WATER

P-NOTES

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Overcoming Drought in India:

Adaptation Strategies for the State of Andhra Pradesh

Climate change and drought are both an environment and a development issue. Nowhere is this more critical than in India, where the poor are the most at risk from the increased variability and volatility in weather patterns. One of the key climate-related vulnerabilities of India's economy is its heavy dependence on the monsoons. Monsoon analysis reveals that some part or the other of the Indian subcontinent has been hit by drought almost every two years.

Despite programs that were designed to mitigate the impact of drought that have been in place since the 1950s, drought remains prevalent in India. The disastrous effect of feeble or failed monsoons has been particularly acute in the state of Andhra Pradesh (see *Figure1*), where more than 70 percent of the people depend on agriculture for their livelihood. The human and social costs of these droughts are devastating and wide-ranging, resulting in crop-yield failure, unemployment, erosion of assets, decrease in income, reduction in living conditions, impoverished nutrition and health, and increased vulnerability to other shocks.

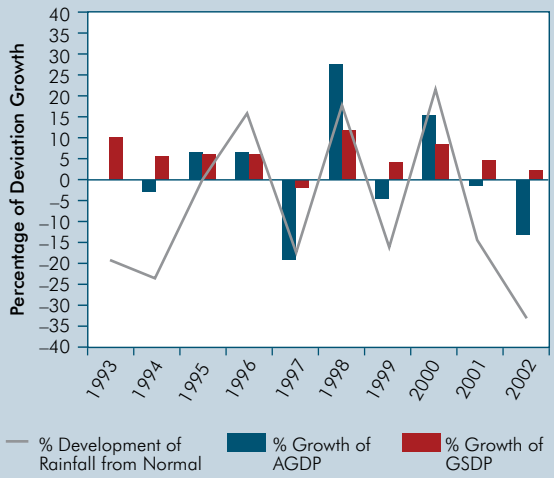
Developing a strategy for sustainable practices

The Government of Andhra Pradesh (GoAP) recognized the need to support a gradual shift to more sustainable agricultural and economic practices. It supported the development of a study focused on eight (out of a total of twenty-three) districts in Andhra Pradesh that together are home to about 30 million people, account for about 70 percent of the state's drought-related crop production loss, and include some of the poorest areas and communities in the state.

Study Objectives

The study objectives were designed to enhance the state's capacity to assess long-term effects of drought and increase resilience to drought risks at state, district, and community levels. The process for development of study objectives featured extensive consultation with affected sectors, and with state

Figure 1. Rainfall and Economic Performance in Andhra Pradesh



Source: AGDP, Agricultural Gross Domestic Product; GSDP Gross State Domestic Product

This note reports key messages from *Overcoming Drought, Adaptation Strategies for Andhra Pradesh, India*, a Directions in Development/Environment and Sustainable Development publication, the World Bank 2006. Readers may download the complete document from www.worldbank.org/water.

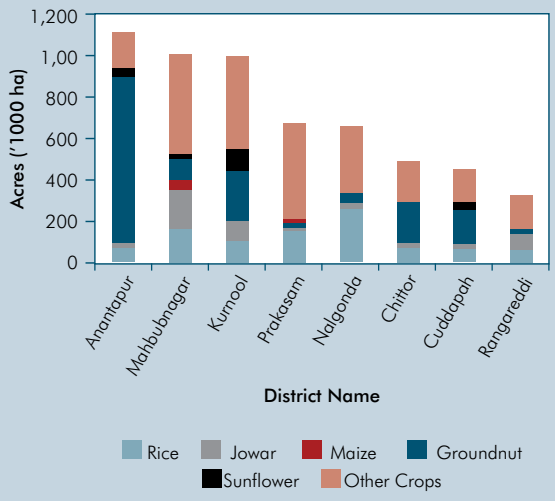
and national programs that aim to address the effects of drought. The study aimed to:

- Develop a framework for simulating long-term impacts of drought in drought-prone areas and at state levels;
- Conduct risk assessments of the impacts under different scenarios; and
- Assist the GoAP in development of a strategy for adapting to frequent drought and water deficits.

Methodology

During the study, a model was developed as a powerful tool for thorough drought risk assessments and for investigation of risk coping strategies and climate scenarios on crop yield and production. The model was calibrated using local farming practices and crop selection (that is, rice, maize, jowar (sorghum), sunflower, and groundnut, *see Figure 2*) in the eight selected districts. The report presents results at the district level. Challenges in determining the economic impacts included: the slow onset of droughts that spread over long periods and large areas; the significant indirect losses; the need to link local impact analysis with statewide analysis; and the linkages between the different sectors and subsectors of the economy, the flow of goods and services and employment.

Figure 2. Crop Area in the Eight Selected Districts of Andhra Pradesh



In addition to the macroeconomic and drought management scenarios, the development of the modeling framework aimed to account for the possible increase in frequency and severity of droughts that may occur owing to human-induced climate change. In this context, the study is linked to a larger program of work by the World Bank in a new strategic area on adaptation to climate variability and longer-term changes.

Key Findings

Key findings of the study provide insight into the human and social costs of drought, how drought impact varies depending on location, the coping strategies of farmers, the impact on the agriculture sector and on households and the macroeconomic impact on the state.

Human and social costs

The human and social costs of drought have been and remain devastating for the millions of people in Andhra Pradesh.

- Even though a variety of anti-drought programs are in place, the agricultural sector faces loss in value of crop production for the five major crops combined under drought scenarios.
- Individual farmers may suffer greater losses, and small and marginal farmers, faced with a loss in output value of 10 or 5 percentage points, fall below the poverty line.
- New approaches and tools are needed to help these people adapt to frequent droughts; economic and social development of drought-prone areas is necessary, with attention to support for sustainable and resilient approaches to water scarce conditions in the long term.

Location differences

Impacts of droughts vary greatly across locations and crops depending on drought severity.

- Different crops can be particularly vulnerable in different districts.

Coping strategies of farmers

In a major drought, farmers often ration the use of available water, and shift from rice, which is water-intensive, to less water-intensive crops.

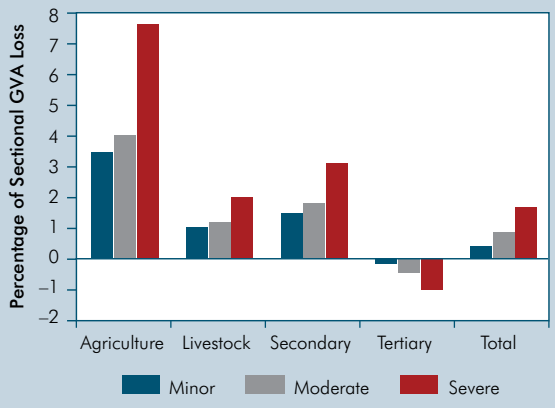
- Shifting farming practices can decrease losses borne by farmers, reduce water demand, and increase production.
- The impacts of measures that can be adopted by farmers are highly location-specific; there is significant scope for increasing the effectiveness of advice to farmers about undertaking location-specific drought coping measures.
- Global climate change is likely to further increase the benefits of shifting from rice to less water-intensive crops; the study reinforces the need for shifting to less water-intensive activities in drought-prone districts.

Impact on Agriculture sector

There is a significant negative impact of drought on the agricultural sector, with a more limited impact on livestock and manufacturing and a lag before a positive impact on the service sector.

- *Droughts continue to have a negative impact on the performance of the agriculture sector and on the lives of those dependent on that sector for livelihood, income and employment*; strategies must specifically target those affected by drought in the most vulnerable areas.

Figure 3. Conditional Average Loss in GVA, by Sector and Drought Category



- *Moderating loss of employment during drought remains a key challenge*; this is important, as the agricultural sector is the major employment generator for the state. To mitigate impact on employment and income in the short to medium term, opportunities could be fostered in the trade and transport sectors (except railways) construction and related industries, mining and quarrying sectors and the poultry sector.

Impact on Households

Responses to drought depend on the situation of a particular household.

- Household responses to drought are varied; tailored assistance is required for those in need.

Macroeconomic impact on the state

Although farmers and communities in drought-prone areas experience significant losses, the statewide macroeconomic impact is rather modest (*see Figure 3*).

- *The macroeconomic impact of drought is decreasing further as the Andhra Pradesh economy shifts from agriculture to other sectors*; manufacturing (secondary) and service (tertiary) sectors are increasing their gross value added (GVA) contributions to the economy; since this trend will most likely continue, the macroeconomic impact of drought will further decrease.
- *Accelerating the shift from agriculture to manufacturing and service sectors could be a powerful macroeconomic drought adaptation strategy*; if the shift to other sectors could roughly approximate the economy of Brazil, the macroeconomic loss due to drought in Andhra Pradesh could be significantly decreased.
- *The findings of a relatively small and declining macroeconomic impact of drought are consistent with other evidence for developing countries*;

Areas for Future Action

The analysis revealed that an effective strategy must combine statewide economic and sectoral policies with intensified, well-targeted efforts at the community level. The study demonstrated that drought

manifests itself at different geographic levels, on different economic indicators, on different crops and sectors, on different population groups, and on different measures of human well-being. Often, there are stark contrasts in drought impact, such as when the impact on farmers and communities in a drought-prone area devastates the local economy, while at the state level, the impact of drought on the state-wide economy is slight.

As a result of the study findings, recommendations for future action include:

- *Continue and accelerate the ongoing changes in the economic structure at the macro level*. This should facilitate growth of other industries, support development of the livestock sector, and encourage the shift from rice to less water-intensive crops to decrease vulnerability to drought;
- *Encourage investments in sectors with significant employment potential for labor displaced from the agriculture sector*, such as trade and transport, construction, and mining and quarrying subsectors;
- *Initiate the development and implementation of drought adaptation plans for the most affected areas to deliver better targeted, coordinated, and packaged assistance to those in need*. The initiative should use a participatory approach and build on successful experiences in Andhra Pradesh with community-based watershed management and other relevant schemes;
- *Consider special support programs for marginal farmers and the landless and poorest populations*. Since the poorer farmers and landless laborers are least resilient to shocks, it is particularly important to address the challenge of reaching out to the poorest and most vulnerable.;
- *Create a supportive institutional and policy framework with the involvement of all levels of Government*. Technical assistance and support mechanisms need to be developed to assist farmers and communities in drought adaptation planning and action. To mitigate the risks and startup costs of transition to different crops, technologies, and economic activities, a wide range of actions must be delivered to support institutional arrangements in communities, strengthen policies and incentives for adaptation to a diversified rural economy, water conservation, aggressive awareness campaigns, capacity building for stakeholders, and innovative financing schemes;
- *Explore and introduce innovative micro financing and insurance schemes for farmers that promote a shift to more sustainable practices*. New financing products should provide incentives to switch to more sustainable agricultural and economic practices. Possible innovative financing products include drought adaptation insurance to cover risks in transition to new business, and drought adaptation credit to assist in the transition to long-term viable business;
- *Develop a Decision Support Toolkit to provide a good scientific basis for supporting drought management and adaptation planning at different levels*. The Toolkit, based on the modeling framework developed for the study, can strengthen drought risk analysis in states in India and other drought-prone countries.

WATER PARTNERSHIP PROGRAM

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