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Research Application Summary

The role of agricultural information and communication systems in disseminating climate change adaptation strategies to smallholder farmers of Coastal Kenya

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Abstract

Climate change is the fluctuation around the mean climate state or pattern that has built over a long period of time, usually decades or longer, typically 30 years. The worlds' climate is continuing to change at rates that are projected to be unprecedented in recent human history. Some models are now predicting that the temperature increases by the year 2100 may be larger than previously estimated in 2001. Floods and droughts are becoming more frequent and severe, which is likely to seriously affect farm productivity and the livelihoods of rural communities. The impacts of climate change are likely to be considerably high in tropical regions. Sub-Saharan Africa is currently the most food-insecure region in the world. Climate change threatens to aggravate the food situation unless adequate measures are put in place. The environmental and social consequences of climate change put farmers' livelihoods at risk and this is worse where farming is done at small scales. Farmers have minimized or spread risks by managing a mix of crops, crop varieties and sites, staggering the sowing/planting of crops, and adjusting land and crop management to suit the prevailing weather conditions. This study was aimed at determining the perception of effectiveness of communication systems in enhancing the management of climate change challenges for increased food production by smallholder farmers. The study was able to show that majority of the respondents have had contact with extension providers, yet many farmers have not realized any changes or have had a decrease in their yields, prompting the concern on how farmers perceive the methods promoted by extension. Change in farmers' yields is not related to the duration over which they have had contact with extension providers.

Key words: Agricultural information and communication systems, adaptation, smallholder farmers, climate change

Résumé

Le changement climatique est la fluctuation autour de l'état climatique moyen, sur une longue période de temps, généralement des décennies ou plus, typiquement 30 ans. Le climat global continue de changer à un rythme sans précédent. Quelques modèles

prédisent d'ici 2100, des températures élevées qui pourraient être plus importantes que les estimations passées de 2001. Les inondations et les sécheresses sont devenues de plus en plus fréquentes et sévères, ce qui pourrait éventuellement influencer la productivité agricole et les conditions de vie des communautés rurales. Les impacts du changement climatique sont susceptibles d'accroitre considérablement dans les régions tropicales. L'Afrique subsaharienne est actuellement la région qui souffre le plus de l'insécurité alimentaire au monde. Les changements climatiques risquent d'aggraver la situation alimentaire si des mesures adéquates ne sont pas mises en place. Les conséquences environnementales et sociales du changement climatique mettent en péril les conditions de vie des agriculteurs, surtout lorsque l'agriculture est exercée à petite échelle. Les agriculteurs ont minimisé les risques en appliquant des rotations et combinaisons de cultures, de variétés, en ajustant le semis, et gestion des terres et des cultures en fonction des conditions météorologiques. La présente étude visait donc à évaluer les perceptions de l'efficacité des systèmes de communication dans l'amélioration de la gestion des défis du changement climatique pour une augmentation de la production alimentaire. L'étude a pu montrer que la majorité des personnes interviewées ont été informées par les vulgarisateurs, toutefois nombreux sont ceux qui n'ont pas observé de changement ou vu leurs rendements diminuer, ce qui a suscité des inquiétudes sur la façon dont les agriculteurs perçoivent les méthodes. La variation des rendements des agriculteurs n'est pas liée à la durée pendant laquelle ils ont eu des contacts avec les services de vulgarisation.

Mots-clés: Systèmes d'information et de communication agricoles, adaptation, petits agriculteurs, changement climatique

Background

In Kenya, climate change effects have been felt most in the arid and semi-arid lands (ASAL). The agricultural sector, which forms the base of rural livelihoods in the country, is confronted with the major challenge of increasing food production to feed a growing and increasingly prolific population amidst a situation of decreasing availability of natural resources. This situation is exacerbated by the challenges related to climate change. To help farmers overcome climate change challenges, researchers and extension agents have put in place modern agricultural technologies, which they disseminate to farmers on a regular basis. There is, however, a wide gap between agricultural technologies produced in research institutions and the translation of the same into increased yields and subsequent food security. The best option is to give farmers the power to dominate their situation, and to create a better future for themselves, rather than being passive recipients of new technology (Maru, 2003).

Some of the dissemination models, especially Training and Visits (T&V) did not recognize the farmers' voice as a way of feedback (Davis and Place, 2003). To cope with the impacts of climate change requires measures that will minimize losses or take advantage of the opportunities presented, a process referred to as adaptation (Pippa, 2008). The author further argues that the development of appropriate adaptation options therefore depends on the availability of accurate information on climate change impacts and reliable

communication strategies, which need to be availed to empower poor communities. Davis and Place (2003) argue that low production by Kenya's smallholder farmers is partly due to their limited access to farm inputs, lack of appropriate technical skills, lack of access to appropriate agricultural information system, insufficient use of yield-enhanced technology and unreliable rainfall patterns that is aggravated by climate change variations. The poor are hardest hit by all this because of their vulnerability to the effects of climate change. Since most of them depend on natural resources and rain-fed agriculture for their livelihoods, they are least able to cope with the shocks of climate change-induced droughts, floods and other natural disasters (Besada and Sewankambo, 2009).

Food production in Kilifi district has been declining over the years. This has reduced food self-sufficiency from 50 percent to 30 percent over a period of 30 years, whereas there is enough agricultural land. The district has suffered from repeated drought, erratic rainfall as well as floods, which have been exacerbated by climate change. There are strategies and information that have been developed by government agencies for adaptation to climate change. These strategies have however not been effective in managing this unprecedented change in climate. If agricultural information and communication systems could be effective in its role in climate change management strategies, it is assumed that there would be better resilience to cope with climate change uncertainties and livelihoods of the smallholder farmers in ASALs would improve. The objective of the study was (i) to determine the smallholder farmers' perceptions of effectiveness of existing agricultural information and communication systems in disseminating climate change adaptation strategies; and, ii) determine the extent to which agricultural information and communication systems encourage feedback from smallholder farmers in respect to climate change management.

Methodology and approaches

The target population comprised of all smallholder farmers from the two divisions within Kilifi district, Ganze and Kikambala. Ganze has a population of 52,330 persons while Kikambala has 60,040 persons (CBS, 2001). A sample frame consisting of smallholder farmers from the study area was developed by use of random sampling and a sample size of 167 household heads was arrived at using a formula developed by Yamane (1973). In addition, agricultural extension officers from Kilifi and researchers from Kenya Agricultural Research Institute, Mtwapa were also interviewed as key informants. Data were collected by use of questionnaires (closed and open- ended).

The data collected were sorted before being coded and entered into the computer using Statistical Package for Social Science research (SPSS) version 15.0 software. The same software was used for data analysis. Data were analysed by use of descriptive (frequencies and percentages) and inferential statistics (Chi-square test).

Emerging issues/findings

Contact with extension providers. Extension contacts are very important when introducing new technologies to farmers because this is the time they need a lot of advice

and guidance. Figure 1 summarizes the results on contact with extension providers. Only 16% of the farmers interviewed indicated that they had not had contact with extension providers, raising concern on why the farmers are still food insufficient, yet they are largely exposed to extension services.

i) *Perception of farmers on effectiveness of existing AICS in knowledge dissemination.* The agricultural information and communication systems (AICS) that have been used to disseminate knowledge to farmers include Training and Visits (T and V) and Farmer Field Schools (FFS). Two approaches were utilized to capture the farmers' perception on the effectiveness of the existing AICS in disseminating knowledge namely: i) exposure to extension vis-à-vis change in yields; ii) relationship between technologies promoted and those that had been adopted.

ii) Exposure of farmers to extension contact compared to crop yields. The relationship between farmers' contact with extension providers and the change in yield was evaluated. The results are represented in Table 1. Only 2.4% of the respondents have had contact with extension agents for less than 1 year. Majority of the respondents have had contact with extension providers, yet many farmers have not realized any changes or have had a decrease in their yields, prompting the concern on how farmers perceive the methods promoted by extension. With a chi-square of 7.746 and a p-value of 0.459, there is no statistical significance and the null hypothesis is therefore accepted that the existing AICS are not effective in disseminating knowledge to farmers. Change in farmers' yields is not related to the duration over which they have had contact with extension providers.

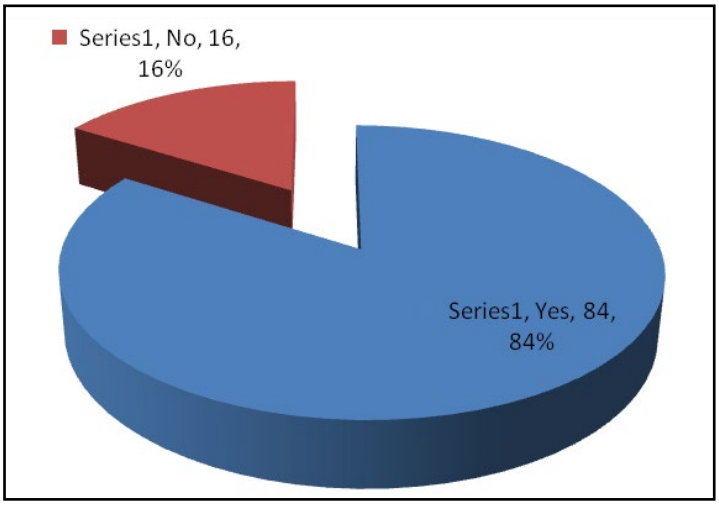

Figure 1. Contact with extension providers (%)

Practices extension providers promote and have been adopted by farmers. In order to obtain information on the practices extension officers promote and have been adopted, respondents were asked to list the practices that have been promoted and the ones they perceive to have increased their yields and have therefore been adopted. The results are presented in Table 2. In terms of the practices the extension providers promote, findings indicate that water harvesting techniques and new varieties were widely promoted by extension providers.

The least common practice was planting along contours. Of the practices that have been adopted by farmers, early planting leads followed by water harvesting techniques. The order of promotion and adoption follow similar patterns, indicating that extension messages are favored by farmers, meaning that AICS are perceived to be effective.

Table 1. Change in yield compared to the duration of contact with extension providers

Duration of Contact (Years)	Change in Yields (%)		
	Decrease	No change	Increase
Less than 1	0	4.3	0
1-5	10.7	4.3	3.6
5-10	7.1	15.9	21.4
10-15	21.4	23.2	32.1
Over 15	60.7	52.2	42.9

Chi-square =7.75, p-value=0.459 (p> 0.05), not significant

Summary of farmers' Perception to effectiveness of AICS. As a summary to determine the farmers' perception to effectiveness of AICS, perception index as well as perception categories were determined. Three items namely; duration of contact with extension providers, changes realized regarding yields and attribution of changes in yield to contact with extension providers, were considered. The data were treated as ordinal after which the data were scored then means computed for each item to get the perception index. This index was used to measure perception since it encompassed all the three items. This came to 2.6035 on a continuum of 0-3. Using the mid- point formula, categories of perception were arrived at. An index of 0-1.66 was considered as negative while that of 1.67-3.33 was considered positive. The results are shown in Tables 3 and 4. Out of the 126 respondents only one had a negative perception to effectiveness of AICS, meaning that AICS are perceived by smallholder farmers to be effective in disseminating climate change strategies.

Table 2. Distribution of practices promoted by extension providers and those that have been adopted by farmers

Practices	Frequency of practices promoted	%	Frequency of practices adopted	%
Use of manure	102	68	63	42
New varieties	111	74	103	68.7
Water harvesting techniques	111	74	89	59.3
Correct plant population	62	41.3	49	32.7
Line planting	30	20	29	19.3
Early planting				
Tractor ploughing	17	3	11.3	2
	17	3	11.3	2
Ploughing along contours	1	0.7	1	0.7
Tree planting	10	6.7	3	2

Table 3. Farmers' perception index

Items	N	Mean	Std. Deviation
For how long have you had contact with extension providers	126	4.18	1.038
Since your first contact with extension providers, what changes have you realized regarding yields?	125	2.00	0.672
Do you attribute this change to contact with extension providers?	126	1.66	0.476
Perception index (mean of means)	126	2.609	0.420
Valid N (list wise)	125		

N= 126 (Those who have had contact with extension providers)

Table 4. Farmers' perception category

Perception category	Frequency	Percentage (%)
Negative perception	1	0.8
Positive perception	125	99.2
Total	126	100.0

Main mode of communication by extension providers. Extension uses different modes of communication when disseminating knowledge to farmers. The type of mode will also determine the level of feedback farmers are encouraged to give. Feed back from the 126 farmers who reported to have had contact with extension providers are shown in Table 5. In terms of mode of meeting, the one with the highest frequency was farm visits while seminars came last. It can be concluded that farmers prefer face-to-face communication with extension agents. Farmers' needs are addressed fully when extension personnel come home, and when a new idea is not well understood, a farmer has an opportunity to ask questions for clarification. Besides, the extension agent can demonstrate the hard technical aspect of a technology on the farm in the presence of the farmer.

Table 5. Relationship between the main mode of communication and the extent of feedback

Main mode of meeting	Frequency	%	Mean extent to which feedback AICs encourage
Farm visits	34	27.0	Often
Group visits	19	15.1	Often
Field days	17	13.5	Often
Office visits	11	8.7	Often
Barazas	15	11.9	Never
Seminars	3	2.4	Often

Conclusions

This study aimed to evaluate the farmers' perception of effectiveness of agricultural communication systems in disseminating technologies to adapt to challenges of climate change. The following conclusions were made from the study: i) the existing agricultural information and communication systems are perceived to be effective in disseminating agricultural knowledge to farmers; and ii) agricultural information and communication systems being used by extension providers have been found to encourage feedback from information users. However, this feedback does not translate to farmers' needs and priorities being incorporated in research agendas.

Recommendation

The region under study is vulnerable to the current weather variability and associated shocks, and indeed Ganze has been declared one of the poorest divisions in the country. It is therefore important to find ways by which the farmers can build their livelihood resilience through coping better with current weather-induced risks as a pre-requisite to adapting to future climate change. The study has recommends that; i) there is a need to review agricultural information and communication systems being used to disseminate knowledge to farmers, if this is the major medium used to disseminate agricultural knowledge to farmers; ii) there should be a national framework for mainstreaming climate change adaptation, and iii) there is need to target research to farmers' needs more effectively and to produce technology more appropriate to farmers, as there is a growing importance of farmer participation in defining research agenda and technology generation. This will strengthen the communication systems being used.

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