

Access and utilization of agro-meteorological information: A case study of small holder irrigation farmers in Kenya

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Abstract

Weather and climate are one of the major production risks and uncertainties impacting on agricultural systems performance and management. A study was conducted in Lari Wendani irrigation scheme, Nakuru North District, and Perkerra irrigation scheme, Baringo district to assess the socio-economic, demographic and psychological factors affecting access and utilization of agro-meteorological information for decision making among small holder irrigation farmers. A systematic random sampling procedure was used to select a sample of 255 farmers from a total population of 776 farmers. Structured questionnaires were used to elicit responses from farmers in the study areas. Data was analyzed using descriptive and inferential statistics. Findings indicate that the National Meteorological Centre in Kenya is the main source of agro meteorological information reaching the farmers mainly through the radio. Level of education, access to seasonal forecasts, radio, television and extension services indicated positive significant correlation with the utilization of seasonal agro-meteorological forecasts at $p < 0.05$ ($r = 0.17, 0.49, 0.191, 0.18, 0.22$ respectively). Several farmers (23%) perceived both scientific and indigenous weather forecasting to be accurate and incorporate them in making planting decisions. However, over 70% consider such forecasts either unreliable or partially reliable for both scientific and indigenous forecasts. It is apparent from this study that in order to improve access and utilization of seasonal agro-meteorological forecasts it is imperative that access to radio, television, extension services and the dissemination of detailed location specific short-medium range forecasts are paramount.

Key words: Access/utilization, Agro-meteorological information, small holder farmers

Résumé

La météo et le climat sont l'un des risques majeurs de production et d'incertitudes ayant un impact sur la performance des systèmes agricoles et la gestion. Une étude a été menée dans

le schéma d'irrigation Wendani Lari, le district de Nord Nakuru, et le système d'irrigation de Perkerra, le district de Baringo pour évaluer les facteurs socio-économiques, démographiques et psychologiques qui affectent l'accès et l'utilisation des informations agro-météorologiques pour la prise de décision chez les petits agriculteurs pratiquant l'irrigation. Une procédure d'échantillonnage aléatoire systématique a été utilisée pour sélectionner un échantillon de 255 agriculteurs sur une population totale de 776 agriculteurs. Des questionnaires structurés ont été utilisés pour obtenir des réponses auprès des agriculteurs dans les zones étudiées. Les données ont été analysées à l'aide de statistiques descriptives et différentielles. Les résultats indiquent que le Centre météorologique national au Kenya est la principale source de renseignements agro météorologiques qui atteint les agriculteurs principalement par le biais de la radio. Le niveau d'éducation, l'accès à des prévisions saisonnières, la radio, la télévision et les services de vulgarisation ont indiqué une corrélation significative positive avec l'utilisation des prévisions saisonnières agro-météorologiques à $p < 0,05$ ($r = 0,17, 0,49, 0,191, 0,18, 0,22$, respectivement). Plusieurs agriculteurs (23%) perçoivent à la fois les conditions météo scientifiques et autochtones, les prévisions exactes et de les intégrer dans la prise de décisions de plantation. Cependant, plus de 70% considèrent que ces prévisions sont peu fiables ou partiellement fiables pour les prévisions scientifiques et autochtones. Il ressort de cette étude que dans le but d'améliorer l'accès et l'utilisation des prévisions saisonnières agro-météorologiques, il est impératif que l'accès à la radio, à la télévision, les services de vulgarisation et de la diffusion des prévisions détaillées, des endroits précis à court, de moyen gamme de prevision sont primordiales.

Mots clés: Accès/utilisation, les informations agro-météorologiques, les petits exploitants agricoles

Background

Small scale farmers are unprepared for the weather conditions that do occur, and make decisions based on their general understanding of climatic patterns for their regions (Bert *et al.*, 2006, Gomme *et al.*, 2007). Climatic uncertainty often leads to conservative strategies that sacrifice productivity to reduce the risk of losses in poor years. Most farmers in Kenya rely to a significant extent on the local indigenous knowledge for predicting weather. However increased variability associated with climate change has reduced their confidence in traditional knowledge (Barret, 2001). At the same time the advancement

in technology has made the scientific weather forecasting more accurate and farmers need to compliment their indigenous technical knowledge with the advanced climatic prediction methods (Ingram *et al.*, 2002). Scientific forecasts on the other hand are formulated on a much larger scale and presented in a way that is unfamiliar to farmers making it difficult for them the adopt them (Strachan, 2008).

Literature Summary

Agriculture is inherently sensitive to climate variability and is among the sectors most vulnerable to weather and climate risk. Risks can be minimized by making adjustments with the coming weather through timely and accurate weather forecast (Mannava *et al.*, 2007). Accurate forecasts of climate 3–6 months ahead of time can potentially allow farmers and others in agriculture to make decisions to reduce unwanted impacts or take advantage of expected favorable climate (Hansen, 2002). Planting and crop selection are functions of the climate and of the normal change of the seasons. Timing of cultural operations, such as cultivation, application of pesticides and fertilizers, irrigation and harvesting, is strongly affected by short to medium range weather conditions (Gommes, 2007).

In a study of seasonal climatic forecasting applications for farmers in West Africa and India, it has been noted that while farmers were generally interested in receiving seasonal forecasts that provided the expected quantities over the season, they were much more interested in forecasts relevant to their actual decisions (Stone and Meinke, 2006). The Kenya Meteorological Department provides services such as start and end of the rainy seasons, rainfall performance during the seasons, probable planting dates, monthly and decadal (10 day) agro meteorological bulletin (Kenya Meteorological Department, 2009).

Study Description

The study was conducted in Lari Wendani irrigation scheme, and Perkerra irrigation scheme. Perkerra irrigation scheme (0°28'N, 36° 1'E) is situated 100 km north of Nakuru in Marigat Division, Baringo District with a mean annual rainfall of 322 mm. The scheme has a potential area for irrigation of 2 340 ha. Only 810 ha were developed for irrigation due to irrigation water shortages, 607 ha are cropped annually. The scheme has 672 farm households each with 1.2 to 1.6 ha of farm land. Lari Wendani scheme (0° 7' N, 36° 16' E) is located in Waseges location of the Mbogoini Division Nakuru district in the Rift Valley Province of Kenya. It has mean annual rainfall of 750

mm, temperature ranges from 18°C to 39°C with a mean of 25°C. The scheme which serves 100 farmers has 4 sub-schemes. The target irrigation schemes, lie within agro-ecological zones of medium to low agricultural potential where climatic conditions are unfavourable for rain-fed agriculture.

Results

Sources of agro-meteorological information. Five sources of agro-meteorological information were identified with 58.8% of the respondents getting their information from the National Meteorological Centre in Nairobi through radio and television. Other sources included Kenya Agricultural Research Institute (25.1%) mostly in Perkerra, extension officers (10.6%), internet (5.5%) and the Drought Monitoring Centre (0.8%).

Access to dissemination channels. Table 1 shows the dissemination channels used by farmers to access weather forecasts. Results indicate that 98.1% of the farmers have at least access to radio. Up to 90.4% of these farmers are able to listen to the radio daily. Other important and reliable dissemination channels are television, (50%), neighbours (35.5%), newspapers (29.8%), extension (22.7%), barazas (13.3%). The least popular are mobile (7.8%), internet (7.1%) and bulletins (1.2%). Perception on accuracy from the various disseminating channels is very low with not more than 20% from each disseminating channel perceiving the forecasts to be accurate. On the packaging of the weather forecast by each disseminating channel the majority of the farmers were comfortable with the presentation with more than 80% indicating that the language used is simple.

Table 1. Factors affecting access to agro meteorological information.

Factors	Yes		No	
	Frequency	%	Frequency	%
Language of dissemination	79	31.0	176	69.0
Time of dissemination on radio	115	45.1	140	54.9
Access TV	150	58.8	105	41.2
Access to internet	180	70.6	75	29.4
Inadequate extension officers	185	72.5	70	27.5
News papers no delivered on time	156	61.2	99	38.8

Factors affecting the access to agro meteorological information. Most farmers indicated inadequate extension (72.5), no access to internet (70.6%), newspapers not delivered on time (61.2%) and no access to TV (58.8%) as the major

factors that affect their access to agro meteorological information.

Utilization of agro meteorological information by small holder farmers in decision making. Few farmers 46.7% make use of agro-meteorological forecasts to decide on which crops to grow. In terms of planting decisions the majority (49.8%) follow normal season to plant their crops followed by 24.7% who wait for the normal rains, 23.5 % of the farmers make use of scientific forecast to make planting decisions. Figure 2 shows a summary on the perception of scientific and indigenous forecasts.

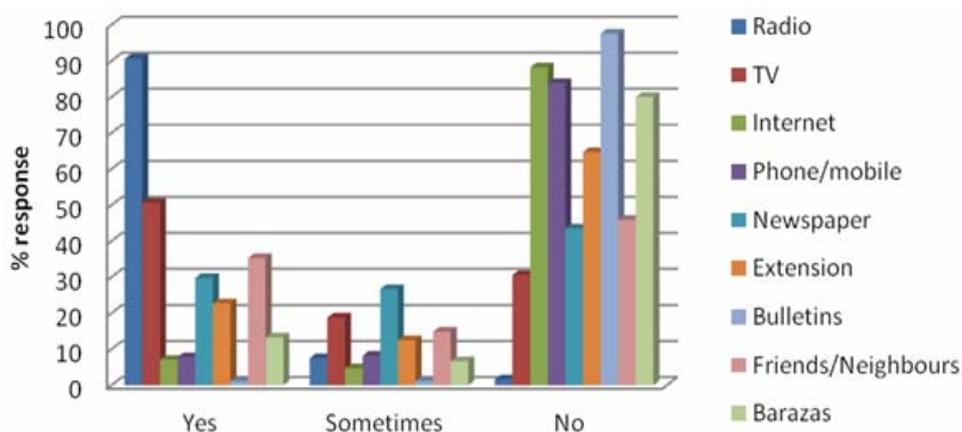


Figure 1. Agro-meteorological information access from the available dissemination channels.

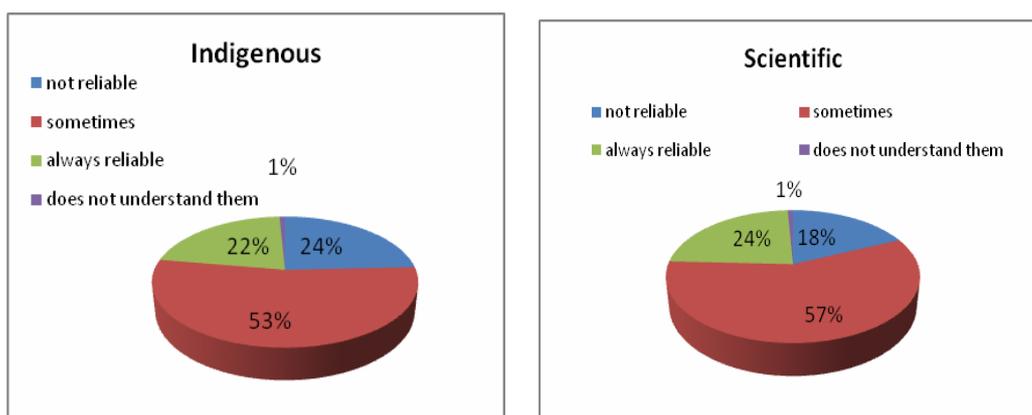


Figure 2. Perception on indigenous and scientific forecasts reliability Scientific forecasts important for farmers.

Table 2. Use of important agro-meteorological information for decision making.

Important forecast information	Use of important meteorological information					
	Make decision always		Sometimes make decisions		Not at all	
	Freq.	%	Freq.	%	Freq.	%
Seasonal forecasts	138	54.1	113	44.3	4	1.6
Onset dates of rains	143	56.1	93	36.5	19	7.5
Rainfall amount	146	57.3	74	29.0	35	13.7
Cessation dates of the main rains	107	42.0	98	38.4	50	19.6
Timing & frequency of wet and dry spells	108	42.4	91	35.7	56	22.0
Crop/weather recommendations	193	75.7	43	16.9	19	7.5
Irrigation schedules	196	76.9	57	22.4	2	0.8

About 56% of farmers incorporate seasonal forecasts, onset dates of rains and rainfall amount information in making their farm decisions. The highest percentage (>75%) of agro-meteorological information use in decision making is in crop/weather recommendation and irrigation schedules. This calls for the need of short-medium range forecasts which are specific to a particular area.

Factors influencing farmers' adoption to agro meteorological information. Inaccuracy of forecasts, forecasts not detailed enough for decision making, income, delays in disseminating seasonal forecasts and irrigation water shortage were ranked among the highest (> 70%) factors that affects farmers' adoption of agro meteorological information as indicated in Figure 3.

The Pearson correlation coefficient was used to explore the correlations between some selected respondents' characteristics with the use of seasonal agro meteorological information forecasts. According to the correlation analysis there was a significant relationship between the average income, access to seasonal forecasts, education, access to radio, TV, and access to extension services.

Research Application

This study can be used in the development of tools and infrastructure to enhance the access and use of agro-meteorological information.

Recommendation

Effective adoption of agro meteorological forecasts calls for partnerships between meteorological centers and farmers and

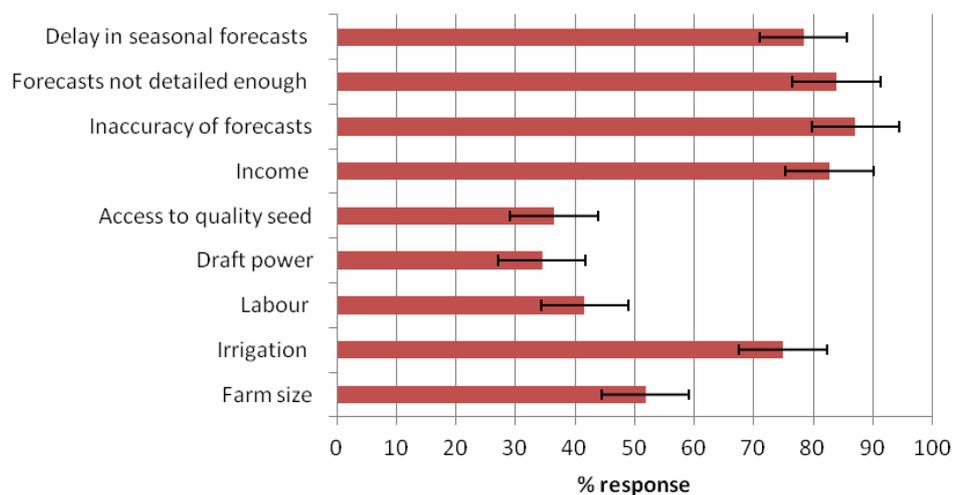


Figure 3. Factors affecting farmers' adoption to agro meteorological information. Relationship between selected socio-economic, demographic and media channels with the use of seasonal agro meteorological forecasts.

Table 3. Relationship between selected socio-economic and demographic characteristics with the use of seasonal agro meteorological forecasts.

Variable	Use of seasonal forecasts	
	r	p
Farm size	-0.12	0.056
Average income	-0.13*	0.034
Age	-0.04	0.520
Access to seasonal forecasts	0.49*	0.000
Gender	0.01	0.893
Education	0.17*	0.006
Access to radio	0.19*	0.002
Access to TV	0.18*	0.004
Access to internet	0.08	0.209
Access to extension	0.22*	0.001

*Correlation is significant at 0.05 level (2-tailed).

the dissemination of information specific to their areas that reflect their current crop enterprises.

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