of 2,310 hectares of shelter belts and rehabilitation of 2,190 hectares of mangroves in river deltas. Little information is available about the mangrove component, but the ICR (World Bank 2010d) reports that survival rates were high.
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and that mangrove reforestation was successful due to both planted seedlings and natural regeneration.

Appendix I4: Financing the Caribbean Catastrophe Risk Insurance Facility

The Caribbean Catastrophic Risk Insurance Facility is an example of a successful multicountry insurance risk pool. The facility is designed to reduce the impact of natural disasters by providing member countries with insurance payouts sufficient to cover short-term liquidity needs in the aftermath of an earthquake or hurricane. Its 16 members pay risk-based insurance premiums (calculated from risk modeling work supported by technical assistance from the World Bank Treasury) to purchase a desired level of insurance coverage. The instrument is designed to cover only short-term needs, estimated to comprise at most 20 percent of losses.

The World Bank, through IDA, funded the participation fees, 100 percent of the first two years’ premiums, and 50 percent of the third year’s premium for Haiti, Dominica, Grenada, St. Lucia, and St. Vincent and the Grenadines. It also funded 50 percent of the fourth year’s premium for Dominica and St. Lucia.

The facility has been successful in offering insurance at a lower rate than would be available had each country tried to purchase insurance separately, or if each country had to maintain its own reserves separately. A World Bank document estimated that the premium was 68 percent lower than the cost of meeting similar risks through domestic reserve funds (Ghesquiere and Mahul 2007). In addition, some very small countries may have been effectively uninsurable on an individual basis. Cost savings come from economies of scope and scale; it was cheaper to undertake risk modeling for the Caribbean in a coordinated fashion, it was more efficient to undertake a single client education program, and the transaction costs of operating the facility are lower than would exist for a set of separate insurance contracts (due in part to the small size of member countries).

Payouts as of 2011 have totaled $32 million across 8 claims, with all payouts being made within 3 weeks of the event. The following CCRIF members have received payouts: Dominica and St. Lucia after a November 2007 earthquake; Turks and Caicos after Hurricane Ike in September 2008; Haiti after the January 12, 2010, earthquake; Anguilla after Hurricane Earl in September 2010; and Barbados, St. Lucia, and St. Vincent and the Grenadines following Hurricane Tomas in October 2010. In the financial year 2009-10 (the most recent for which full accounts are available) gross income from premiums was $21.5 million, as compared to payouts of $7.8 million, and equity in the facility was $67.5 million, so the facility appears to be operating sustainably (CCRIF 2010).
The CCRIF manages risk with a layered risk structure. For 2009-10 aggregate the facility had a maximum potential liability of roughly $600 million; the facility itself retains risk for claims up to $20 million (paid out of reserves), and then transfers higher levels of risk to insurance and reinsurance markets, using the IBRD as an intermediary. The facility reinsures most of its risk externally, and is financially self-sustaining. The use of simulated rather than actual losses allows for rapid response and lower cost than under traditional indemnity insurance. However, damage models that relied on wind speed rather than rainfall meant that significant basis risk remained; the CCRIF made no payout following Hurricane Dean in 2007, as the main damage came from flooding rather than wind damage. CCRIF intends to offer excess rainfall coverage in future.

Based on IEG interviews and a CCRIF beneficiary assessment, member governments seem generally happy with the CCRIF. They find that the insurance is reasonably priced, with good service and rapid payouts, and many countries would be interested in seeing the CCRIF expanded to offer insurance cover for other hazards.

While the CCRIF has been a successful instrument for managing disaster risk in the Caribbean, the opportunities for replication of the multi-country risk pool model remain unclear. The CCRIF opportunity arose in part because of case-specific factors; a set of disaster-prone countries with a similar but low correlation risk profiles, the small size of these countries (which meant that transaction costs from traditional insurance would be significant), and the shared trust and prior experience between member countries in working together on disaster risk management. Discussions are in progress for a disaster risk pool for Pacific Island nations and a drought risk facility for Africa.

**Appendix I5: Index-Based Insurance in India and Mongolia**

Though most index insurance pilots have not led to scaling up, two Bank-supported index insurance projects are operating at large scale.

The Weather Based Crop Insurance Scheme in India is by far the largest in the world; as of 2010-11, over 9 million farmers were enrolled, with annual revenues of $258 million, insuring $3.17 billion of assets (Clarke, Mahul, and others 2012). The scheme draws its origins from a 2003 pilot in Andhra Pradesh, which received World Bank technical assistance. The WBCIS system relies heavily on public subsidies, with premium rates capped at 1.5-2 percent of insured value for wheat and other food crops, and over 2007-10 total payouts exceeded total premiums by 30 percent. Participation by farmers is largely compulsory (it is tied to credit access), though some farmers participate voluntarily. So widespread adoption is
unsurprising. Basis risk remains significant; farmers who suffer a total crop loss will still have a 1 in 3 chance of receiving no payment from the WBCIS (Clarke, Mahul, and others 2012).

The ongoing Index-Based Livestock Insurance Project in Mongolia has been the most successful livestock index insurance to date. Implemented in 2006, the product insures losses of livestock caused by severe winter weather, and provides payouts to herders based on the average losses of livestock in each district. The instrument contains both a base layer (for losses up to 30 percent) that is intended to be commercially viable, and a catastrophic layer (for losses exceeding 30 percent) that is subsidized by government. The product has performed relatively well in attracting customers; in 2010/11, 10.5 percent of herders in the target areas purchased insurance (covering on average 30 percent of the value of the herds of those who purchased insurance), and premiums collected were roughly $330,000 across 7,000 policies (Luxbacher and Goodland 2011). However, observed uptake may have been due in part been to three successive years of severe winters and high payouts (including the worst winter ever recorded in 2009/10), which have strained program finances. Cumulative premiums up to 2010/11 have been $750,000 for the basic layer while cumulative payouts for this layer have been $1.9 million. The long-term financial sustainability of the program thus remains in question.