Supply-side approaches, though necessary, are seldom sufficient to build adequate resilience to flood rain patterns. Without proper economic signals, increasing the supply of water often also increases demand. The result is a vicious cycle where water supplies are expanded only to see that water consumed inefficiently—eventually returning the region to worsening levels of water stress. The parallel of supply force-fully illustrates the need for combining investments that expand water supplies with policies that manage demand and allocate water efficiently. Such policies include water pricing, water trading exchanges, and quotas on overall water use to ensure enough is left over for the environment. Water trading schemes are a promising approach that allows for the sale of water to higher-valued uses. The result is a win-win because a transfer occurs only if buyer and seller both benefit from the transaction. Efficiency of use and conservation improves. The institutional architecture required for a well-functioning water trading system is complex. But even if the obstacles seem significant, this is an instrument whose time has come for consideration, if not immediate implementation in all contexts.

Improved management in the water sector, while necessary for building efficiency and resilience, may not protect the poor from erratic rains nor assure that water is used sustainably. Safety net programs and insurance schemes are needed to protect the most vulnerable populations from the torments of droughts and floods. In rural areas, these safety nets could take the form of crop-insurance schemes, while in cities, careful water utility regulation is needed to ensure affordable access to clean water. Adequate safeguards, such as quotas and water quality standards, are required to ensure more sustainable water use, to protect water sources, and to prevent overuse and abuse of these public goods. This mix of policy tools is needed to protect those most vulnerable to water shocks, and ensure that rainfall does not become destiny, perpetuating poverty.

The future will be thirsty and uncertain. Already more than 60 percent of humanity live in areas of water stress where available supplies cannot sustainably meet demand. If water is not managed more prudently—from source, to tap, and back to source—the crisis observed today will become the catastrophes of tomorrow.

When the rains withheld and the forests turned into parched savannas, the earliest humans drifted out of Africa in their quest for water. Farm, settlements, and eventually cities clustered along riverbanks and grew to give rise to great civilizations. Now, as then, economic systems are shaped by water availability. But this relationship will undergo unprecedented pressures, as the 21st century witnesses the collapse of two powerful forces—fostering population growth, together with a changing climate. With population growth, water scarcity will proliferate to new areas across the globe. And with climate change, rainfall will become more fickle, with longer and deeper periods of droughts and deluges.

Erratic rains weigh heavily on communities and economies. Floods are as powerful a metaphor of the human experience that nearly every civilization—from classical antiquity, to the Abrahamic religions, to ancient Mesopotamia—tells of a deluge epic that changed the world. Although it is debated whether these myths have a basis in historical events, extreme weather events still reshape societies and permanently mark the lives of those who experience them. Over the past two decades, extreme rainfall events have affected about 300 million people on average every year. With climate change, such extreme episodes of rainfall are expected to increase in frequency. Adapting to changing trends in rainfall, although difficult in its own right, is a gradual and predictable process. Knowing how to address unpredictable rainfall shocks, of uncertain frequency and unknowable magnitude, presents additional challenges. We know, however, that expanding adaptation efforts, particularly in rural areas, is crucial—accelerating the destruction of forests, and compromising agricultural systems.

Droughts can have health impacts, hamper firm productivity, exacerbate the destruction of forests, and compromise agricultural systems. This book presents new evidence to advance understanding on how rainfall shocks coupled with water scarcity impact farms, firms, and families. On farms, the largest consumers of water in the world, impacts are channeled from declining yields to changing landscapes. In cities, water extremes, especially when combined with unreliable infrastructure, can still firm production, sales, and revenue. At the center of this are families, who feel the effects of this uncertainty on their incomes, jobs, and long-term health and welfare (figure 1).

Parched Farms, Shriveling Yields, and Shrinking Forests

Throughout much of the world, even moderate deviations from normal rainfall levels can cause large changes in crop yields. The driest regions are most sensitive to rainfall variability, although extreme rains can also bring crop losses to regions with more bountiful precipitation and productivity. Such variability is typical of a considerable net loss of food production every year—enough to feed 81 million people every day, a population the size of...
When Rainfall Becomes Destiny

Although a rainfall shock may be fleeting, its consequences can shape the destiny of those who experience it in infancy. Flooding, such as a lack of food, children, and an increased frequency of poverty outages. The performance of firms in cities is also affected by rainfall shocks. While the government’s reliance on transport and energy infrastructure is well established, little is known about the significance of water to firms. Findings in this book show that when urban water services are disrupted, whether by climatic or human-made events, there are significant reductions in their sales and employment. Particularly vulnerable are small and informal firms, a major source of employment in developing countries. The impacts of water supply and sanitation services in cities are therefore critical to the wider documentation of human health.

Avoiding the Parachute Path

Pursuing business as usual will lead many countries down a "parachute path" where droughts shape destinies. Avoiding this misery in slow motion will call for fundamental changes to how water is managed. It will require using different policy instruments to address the multiple economic attributes of water, through its multiple, and at times competing, attributes. These multiple, and at times competing, attributes can pose major health and environmental risks. People can afford. Finally, the water passes through a single network—a monopolist—that needs to be regulated to ensure adequate access to water at a price that people can afford. Finally, the water must protect sewers and wetlands and the environment where, if untreated, it can pose major health and environmental risks.

Dry shocks reduce yields and cause annual losses that could feed 81 million people, the population of Germany. Dry shocks push farmers to expand agriculture into forests, worsening climate change and threatening water supplies.

Farms

Dry shocks reduce yields and cause annual losses that could feed 81 million people, the population of Germany. Dry shocks push farmers to expand agriculture into forests, worsening climate change and threatening water supplies.

Farms

For firms and cities, the cost of dry shocks are four times greater than wet shocks. Without sufficient water, economies slow down with impacts on health, labor incomes, and firm sales.

Farming

A dry shock in infancy can become destiny, with lasting effects on health and wealth, trapping subsequent generations in poverty and malnutrition.

Families

Some Results at a Glance

With population growth the demand for water is accelerating and with climate change rainfall and temperature changes are causing spectacular changes in distribution of water availability. As a result, crop productivity suffers drastically. As water moves into pipes to deliver water to users, these linkages can result in policy decisions that are at times conflicting, and a merit good—one to which people have a right but for which they must pay a price.