

Research Application Summary

**Quality and dissemination of information on restoration of Awoja watershed in Eastern Uganda**

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**Abstract**

Effective restoration of watersheds relies on several factors including quality of information shared and its sharing mechanism. Quality of information is critical in the restoration of common pool resources such as watersheds in most parts of sub-Saharan Africa. Quality of information can be enhanced through initiatives like capacity building. In the case of Awoja watershed of Eastern Uganda, little is known on the quality of information and appropriateness of the channels used. This study assessed the nature and quality of information and its dissemination mechanisms used in restoration of Awoja watershed. Data were collected from two sites where watershed restoration activities had been implemented by the Farm Income Enhancement and Forest Conservation (FIEFOC) and Community Based Wetland and Biodiversity (COBWEB) projects. Data were collected through review of secondary documents, key informant interviews and household surveys. The findings indicated that the community preferred information was livestock, climate change and fruit growing. The most preferred channel was training. The  $\chi^2$  analysis showed significant relationship between relevancy ( $P < 0.000$ ), adequacy ( $P < 0.002$ ), timely delivery ( $P < 0.000$ ) and packaging of information ( $P < 0.011$ ); and restoration between the two restoration sites. The study found no significant difference between consistence of information and restoration in both sites. Quality of information, attributes of relevance, adequacy, timeliness and packaging should be emphasised in the subsequent projects for better restoration results. Training as a channel could be popularised to disseminate information on restoration because it was the most preferred. Therefore practitioners should include information on livestock management, climate change and fruit growing in addition to information on restoration aspects addressed in this study for better results

Key words: Awoja watershed, community skilling, information preference, information relevance

**Résumé**

La restauration efficace des bassins versants dépend de plusieurs facteurs, dont la qualité des informations diffusées et le mécanisme de diffusion. La qualité de ces informations est essentielle à la restauration des ressources telles que les bassins versants dans la plupart des régions de l'Afrique subsaharienne. La qualité de l'information peut être améliorée grâce aux initiatives de renforcement

des capacités. Dans le cas du bassin versant d'Awoja, dans l'est de l'Ouganda, peu de détails existent sur la qualité des informations et la pertinence des canaux utilisés. Cette étude a donc évalué la nature et la qualité de l'information et ses mécanismes de diffusion utilisés lors la restauration du bassin versant d'Awoja. Les données ont été collectées sur deux sites où des activités de restauration des bassins versants avaient été mises en œuvre dans le cadre des projets d'amélioration des revenus agricoles et de conservation des forêts (FIEFOC) et des zones humides et biodiversité communautaires (COBWEB). Les données ont été obtenues au moyen d'examen de documents secondaires, d'entretiens avec des informateurs clés et d'enquêtes auprès des ménages. Les résultats ont indiqué que les informations préférées par la communauté portaient sur le bétail, le changement climatique et la culture fruitière. Le canal le plus préféré était la formation. L'analyse  $\chi^2$  a montré une relation significative entre la pertinence ( $P < 0,000$ ), l'adéquation ( $P < 0,002$ ), la livraison à temps ( $P < 0,000$ ) et la présentation de l'information ( $P < 0,011$ ); et la restauration au niveau des deux sites. L'étude n'a trouvé aucune différence significative entre la cohérence des informations et la restauration dans les deux sites. La qualité de l'information, les attributs de pertinence, d'adéquation, de rapidité et de présentation doivent être mis en évidence dans les projets ultérieurs pour de meilleurs résultats. La formation en tant que mécanisme de diffusion pourrait être vulgarisée pour diffuser des informations sur la restauration, car elle était la plus préférée. Par conséquent, les praticiens devraient inclure des informations sur la gestion du bétail, le changement climatique et la culture fruitière en plus des informations sur les aspects de restauration abordés dans cette étude pour de meilleurs résultats.

Mots clés: Bassin versant d'Awoja, compétences de la communauté, préférence d'information, pertinence de l'information

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## Introduction

Quality of information and appropriateness of channels used to disseminate information is important in supporting restoration of degraded environments (German *et al.*, 2007). Whereas information sharing on watersheds contributes to restoration, the quality and dissemination channels used are vital (Berkes, 2008; Global Reporting Initiative, 2012; Rex, 2013). According to Eberle (2013) and Opolot *et al.* (2015), information quality refers to the comprehensiveness of information disseminated in terms of adequacy, relevancy, timeliness, usefulness, appropriateness and consistency (Dauda *et al.*, 2009; Vidanapathirana, 2012). Information on watersheds is only useful if effectively shared to achieve restoration (Wyborn *et al.*, 2012; Rex, 2013). Therefore, effective information exchange mechanism on restoration enables transmission and application of information between watershed partners and users. As noted by Cheserek *et al.* (2005), Parlee (2011) and Rex (2013), information packaging and the context in which it is disseminated impacts on its adoption rate.

In Latin America and the Caribbean for instance, information sharing on watershed restoration contributed to improved rural livelihoods (Salas *et al.*, 2008; Eberle, 2013). In Canada, the Philippines, India and Kenya, acquisition of information on watershed restoration through social interactions between humans was the most sought after means (Leslie and McLeod, 2007; Palmer, 2009). In this way, implicit information shared contributed to restoration of the degraded watersheds through social coordination, collective actions and appropriate exchange of information (FAO, 2014). According to Ribot (2004), Botha *et al.* (2008), and Mustonen (2013), in practice, all knowledge is a mix of implicit and explicit, with farmers having a better grip of the former.

In Uganda, several attempts by Government and non-Governmental organisations have been made to protect and restore the degraded watersheds through information transfer. Some of the projects implemented include but are not limited to the Farm Income Enhancement and Forest Conservation (FIEFOC) and the Community Based Wetland and Biodiversity (COBWEB). The aim of FIEFOC was to improve on household incomes, rural livelihoods, food security, avail forestry products and services through sustainable management of natural resources (World Bank, 2013). The COBWEB project was to strengthen the Ugandan National Protected Areas (PA) network by expanding the coverage of the PA network to include the country's biologically important wetland ecosystems like Awoja wetland system (World Bank, 2013). Ultimately, both were livelihood and restoration projects that focused on training the watershed adjacent communities on tree growing, establishment of soil and water conservation technologies, controlled fishing, protection, restoring and monitoring of biodiversity (MWE, 2013; World Bank, 2013).

Despite massive efforts towards capacity building and information dissemination on Awoja watershed restoration, ecosystems continue to deteriorate as a result of human influences (Mutekanga *et al.*, 2013; de Leeuw, 2016). Previous studies emphasised the importance of information sharing on restoration (MWE, 2012; World Bank, 2013), with little known on how quality and information dissemination channels influenced restoration of Awoja watershed, yet this is critical in curtailing watershed degradation. This study addresses the fundamental question: How did the nature, quality and information pathways influence the restoration of Awoja watershed ecosystems in Eastern Uganda? Therefore, watershed restoration efforts require an understanding beyond the current knowledge on quality of information in terms of relevancy, adequacy, consistency and timeliness and present a significant challenge to scientists.

**Theoretical framework.** This study draws insights from the Social Exchange Theory (SET) by Thibaut and Kelley (1959); Homans, (1961) and Blau (1964) on reciprocity of social exchange. This theory explains how exchange of quality information during restoration benefits and enhances community's skills that support watershed restoration. From the perspective of rational assessment of self-interest in human social relationships, actors will engage in collective action if the benefits of their interaction outweigh the costs of their involvement (Ostrom, 2003, 2005). The assumptions that rationalism, forces shaping perception or experiences are well understood for this study to explain their reason to commit to restoration of watersheds. The networks established during restoration enhance exchange of information within institutions and among partners. However, for effect, the information must be of quality and the channels appropriate. The elements of quality information are: relevancy, adequacy, accuracy, timeliness, usefulness, consistency and appropriateness (Dauda *et al.*, 2009; Vidanapathirana, 2012). Inadequate quality information stagnates restoration when community fails to make informed decisions to support collective action. Quality information received as they interact spurs reciprocity of their action when they are able to make informed decision on restoration.

As guided by Lwoga *et al.* (2010), Okwu and Dauda (2011), and Eberle (2013), the need for and information preferred by the community, coupled with its source and channels used are important in ensuring effective information flow. Access to quality information depends on sources and appropriateness of the channels used. The same authors assert that the quality of information and preferred channels should be determined when the beneficiaries' expectations are known. Furthermore, the information need, preferred and appropriateness of the channels used must be context specific of the community and well understood. The nature of information in terms of information type, need, source and preference during restoration of Awoja watershed is vital. This framework detailed how the nature, quality and information dissemination channels influenced restoration of Awoja watershed in Ngora district of

Eastern Uganda. The framework considers nature, quality and information sharing mechanism, as key factors influencing information flow in watershed restoration. Understanding the key elements of the variables and outcomes helped support watershed restoration processes.

## **Methodology**

**The study area.** This study was conducted in a portion of Awoja watershed of Eastern Uganda. This was based on its high degradation rate in the last two decades estimated at 20%, compared to the national average of 11% (MWE, 2013). Ngora district specifically, was selected because it occupies a greater part of Awoja watershed and it also piloted the two watershed restoration interventions by the Farm Income Enhancement and Forest Conservation (FIEFOC) and the Community Based Wetland and Biodiversity (COBWEB) projects. Ngora district is situated in North Eastern Uganda and lies approximately between latitudes 1010<sup>0</sup> and 1035<sup>0</sup> North and longitudes 33030<sup>0</sup> and 34020<sup>0</sup> East. Ngora is bordered by the districts of Kumi district in the East, Serere to the West, Soroti in the North West, Katakwi in the North and Pallisa district to the South. The district covers a total area of 715.9 km<sup>2</sup> (Ngora District Development Plan, 2015). The main water bodies include Lake Bisina, Lake Nyaguo, Lake Meito and Lake Nyasala. Over 93% of the households are engaged in agriculture with a population density of 267.5 persons /km<sup>2</sup>, higher than the national average of 174 persons /km<sup>2</sup> (UBOS, 2015).

**Research design.** This study used an ex-post facto cross-sectional research design. This design, is often used after an event has occurred (Amin, 2004). From the perspective of social science research, the ex post facto research design aims at establishing the possible relationship among the variables by observing the present condition and looking back for some possible contributory factors (Kerlinger and Rint, 1986). This design was found to be appropriate to study the watershed interventions at Awoja because the study occurred well after the interventions.

**Sampling strategy, sample selection and size.** Four villages of Ariet and Puna in Moru Kakise parish (Mukura) and Omiito and Kakor in Omiito parish (Kapir) were randomly selected out of the eight implementing villages, two from each sub county. The sub counties of Mukura and Kapir were chosen because they were project implementing sub counties, besides having the highest average household sizes of 5.3 and 5.2 respectively which is above the country's average of 4.7 (UBOS, 2015). Moru-Kakise was chosen because it was the implementing parish for FIEFOC and Omiito parish for COBWEB projects.

The households to be interviewed were selected through simple random sampling so as to have equal chances of being chosen from the list provided by the chairpersons of the groups. The sample size was determined using Krejcie and Morgan's (1970) table, commonly used for determining sample sizes when the size of the study population is known. On average, each group had 40 and 50 registered households for FIEFOC and COBWEB Projects respectively. In total, 112 respondents were selected from the households in Mukura and 125 from Kapir. Each household was represented by a respondent who was either the head of the household or any member of the household who was knowledgeable on the group activities. The unit of analysis was the household.

## Data collection methods

**Key informant interviews.** Interviews using an interview schedule were held with four chairpersons of the watershed management groups, two from Kapir and two from Mukura implementation sites. This aimed at generating information on nature, quality and information dissemination channels used by FIEFOC and COBWEB projects on different aspect of restoration (Tables 1, 2 and 3).

**Table 1. Information type disseminated on Awoja restoration (N=237)**

Information type	Frequency (f)	Percentage (%)
Tree establishment	146	61.6
Environmental management	57	24.1
Soil and water conservation tech.	20	8.4
Maintenance	9	3.8
Controlled fishing	5	2.1

**Table 2. Information preferred by the community (N=237)**

Preferred information	Frequency (f)	Percentage (%)
Livestock keeping	187	78.9
Climate change	49	20.7
Fruit growing	1	0.4
Total	237	100

**Household survey.** A household survey was carried out in the two restoration sites of FIEFOC (Mukura) and COBWEB (Kapir). A total of 237 respondents were interviewed. This was aimed at generating information from the participating household members on the quality of information disseminated and mechanisms used. A questionnaire containing structured and semi structured questions aided the generation of information on; socio economic characteristics of the household, information type, source, quality, preference, need and channels used to disseminated information on restoration of Awoja watershed.

**Quality assurance.** Validity was ensured by calculating the content validity index which was found to be 0.8 through having experts in restoration go through the questions and reliability through pre-testing the instruments that took place in Gweri sub county of Soroti district as recommended by Amin (2005).

**Data analysis.** The data collected from the survey were coded and entered into the computer, managed and analysed in SPSS version 21. Descriptive statistics were run to generate frequencies on information (type, source, preferred, frequency of attendance) and channels preferred. A chi square test was carried out to assess information quality (relevancy, consistency, adequacy, timeliness and packaging) on restoration of Awoja watershed.

**Table 3. Assessing information quality against social demographic factors N=237**

Variables of quality	Social demographic factors	$\chi^2$	df	P-value	FIEFOC & COBWEB
Relevancy	Household type	22.654	3	0.000	Gd 87.5 60.8
	Gender	2.511	3	0.473	Ave 77.6 70.5
	Marital status	11.371	9	0.252	
	Education level	6.533	18	0.994	
Consistency	Household type	3.377	3	0.337	
	Gender	2.426	3	0.489	
	Marital status	11.531	9	0.241	
	Education level	9.123	18	0.957	
Adequacy	Household type	14.547	3	0.002	Ave 59.8 78.4
	Gender	6.629	3	0.085	
	Marital status	13.865	9	0.127	
	Education level	25.044	18	0.124	
Timeliness	Household type	19.482	3	0.000	Poor 51.8 28.8
	Gender	0.961	3	0.811	
	Marital status	6.027	9	0.737	
	Education level	20.334	18	0.314	
Presentation Lang	Household type	7.257	4	0.123	Average 53.3 32.7 50 30
	Gender	5.885	4	0.208	
	Marital status	25.942	12	0.011	
	Education level	11.419	24	0.986	

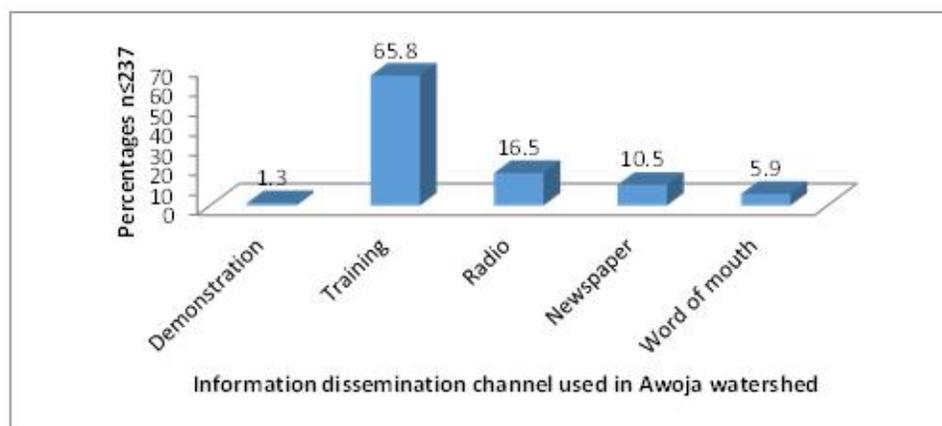
## Results

**Type, source, preference and frequency of information received on watershed restoration.** Majority (61.6%) of the respondents received information on tree establishment and environmental protection (24.1%), soil and water conservation technology (8.4%), tree maintenance (3.8%) and controlled fishing (2.1%) (Table 1).

The results also showed that 81% of the information source was either from FIEFOC or COBWEB projects while 19% were from other organisations such as National Agricultural Advisory Services, HEIFER international, Teso Rural Development Organisation, Soroti Catholic Diocesan Development Agency and Mukura Integrated Development Association. Furthermore, most (40.1%) of the respondents stated that the frequency of meetings was monthly, quarterly (0.4%), biannually (26.6%) and 32.5% annually. Findings on preferred information by the community on restoration was that 78.9 % of the respondents preferred information on livestock management, 20.7% on climate change and 0.4% fruit growing (Table 2).

**Quality of information and dissemination channels used.** The chi square analysis indicated significant differences in relevancy of information on restoration ( $P < 0.000$ ) between FIEFOC and COBWEB households. Findings also showed that on average 87.5% of respondents in FIEFOC

restoration site indicated that the information on restoration received was relevant compared to 60.8% in COBWEB (Table 3). There were significant differences ( $P < 0.002$ ) on adequacy of information between the restoration sites. In the FIEFOC site, 59.8% of respondents agreed that the information disseminated was averagely relevant while 78.4% of COBWEB respondents indicated information disseminated was averagely good. There were also significant differences ( $P < 0.000$ ) on timely delivery of information by respondents. Majority of respondents (51.8%) in FIEFOC restoration site indicated that information delivery was not timely compared to COBWEB (28.8%). There were also significant differences ( $P < 0.011$ ) on presentation language. This suggests that the language used in information dissemination was simple and well packaged. However, there was no significant difference in consistence of information between the two restoration sites. The findings on dissemination channels indicated that most of the respondents interviewed (65.8%) preferred training, 16.5% radio, 10.5% newspaper, 5.9% word of mouth and lastly 1.3% demonstration as channels for dissemination of information on restoration of Awoja (Fig. 1). Training was the most preferred because it is interactive and easy to comprehend.



**Figure 1. Respondents' preferred channels used in restoration of Awoja watershed.**

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## Discussion

The findings in this study propose that farmers in Awoja watershed area prefer information that enables them to better manage their cattle, adapt to climate change and grow fruits as a way of diversification. Considering that Teso sub region has great potential for commercial citrus growing, this could lead to higher income and better prices. Preference of information on-farm has been applauded for better productivity as it is in line with a similar study conducted by Daudu (2009) and Vidanapathirana (2012). It is therefore important that the information priority needs and the choice of channels used in dissemination of information to famers be appropriate for any project to achieve positive results.

Results on information sources and frequency of contact with the farmers suggest that, multiple sources of information existed albeit with varied contact levels. According to World Bank report (2013), 44% -

60% of farmers accessed information on tree planting by extension agents in the project for the entire country. Drawing from theoretical perspective of social exchange by Thibaut and Kelley (1959); Homans, (1961); and Blau (1964) on reciprocity of social exchange, quality information during restoration benefits and enhances the community's skills that support watershed restoration. This is an indication of an opportunity to engage with various actors in order to enhance information sharing among and with the watershed community. The frequency with which communities were met by staff of either FIEFOC or COBWEB was low. Having the majority (about 60%) of the respondents acknowledge attendance of meetings once or twice each year is a demotivating factor. This might eventually affect those who may be interested in joining subsequent future projects on restoration.

The quality of information on restoration based on relevancy, adequacy, consistency, packaging, and timeliness were rated by the respondents as being averagely fine, save for timeliness in deliveries that was rated as poor during the restoration of Awoja watershed. This is similar to a study conducted by Opolot *et al.* (2015) on quality of information disseminated to farmers. Additionally, consistency in delivering information to the community was not important in both restoration sites. This suggests that information disseminated on restoration was not divergent in either side. Getting information to farmers requires the use of appropriate channels. This study showed that there was interest in using interpersonal channels and mass media by respondents. These encourage physical contacts in sharing information as well as complementing them with mass media for effective dissemination. The use of various channels in order to cover a bigger portion of the population has been supported by Torres (2013) who attributes success of restoration efforts to not only implicit information source and channel but also various channels including optic histories and ICTs.

### **Conclusion and recommendation**

Based on the findings and discussions in this paper, the quality of information and information dissemination channels influenced restoration of Awoja watershed. Initiatives and concerted efforts by various actors responsible for the restoration of Awoja should focus on improved quality of information disseminated on specific attributes of adequacy, timely delivery, appropriateness and packaging of information on restoration; as well as promote the use of preferred channel of training by the community. This will increase their knowledge on restoration and eventually employ the best practices during implementation. Whereas Awoja watershed community needed information on restoration, their preferences of information were on livestock keeping, climate change and fruit growing. The best approach should have been engaging with the community leadership in planning and designing restoration interventions.

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