HOW CAN AFRICAN AGRICULTURE ADAPT TO CLIMATE CHANGE? INSIGHTS FROM ETHIOPIA AND SOUTH AFRICA

Understanding Farmers’ Perceptions and Adaptations to Climate Change and Variability
The Case of the Limpopo Basin, South Africa

Glwadys Aymone Gbetibouo

Climate change is expected to have serious environmental, economic, and social impacts on South Africa. In particular, rural farmers, whose livelihoods depend on the use of natural resources, are likely to bear the brunt of adverse impacts. The extent to which these impacts are felt depends in large part on the extent of adaptation in response to climate change. Adaptation is widely recognized as a vital component of any policy response to climate change. Without adaptation, climate change would be detrimental to the agricultural sector, but with adaptation, vulnerability can be significantly reduced.

This brief is based on a study that examines farmers’ perceptions of climate change and analyzes their adaptation responses to climate change and variability using household survey data from the Limpopo River Basin in South Africa.

FARMERS’ PERCEPTIONS OF CLIMATE CHANGE
Farmers’ ability to perceive climate change is a key precondition for their choice to adapt. The accuracy of farmers’ perceptions of climate change was assessed by comparing their perceptions of long-term changes in temperature and precipitation with climate trends recorded at nearby meteorological stations. About 91 percent of the farmers surveyed perceived an increase in temperature over the past 20 years. This perception was confirmed by the statistical record for the Limpopo River Basin between 1960 and 2003, which showed the increase occurring mostly in the summer months (October to March). An analysis of climate data at the provincial level shows the same general trend of increasing temperature with some minor variations in terms of the severity of the increase and its timing (warming occurred mostly during the winter months in Limpopo, Gauteng, and Mpumalanga). Thus, farmers’ perceptions are supported by the statistical record.

In terms of precipitation, 81 percent of respondents reported a decrease in rainfall over the past 20 years. Approximately 12 percent of farmers reported a change in the timing of rains, and many of these respondents observed a delayed and shorter rainfall season (summer).

The recorded rainfall data for 1960–2003 show that about 85 percent of rainfall occurs during summer months. However, despite a majority perception that rainfall had decreased—and with the exception of the winter season where the data do show a decreasing trend—the climate record shows no statistically significant trend over the past 40 years. Overall the climate record shows large variability in the amount of precipitation from year to year, and the same pattern was observed in each province. The high proportion of farmers noticing a decrease in precipitation could be due to the substantial decline in rainfall during 2001–03. Thus, farmer reports of a reduction in rainfall over the past 20 years may indicate that their perceptions are influenced by more recent climate trends.

A number of factors influence the likelihood that farmers will perceive climate change. Having fertile soil and access to water for irrigation decreases the likelihood that farmers will perceive climate changes, whereas education, experience, and access to extension services increase the likelihood that farmers will perceive climate changes. This suggests that perceptions are not based entirely on actual climate conditions and changes but are also influenced by other factors.

ADAPTATION TO CLIMATE CHANGE
Even though a large number of farmers interviewed noticed changes in climate, almost two-thirds chose not to undertake any remedial action. Among those farmers who did adapt, common responses included changing planting dates, increasing irrigation, diversifying crops, changing the amount of land under cultivation, and supplementing livestock feed.

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Results from mathematical models indicate that experienced farmers are more likely to adapt to perceived climate change. In particular, the likelihood of diversifying portfolios (that is, adopting new crops or crop varieties, or using mixed farming systems), changing planting dates, and changing the amount of land under production increases with farm experience. This suggests that
Table I

<table>
<thead>
<tr>
<th></th>
<th>Lack of information about climate change</th>
<th>Lack of knowledge concerning appropriate adaptations</th>
<th>Poverty or lack of credit or savings</th>
<th>No access to water</th>
<th>Insecure property rights</th>
<th>Poor transport links or lack of market access</th>
<th>Others</th>
<th>No barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Basin</td>
<td>6</td>
<td>2</td>
<td>54</td>
<td>21</td>
<td>10</td>
<td>6</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Limpopo</td>
<td>4</td>
<td>3</td>
<td>24</td>
<td>33</td>
<td>14</td>
<td>10</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Northwest</td>
<td>10</td>
<td>0</td>
<td>55</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>Gauteng</td>
<td>0</td>
<td>0</td>
<td>32</td>
<td>12</td>
<td>0</td>
<td>4</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>9</td>
<td>2</td>
<td>48</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td>13</td>
<td>23</td>
</tr>
</tbody>
</table>

CONCLUSIONS AND POLICY IMPLICATIONS

Given that few farmers adjusted their farming practices despite perceiving changes in climate, governments should facilitate adaptation by enabling farmers to overcome the barriers reported in this study. Specifically, policies should ensure that farmers have access to affordable credit, which would give them greater flexibility to modify their production strategies in response to climate change. Because access to water for irrigation increases farmers’ resilience to climate variability, greater investments in smart irrigation are needed. Reforming pricing, clearly defining property rights, and strengthening farm-level managerial capacity should also be emphasized to promote efficient water use. More importantly, given that land reform has increased the number of less experienced and unskilled farmers, extension services need to be expanded with highly qualified personnel. Additional measures required are improving off-farm income-earning opportunities, and facilitating a smooth transition from subsistence to commercial farming.

FOR FURTHER READING


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