

## Illustrative Global Climate Change Adaptation and Mitigation Measures

Sector	Adaptation	Mitigation
Energy		Minimize use of fossil fuels
		Promote renewable energy generation (e.g., through use of tax incentives and disincentives) Solar PV Wind Methane Capture Biomass Geothermal Hydro Nuclear
		Promote tree plantation/reforestation
		Avoid tree cutting (e.g. REDD)
		Promote energy efficient electrical applications
		Reduce road transport/Promote commercial and passenger rail transport
		Promote least polluting fossil fuel sources
		Promote trading of carbon credits and carbon offsets
	Hydro-electric facilities – Design for extreme events applying adaptive risk management modeling; retrofit for anticipated changes in river volumes and flows	
	Power plants (Coal and Nuclear) – Modeling to anticipate cooling requirements (e.g., water source, cooling tower design)	
Water	Increase water use efficiency/Better water management	
		Reduce methane emissions from wastewater treatment
Agriculture	Implement famine early warning system	Reduce methane emissions (e.g., rice cultivation, livestock raising)
	Diversify crops	
	Plant drought resistant crops	
	Anticipate changes in historical baseline patterns of precipitation and river flows in design and operation of irrigation schemes	

<b>Sector</b>	<b>Adaptation</b>	<b>Mitigation</b>
Human Health	Implement disease warning and epidemic management system	
Municipal Services	Promote integrated coastal zone planning and Management	Promote dense urban development (e.g., tax incentives and disincentives)
	Relocate critical infrastructure	Promote mass transit (e.g., tax incentives and disincentives)
	Floodproof critical infrastructure	
	Implement storm monitoring and warning system	
	Implement disaster management system	
Transport	Anticipate changes in baseline historical patterns of precipitation and river flows in design and operation of roads, bridges and rail systems	Promote fuel switching to lower carbon emitting fuels (e.g., CNG)
	Assess effects of sea level changes on port development	
	Anticipate changes in sea routes	
Tourism	Use adaptive risk management to assess effects of changes in baseline precipitation, climate, and of extreme weather events on species composition	Promote adoption of green certification standards and practices
	During design assess potential impacts of species loss, fluctuations in water availability, and sea level rise on ecotourism facilities and the tourism industry	

## **GCC Small-Group Exercise: Country X Agricultural Improvement Project**

### Objective

Improve food security and increase economic development opportunities by diversifying and expanding agricultural development.

### Background

This \$30 million project is planned to develop and diversify agricultural sector activities in a region of Country X. The agriculture sector in Country X is dominated by traditional livestock raising by nomadic and semi-nomadic communities, but there is growing attention by the government to improve the livelihood security and economic growth opportunities in rural areas by introducing new crops and expanding agricultural support systems. As more people abandon nomadic traditions and human population increases in some areas, the land is being stressed by overgrazing and economic opportunities do not meet the needs of the changing populations. While some resources have been allocated to improving non-livestock agricultural development, there is still a lack of basic infrastructure and expertise.

### Key Issues

- Irrigation systems are inadequate for expansion of croplands or diversification of crops.
- The transport network is insufficient to bring crops to market.
- Processing facilities, such as cold storage, are lacking.
- Information about weather patterns, soil conditions and crop selection and other information to improve agricultural productivity for non-traditional crops and to make informed decisions is limited.

### Environmental Context

The project area is typical of a steppe environment. The topography is predominately open plains, with some gently rolling hills. The flat open plains create strong and constant wind patterns in the area. Rainfall is extremely limited, though local people comment that weather patterns have been strange in recent years, with more rainfall than in the past. There is a river running through the project area that provides water for livestock and domestic needs and has been tapped for very limited agricultural use. The river is experiencing increasing sedimentation as over-exploitation of the surrounding area is overgrazed by communities that have increased their livestock activities and are living more settled livelihoods. There also is a major electrical transmission line running through the project area, carrying electricity from an aging and inefficient coal-fired power station to the north of the project area to Country X's capital.

### Proposed Activities

The project will include a large technical assistance and training component, intended to increase the knowledge and expertise of local farmers, so that they can increase their agricultural yields and diversify their crop varieties. Support will be provided to the government to strengthen and expand the reach of the agricultural extension service. A variety of infrastructure improvement activities are planned including significant expansion of the irrigation network, using water from the river in the project area. The project also will improve existing roads and construct new roads to facilitate transport of harvested crops and livestock. In addition, the project will fund the construction of agricultural processing facilities, particularly cold storage for cash crops grown in the area.



## **GCC Small-Group Exercise: Country Y Coastal District Development Project**

### Objective

Improve economic growth and livelihood security by the quality of services provided to local residents.

### Background

This \$25 million project is planned for a group of historically rural but rapidly urbanizing communities on Country Y's eastern coast. The area's economy has traditionally been based on small scale fishing and agriculture, but now finds itself in the middle of an area that is becoming more urban and is attracting manufacturing and other industry. Local government capability to deliver services to the growing and urbanizing population is extremely limited.

### Key Issues

- Roads are inadequate to handle the growing number of passenger cars and commercial vehicles.
- The electricity supply is inadequate, leading to periodic load shedding; the transmission and distribution (T&D) network does not serve all areas, particularly the coastal communities that were once small fishing villages, but have now grown into unplanned and densely populated residential and industrial centers.
- The water supply system also does not cover the entire municipality, with many poorer communities relying on shallow wells and trucked water for the daily needs. The municipal wastewater treatment facility was built 30 years ago to serve 20,000 households; it now serves 50,000, with many more households and business not connected to the system.
- The area's only official landfill is well engineered with a clay lining, but it is reaching capacity.
- The main municipal hospital is aging and in need of rehabilitation. It occupies a low-lying plot in one of the area's historic coastal fishing communities.

### Environmental Context

This part of eastern, coastal Country Y includes hilly areas that were once forested, but were long ago cleared for terraced farming on their steep slopes. The hills extend to within five kilometers of the sea where they flatten out into a coastal plain. Most of the urban development has occurred within this coastal plain. Although the small scale farming in the terraced hills of the area has historically been productive, in recent years the monsoon rains that are the primary source of water for farmers, have decreased and become less predictable. Fishermen report that fisheries are being compromised by sedimentation running off the hillsides during flash flood events and from industrial and municipal waste. The area also has experienced an increase in violent and destructive storms in recent years.

### Proposed Activities

The Local Government Development Project will combine technical assistance and training for local officials and community based organizations, and funding for rehabilitation of existing infrastructure and extension of existing infrastructure. Proposed infrastructure activities include (a) repaving the coastal highway and expanding it from two to four lanes, (b) increasing the generation capacity of the area's coal-fired power plant and extending the T&D network, (c) extending the municipal water supply system to underserved communities, (d) expanding the municipal landfill to adjacent land currently part of a residential community, and (e) expanding the municipal hospital to land within into grounds.

