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Research Application Summary

# Identifying indigenous knowledge and effective communication systems for adaptation to climate change by smallholder farmers of Kilifi District, Kenya

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## Abstract

This study investigated the influence of incorporating feedback from agricultural information users in agricultural communication systems and identified coping strategies for adaptation to climate change by smallholder farmers of Kenya. Food production, especially in Kilifi district, has been declining over the years, lowering food sufficiency to about 30 percent down, from 50 percent. This has persisted with continued changes in climate, despite all the efforts put in by the government and non-governmental agencies.

Key words: Adaptation strategies, agricultural information communication system, climate change, indigenous technical knowledge

## Résumé

Cette étude a examiné l'influence de l'intégration de la rétroaction des utilisateurs de l'information agricole dans les systèmes de communication agricole et identifié des stratégies d'adaptation au changement climatique par les petits agriculteurs du Kenya. La production alimentaire, en particulier dans le district de Kilifi, a diminué au fil des ans, en abaissant l'autosuffisance alimentaire à environ 30 pour cent de moins, passant de 50 pour cent. Cette situation a persisté dans la poursuite de changements climatiques, malgré tous les efforts déployés par le gouvernement et des organismes non gouvernementaux.

Mots clés: Stratégies d'adaptation, de l'agriculture système de communication de l'information, le changement climatique, les connaissances techniques indigènes

## Background

Climate change is an unprecedented threat to humanity caused by unpredictable variation in rainfall patterns and an increase in global temperature. The environmental and social consequences of climate change in Kenya include emergence and escalation of a biotic stresses (water and temperature)

and biotic stresses (diseases and pests), which culminate to food insecurity and destitution, especially to smallholder farmers. Davis and Place (2003), argue that low production by Kenya's smallholder farmers is partly due to their lack of appropriate technical skills, lack of access to appropriate agricultural information system, insufficient use of yield-enhancing technologies and unreliable rainfall patterns that is now exasperated by variations in climate. The environmental and social consequences of climate change, especially for smallholder farmers, put their livelihoods at risk.

It is known that farmers have lived with climate variations for many years and have developed their own coping strategies, known as indigenous technical knowledge (ITK). There is an increasing awareness that indigenous knowledge and practices should be recognized in development initiatives aimed at sustaining and improving the livelihoods of farming communities (Orindi, 2009). However, the conventional Agricultural Information and Communication Systems (AICS) have not been incorporated existing ITK on climate change coping strategies as a feedback mechanism from information users. Hence the AICS have rarely benefited from ITK risks thus missing the wealth of accumulated knowledge which had stood the test of time.

## Literature Summary

Climate change is an emerging global threat that has profound environmental and social consequences to the livelihoods of humanity, especially for the poor people living in developing countries. In order to deal with the impacts of climate change, measures that will minimize food losses or that take advantage of the opportunities presented need to be sought.

Development of appropriate climate change adaptation options depends on the availability of accurate information on climate change impacts and reliable communication strategies, which need to be availed to empower poor communities (Pippa, 2008). Currently there is increasing emphasis on farmers themselves through community-based extension methods. The current approaches in Kenya, which utilized this philosophy include Farmer Field schools.

## Study Description

The study was conducted in Kikambala and Ganze divisions of Kilifi district, Ganze being classified as an arid and semi-arid (ASAL) division in coastal Kenya. The average annual rainfall in the district is 500 to 1000 mm per year, occurring biannually with long rains (April-June) being heavier than short rains (only

October - December) (Ministry of Agriculture, 2008). Temperatures range between $24^0$ and $35^0$ C. Soils change from sandy to sandy-loam as one moves away from the coast line. The district has remained food deficit for a long time with about 30% food sufficiency when cereals alone are considered, resulting in some divisions receiving relief food from the government and Non-Governmental Organizations (NGOs) (Ministry of Agriculture, 2008). Data collected included farmers perceptions of climate variations, variation in yields, coping strategies to enhance crop yields in the face of variable climate, sources of information and support institutions. Level of incorporation of farmers' knowledge in formulating coping strategies was also obtained from researchers.

## Results

**ITK practiced by farmers to manage climate change challenges.** Description of the various ITK practices used by the farmers to manage the various challenges related to climate change in the study area was studied. The challenges were identified as: 1) floods; 2) erratic rainfall; 3) drought; and 4) pest incidences. A comparison was made between the practices promoted by extension agents and those that have been perceived by farmers to increase yield. The chi-square test of 14.244 was significant at 10%, suggesting that there was a significant role played by the ITKs in increasing the crop yield among the farmers in the district. This indicates the importance of the ITK practices in managing climate change challenges.

**Effectiveness of existing AICS in disseminating knowledge to smallholder farmers.** To demonstrate whether the existing AICS were effective in disseminating knowledge, the study compared the practices which the information providers promoted versus the practices which the farmers acknowledged to have adopted and had increased crop yields. The results are presented in Table 1. Findings indicated that new varieties and correct plant population were widely promoted by extension providers and were perceived by farmers to have contributed to high yields. This could be because these two practices were probably the easiest to demonstrate and their results were immediate. The other technologies were expensive to demonstrate and time consuming. The two technologies also were mentioned to increase yields (25.2% and 25.5%). However, the chi-square of 12.294 was not significant, implying that AICS are not effective in disseminating knowledge to smallholder farmers. This could be contributed to the lack of feedback from information users.

**Table 1. Percentage distribution of the practices promoted by extension staff and those that have increased yield.**

| Practice | Frequency of practices promoted by extension | Percentage | Frequency of practices promoted by extension that have increased yield | Percentage |
|---|---|---|---|---|
| Early planting | 102 | 22.8 | 63 | 17.1 |
| Correct plant population | 111 | 24.8 | 103 | 25.5 |
| New varieties | 111 | 24.8 | 89 | 25.2 |
| Water harvesting techniques | 62 | 13.9 | 49 | 15.4 |
| Line planting | 30 | 6.7 | 29 | 8.7 |
| Tractor ploughing | 17 | 3.8 | 17 | 5.6 |
| Ploughing across contours | 3 | 0.7 | 3 | 1.4 |
| Use of manure | 1 | 0.2 | 1 | 0.3 |
| Tree planting | 10 | 2.2 | 3 | 0.7 |

F statistics 2.514, significant at 5%.

**The extent to which ITK has been integrated into scientific climate change adaptation strategies.** The extent of integration of the various practices plays an important role in successful climate change adaptation. From the results in Table 2, the overall mean of extent is "a little" level of integration of the practices with scientific climate change adaptation strategies. This suggests that farmers still value their ITK and have not found it necessary to integrate it into scientific farming methods. Another explanation is possibly that extension providers have not recognized ITK and have therefore not found it necessary to integrate it in their recommended practices. Mtwapa location could be leading in integration because of its proximity to the Regional Research Centre since the centre is located in the division.

**Table 2. The extent to which ITK has been integrated into scientific climate change adaptation strategies.**

| Location | N | Percentage N | Mean extent of integration |
|---|---|---|---|
| Palakumi | 30 | 19.3 | A little |
| Marimani | 29 | 12.0 | A little |
| Mtwapa | 73 | 48.7 | Often |
| Mikanjuni | 18 | 20.0 | A little |
| Total | 150 | 100.0 | A little |

F test = 5.397 df of 3 between groups and 146 within groups and significant at 5%.

**Research Application**

The findings, though preliminary will help researchers in decision- making concerning useful and relevant technologies that address the needs of the farmers, in relation to climate change challenges. They will also help policy makers and agricultural extension agents to design appropriate, and relevant agricultural information and communication channels to disseminate ITK messages that relate to climate change adaptation practice.

**Recommendation**

Extension needs to expand its role from technology transfer to include roles such as problem solving, education and human development, and a catalyst as facilitator of learning process. The approach should respect the indigenous knowledge of the farmers – knowledge which may not be known by scientists. It should consider the farmers as the basic units for setting research priorities.

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