



Farmers Perceptions and Attitudes towards the Shelterbelts Establishment in Farms, Gedarif State, Sudan

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Abstract

This study was conducted in Gedarif State in 2012 to investigate the farmer's perceptions and attitudes toward shelterbelts establishment and protection of farms. The overall objective of the study was to highlight the farmers perceptions and attitudes toward the shelterbelts in farms while, the specific objectives were: to determine the awareness level of the farmers about the importance of the shelterbelts, to investigate the farmers perceptions of shelterbelts, to investigate the farmers attitudes toward the shelterbelts, and to assess the effect of shelterbelts on crop productivity. For data collection several methods and tools were used: questionnaire, checklist, literature, archive, group discussion and observations. The research population of the study was the farmers whom established shelterbelts around their farms while the research unit based on the individual farmers. The results of the study indicated that, the majority of the respondents were of old age and have attended education ranging from Khalwa to university. Also the findings of the study revealed that, shelterbelts in the study area were perceived as useful and valuable assets which provide a range of forest goods and environmental services such as: increasing crop production, reducing the damage of crops, leading to sustainable agriculture for income generation for local communities. Moreover the study showed that, rural farmers developed positive perceptions over time about the importance of shelterbelts and their management systems. Additionally, there were negative attitudes about forest policy and law. Also the study indicated that the farmers in the study area hold positive attitudes towards shelterbelts establishment and their protective role. Despite negative attitudes toward the notion that shelterbelts bring birds, insects and rodents, they were interested in planting shelterbelts in their farms. The study recommended that: the forestry extension should develop programmes to involve youth and young farmers to the shelterbelts establishment and protection, and enforcement of forest policy and law.

Keywords: Environmental benefits, Perceptions, Attitudes, Sudan.

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Introduction

Gedarif State is one of the important mechanized rain-fed agricultural areas in Sudan and produce more than one third of

total production of sorghum, the main food stuff in the country dry land, which is practiced at various scales. In the past three decades, different land use types were

practiced throughout the region. Soil strength and infiltration rate are important variable for understanding and predicting a rate of soil process (Gedarif State, 2012).

At present, the area allocated for mechanized farming in the state is estimated at 2.730.00 ha (Elmoula, 1985).

Tree planting is accepted by mechanized scheme farmers as stated in the lease contract. According to forest and renewable natural resources act 2002, the shelterbelts should constitute about 10% of total mechanized farm area. Inclusion of shelterbelts in the mechanized farming system started in 1994. The total number of farmers was 540 and has been implemented more than 54,000 fed. planted with *Acacia Seyal* and *Acacia Senegal* (FNC, Gedarif State, 2012). The arable land in Gedarif State is eight million feddans. In last years the decrease of crop productivity is due to clearance of trees and continuous rain fed mono cropping in Gedambalia. Forest National Corporation in coordination with Ministry of Agriculture has been implemented shelterbelts in pilot programme in an area of 54000 feds. The idea is convince farmers in this area to adopt this trial, particularly in other similar area. According to UNEP (1986), farm trees are very important for agriculture and livestock production and provide essential tree products. They are able to sustain agriculture production capacity via improving the microclimate and protecting and ameliorating the soil. Forests are one of the most vital renewable resources, they have four vital functions: they contribute in soil and water conservation, they provide rural people with sustainable needs, they are important source of industrial products, hence foreign exchange and they harbor vast genetic resources.

In the mechanized rain fed sector in Sudan, yield of sorghum, groundnuts and millet have declined due to poor input supply and lack of rainfall. Tree planting and forest have a role to play in this endeavor by building greater

resilience into traditional farming systems through improved soil and water conservation and by improving income generation from the sale of tree plantations (World Bank, 1986).

The specific objectives of the study are: to determine the awareness level of the farmers about the importance of the shelterbelts, to investigate the famers perceptions of shelterbelts, to investigate the farmers attitudes toward the shelterbelts, and to assess the effect of shelterbelts on crop productivity.

Materials and Methods

Based on the reconnaissance survey, survey method and random sampling techniques were used throughout the research.

Farmers who established shelterbelts around their farms in the mechanized rain-fed schemes, constituted the research population (540 farmers). And due to homogeneity of the research population members and for the accuracy of the study a random sample of 10% was selected (54 farmers) for the purpose of this study.

In general, the research participants consisted of two main categories, the farmers and the officials.

Different methods and techniques were used during the data collection process. These included: reconnaissance survey, structured interviews, unstructured interviews, literature and archive, observations and group meetings/dissuasions. Frequency distributions and percentages were calculated as a tool of analysis for interpreting the qualitative information collected from the respondents.

Measurements of some of the study variables:

1. Farm productivity: was measured by gross farm income per feddan and was obtained by dividing the total gross farm income by the total area of crop.
2. Perception of forest management systems: was measured by how the farmers perceived them, whether they do well in developing, sustaining and protecting forest resources (good), or not (not good).

3. Perception of forest policy and law: was measured by how the farmers perceived them, whether they make full use in applying of forest policy and law (effective), or not (not effective).

Results and Discussion

Respondents age in the study area:

Table (1) showed that, the majority of the respondents (83.3 %) were at age 50-90 years, while only (6.7 %%) of age 10-50 years. These results indicated that, the elders gain

good experience to encourage and to enhance the shelterbelts plantation, but simultaneously it reflected the absence of the youth and young people efforts, this not conducive to the diffusion and adoption of tree shelterbelts establishment as young farmers are usually more innovative than old farmers (Roger, 1993). Hence, the extension work needs more efforts to involve those young farmers to the shelterbelts establishment and protection.

Table 1:Distribution of the respondent’s age in the study area

Age	Frequency	%
10-50	9	16.7
50-90	45	83.3
Total	54	100.0

Respondent’s educational level:

The findings in table (2) displayed that, the majority of the respondents (90.7%) have attended education ranging from khalwa, primary, secondary and university (7.4%, 14.8%, 61.1% and 7.4%) respectively, while

only 9.3% were illiterate. These results revealed that, the respondents in the study area can easily understood and make use of the extension methods and aids such as: messages, prints, lectures and seminars which eventually enhance the process of planting and protecting the shelterbelts.

Table 2:Respondent’s distribution according to their educational level

Age	Frequency	%
Khalwa	4	7.4
Illiterate	5	9.3
Primary	8	14.8
Secondary	33	61.1
University	4	7.4
Total	54	100.0

Benefits of the shelter belts in study area:

Table (3) showed the benefits of shelterbelt in the study area, it indicated that, the shelterbelts reduction damage of crops, increasing productivity of crops and source of income generation represented main benefits from shelter belts as mentioned by the all respondents. As well, soil conservation, make

agricultural future best and producing gum Arabic were reported by 96.3%. Furthermore, providing fire wood, increasing rains and grazing was declared by, 94.4%, 85.2% and 83.3% of the respondents, respectively. These results indicated that reduction of damage of crops was considered as benefit provided by the shelter belts. In farm land

trees, play a vital environmental role; they act as windbreaks and protecting crops from wind damage. These results mean that farmers in the study area are well aware about the values of trees. Nevertheless, the study displayed that, increasing productivity of crops is another benefit provided by shelter belts. Forest lands provide food and help to maintain environmental stability on which continued food production dependent. Hence, it is clear that, the farmers are well aware about the importance of forest and trees and their role in increasing productivity of crops. Moreover, it is clear that the farmers in study area socially accepted the idea of planting trees in their farms.

Moreover, the study indicated that, the shelter belts are source income generation. This explained that the shelter belts provide farmers with an additional source of income in terms of cash through selling of timber products and increasing the crop productivity. These results are inline with previous study carried out by (Abu sin and Elsammani, 1986).

Meanwhile, the study revealed that, the shelter belts conserve soil and make agricultural future better. Wind breaks protecting the soil from erosion, where litter slows down the run off of rain and restores the soil fertility.

Nevertheless, the study revealed that, the shelter belts in the study area producing gum Arabic because the study area lies within the gum Arabic belt. This provides an additional opportunity to the farmers to be involved in gum production.

Also the study showed that, the shelter belts providing the respondents with firewood. Since wood is a dominant domestic fuel for

local people in the study area. Wood is also preferred over other fuel substitutes because it is locally available and easy to use. The shelter belts increae the rate of rains,since trees help in environmental stability through evaporation process. Meanwhile, the study reported that, the shelter belts supplied huge quantities of fodder particularly during dry season.

However, for farmers to adopt any new practice, such as participation in forest management and forestation programmes, they have to perceive that it has a relative advantage which is beneficial to them. Innovation relative advantage is usually expressed in economic profitability, in status giving, or in other ways (Rogers, 1993). In a study of adoption of biomass improved cook-stoves in Sudan, it was found that the perceived innovations relative advantage in terms of reduction of charcoal cost was the most important factor affecting household's innovativeness (Muneer and Mohamed, 2003). Also in Saudi Arabia, farmers who planted Date Palm seedlings produced through tissue culture technology indicated that the most important factor that convinced them to adopt this innovation was its low cost (Al-sakran and Muneer, 2006). Therefore, for farmers to participate effectively in forestation programmes, they have to be persuaded that these trees and forests are beneficial to them in one way or another (i.e.) they have a relative advantage). Generally, the farmers are well aware about the benefits and other values of the shelter belts in the study area. It would be useful if the forestry extension service build on this high awareness to enhance farmers participation in the shelter belts establishment and protection.

Table 3: The benefits of the shelter belts in the study area

Benefit of the shelter belts	Frequency	%
Reducing of crops damage	54	100.0
increasing the productivity of agricultural crops	54	100.0
Source of income generation	54	100.0
Soil conservation	52	96.3
Making the agricultural future better	52	96.3
Producing of gum Arabic	52	96.3
Provide fire wood	51	94.4
Increasing grains	46	85.2
Grazing	45	83.3

Effect of shelter belts in the productivity of agricultural crops:

Table (4) showed the effect of shelter belts on the productivity of agricultural crops it revealed that the majority of respondents (87%) mentioned high productivity of crops. While only (13%) mentioned medium productivity.

These results indicated that, the respondents in the study area are well aware about the role of the shelter belts in increasing the production of agricultural crops. This result is consistent with the results of table (1) where all respondents perceived that the shelter belts increasing the productivity of agriculture crops.

Also it is in line with Charreau *et al.*, (1965) in Senegal and Dancette *et al.*, (1969) in Burkina Faso who mentioned that yield of

Millet under Acacia Canopy produced 1688 kg/ha compared with 660 kg/ha on plots outside the canopy, and yield of Millet under *Acacia albida* canopy reported to 1250 kg/ha compared with 820 kg/ha in control plots outside canopy respectively. Also it is consistent with the study of Gezira Scheme shelter belts (case of Abu Gota block) (Muneer, 2006) which mentioned that, farmers whose farms are located closed to the shelter belts got high productivity of crops, while farmers whose farms located away from shelter belts obtained low productivity. However, according to group discussions and observations the variation in crop productivity is mainly due to: cultivated area, financial ability, rainfall and other climatic conditions, insects and rodents, and cost of tending and agricultural operations.

Table 4: Farmers perception on the effect of shelter belts in relation to productivity of agricultural crops

Productivity level (SP)	Frequency	%
High productivity (1050 pounds or more)	47	87.0
Medium productivity (450- 1050 pounds or less)	7	13.0
No effect	00	00
Total	54	100.0

Respondent’s perceptions of shelterbelts establishment and protection:

Table (5) shows respondents perceptions about the importance of shelterbelts in the study area it revealed that, the majority of respondents (98.1) perceived that, the shelter belts are necessary and important resources, moreover , 59.3% perceived the shelter belts management systems as good and practice properly. In addition to few of them (9.3%) whom believed the forest and shelter belts policy and law are effective.

These findings displayed that, the respondents in the study area were perceived the shelter belts as useful resources that provide a range of goods and services because the area suffered from lack of fuel wood before establishing the shelter belts. Moreover, the shelter belts management systems were also

perceived as a good and practiced well in the shelter belts development and protection. Despite that the majority of the respondents believed that forest policy and law were not effective. This negative perception is due to inactivation of the legislation that obliges farmers to establish shelter belts at 10% of farm area.

Generally, the respondents in the study area had positive perceptions of the shelter belts, despite a negative one of the forest policy and law. Understanding people perceptions helps in training and designing suitable programmes to address in needs and perceptions of local people order to enhance shelter belts management in (Ab sin and Elsammani, 1986). The extension work should make more efforts to enforce shelter belts policy and law.

Table 5: Respondents perception on the importance of shelterbelts in the study area

Respondents perceptions of shelter belts	Frequency	%
Shelterbelts are important	53	98.1
Shelterbelts management system are good	32	59.3
Forestpolicy and law are effective	5	9.3

Respondent’s attitudes toward shelter in farms in the study area:

Table (6) shows the respondents attitudes toward shelterbelts in farms in the study area it indicated that, all respondents in the study area agreed that, shelter belts reducing damage of crops, moreover, they agreed it increase production of agricultural crops, and agreed it is an activities leading to sustainable. In addition to that the respondents interested in establishing shelter belts in their farms and agreed the shelter belts are the source of income generation. Moreover, 88.9% of them agreed shelter belts bring birds, insects and rodents to crops, while, 87% agreed that cost of planting and protecting the shelter belts are more than their benefits.

These results revealed that, the respondents in the study area hold positive attitudes toward the role of shelter belts in protecting and reducing damage of crops.

Also, the attitudes toward their role in increasing the productivity of crops, making the agricultural future best and their interest to establish shelter belts in farms, and agreed shelter belts generating income were highly positive.

Furthermore, attitudes toward the cost of planting and protecting shelter belts are more than their benefits, and the attitudes toward the notion shelter belts bring birds, insects and rodents are highly negative.

Generally, the respondents in the study area have developed positive attitudes toward

shelter belts establishment and protection, this mean that the idea of establishing shelter belts should receive higher attention from the forestry extension to develop new programmes that address rural farmer's needs and attitudes related to fuel wood and tree planting in the farms. Nevertheless, changing the mind and attitudes of the people and of the government officials through training,

education and providing an appropriate institutional and organizational structure to foster participation must be of prime importance for the promotion of social forestry (FAO in Elmadina 2006). Moreover, the forestry extension should try to change old and negative attitudes and develop new and positive ones to enhance shelter belts establishment and protection.

Table 6: Respondents attitudes toward shelterbelts in farms in the study area

Attitudes toward shelter belts in farms	Frequency	%
Shelter belts reduce damage to crops	54	100
Shelter belts increase productivity of agricultural crops	54	100
Shelterbelts an activities leading to sustainable	54	100
Farmers willing to grow shelter belts in their farms	54	100
Shelter belts are source of income generation	54	100
Shelter belts bring birds, insects and rodents for agricultural crops	48	88.9
Cost of shelter belts planting and protecting more than their benefits	47	87

Conclusions

The studies revealed that, the majority of the respondents were of old age, and have attended education. Also the study indicated that, shelterbelts in the study area were the main source of several socio-economic and environmental services and benefits such as increasing of crop productivity, generating of income, firewood, and conservation of soil. The study indicated that the majority of the respondents reported high productivity of agricultural crops in their farms. The study showed that the respondents in the study area developed positive perceptions about the importance of the shelterbelts despite the negative perceptions about forests and shelter belts policy and law. The study concluded that the respondents in the study area hold positive attitudes toward shelter belts establishment and protection, despite, the negative attitudes toward the notion that shelterbelts bring birds, insects and rodents and the cost of the shelterbelt establishment and protection.

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آراء واتجاهات المزارعين عن الأحزمة الشجرية حول المشاريع الزراعية في ولاية القضايف .السودان

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المستخلص

أجريت هذه الدراسة بولاية القضايف وهي تهدف لبحث آراء واتجاهات المزارعين عن انشاء وحماية الأحزمة الشجرية حول المشاريع الزراعية. كما تمثلت الاهداف التفصيلية فى: التعرف على مستوى وعى المزارعين عن الاحزمة الشجرية واهميتها، التعرف على آراء المزارعين حول الاحزمة الشجرية ، التعرف على اتجاهات المزارعين حول الاحزمة الشجرية ، وكذلك التعرف على اثر الاحزمة الشجرية فى زيادة انتاجية المحاصيل الزراعية. استخدم البحث عدد من الأدوات البحثية ، مثل: المسح الاجتماعي، الاستبيان، قائمة الأسئلة، تقنيات العينة، الأدبيات والأرشيف، مجموعات النقاش بالإضافة للملاحظة. مثل مجتمع البحث المزارعين الذين لديهم احزمة شجرية حول مزارعهم ، كما ان وحدة البحث هى المزارع. أوضحت الدراسة أن معظم المزارعين من ذوى الاعمار الكبيرة ، كما أنهم تلقوا تعليماً تراوح بين الخلوة والجامعة. أوضحت الدراسة أن المزارعين بالمشاريع الزراعية ينظرون للأحزمة الشجرية كمورد قيمة ذات فائدة كبيرة وتوفر كثير من الفوائد الاجتماعية والاقتصادية والبيئية مثل: زيادة إنتاجية المحاصيل الزراعية وتقليل أضرارها وتقود الى الاستدامة، كما انها توفر دخلاً للمزارعين . كما أوضحت الدراسة بأن المزارعين بتلك المشاريع الزراعية كونوا آراء ونظرات إيجابية تجاه الأحزمة الشجرية ونظم إدارتها بالرغم من النظرة السلبية تجاه سياسة وقوانين الغابات. أيضاً أوضحت الدراسة أن للمزارعين اتجاهات إيجابية نحو إنشاء وحماية الأحزمة الشجرية وبالرغم من الاتجاه السلبي للمزارعين بأن الأحزمة الشجرية تجلب الطيور والحشرات والقوارض إلا أنهم لهم الرغبة في زراعتها حول مزارعهم. كما أوصت الدراسة بان يقوم الجهاز الارشادى باعداد برامج تستوعب صغار المزارعين فى انشاء وحماية الاحزمة الشجرية حول المزارع ، بالاضافة لتفعيل سياسة وقوانين الغابات.