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Empowering Women Skills in Combating Desertification in Sudan

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Abstract **– United Nations Convention to Combat Desertification (UNCCD, 1994) addresses the importance of a bottom-up participatory approach in desertification issues, such as in implementing projects to combat desertification. Sudan suffers desertification problem which become much serious after secession of its southern part to an independent country. In decertified areas, the role of Sudanese women and their knowledge in natural resources management and food security become very crucial. They are usually ranked among poorest of the poor and thus suffer problems to sustain their families. Women are affected by desertification directly as it reduce soil fertility and affect water resources upon which they depend to provide food and fuel for their families.**

A case study is carried out at the El Rawakeeb Dry land Area with latitudes of 15°-2' and 15°-36' North and longitudes of 32°-0' and 32°-10' East. The system of land use is mainly pastoral except in the low lands where traditional agriculture is practiced. The Ethnic groups of the area belong to Gamuia and Hawaweer tribes. The study is aimed to empower women skills in order to combat desertification through extension activities on desertification cause and effects, and informal seminars on some technologies applied to control desertification, such as: 1. nursing of seedling, 2. planting of trees adapted to xeric conditions and can be used to construct shelterbelts, 3. distribution of Azadrichta indica and Prosopis chilensis seedlings among women to plant at their homes and giving incentive prizes for best growing trees, 4. provision of gas cylinders for women as energy source to minimize trees cutting. The results show that environmental awareness is improved significantly among women. They participate successfully in restoring plant cover of the area, use alternative energy source safely and willingly share their indigenous knowledge with researchers.

Keywords **– Desertification, Rural Extension, Indigenous Knowledge, Rural Women, Incentive**.

I. INTRODUCTION

The term "desertification "was initially used by [5] he used it to describe a general process of degradation started with deforestation but not necessarily in dry lands and ending in land turned into desert.

Desertification is defined by the United Nation Convention to Combat [15] as a process of land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. [12] Stated that desertification consists of three major components: meteorological, ecological and social dimensions. The meteorological component relates to drought, atmospheric CO^2, variability of precipitation, and temperature. The ecological dimension includes plant growth, nutrient cycling, regeneration and mortality, plant cover, microbial dynamic and evapotranspiration. Moreover, the socio economic component relates to the loss of habitat, fragmentation of crucial habitat and overexploitation of natural resources e.g. over grazing. Desertification induces certain changes as reported by [11]. These changes include: reduced net primary production, high temporal variability and land cover modifications.

Desertification in Sudan

Desertification in Sudan induced by human misuse of land in addition to climate effect. Several studies indicated that about 120 million hectares (ha) of land, including 64 million ha of soils, are desertified to varying degrees. The most desertified zones are the arid and semi-arid zones where 76% of the human population of Sudan lives. Desertification results in destruction of the natural resources and consequently deterioration of the food resources, fuel and pasture, [10].

In desertified areas, women are responsible for all household tasks like water provision, fuel collection, cooking, houses cleaning and cloth washing. Besides, women are responsible to child bearing and rearing [8]. Moreover, women are also responsible for grazing animals, seedling and harvesting. These roles are intensified when men migrate to the cities, [9]. However, despite these responsibilities, some women especially the ones with low income and resources can hardly have access to modern technology, in which may help them to save time and effort in working.

Theories for empowering women show different concepts for women empowerment approaches. The basic approach comes from the Women in Development (WID), in which concern about women problem in terms of their biological differences from men. After some decades the focus has changed from equity to efficiency, and this is based on assumption that: if women involved into productive activities and provided with access to related facilities such as credits and employment, they will be integrated into development process, [14]. Accordingly, efforts should be directed towards designing measures to help women in development process mainly by empowering them.

Empowerment is considered as the right to influence direction of change through control of material and non-material resources [9]. Within these approaches technology as one of the main resources to promote women empowerment has taken different roles, that range from a tool to help women in their work to a tool that enhance women skills and resources approaches.

The present study is carried out at the EL Rawakeeb Dry land Research Station (RDLRS) with the objectives include: empowering women skills to combat desertification through extension activities on desertification cause and effects, informal seminars on some technologies applied to control desertification such

as: 1. Nursing of seedlings, 2. Planting of trees adapted to xeric conditions and can be used to construct shelterbelts, 3. Distribution of Azadrichta indica and Prosopis chilensis to be planted at homes and giving incentive prizes for best growing trees, 4. Provision of gas cylinders for women as energy source to minimize trees cutting.

II. Materials and Methods

Study Area

The El-Rawakeeb dry land Research Station (RDLRS) has established at El Rawakeeb dry area, in which occupies the area of southwestern Omdurman Governorate. It lies about 45 km away from the capital Khartoum between latitudes 15°-2' and 15°-36' North and longitudes 32°-0' and 32°-10' East.

Climate

According to [3]., El-Rawakeeb area lies in the tropical semi-arid region where the climate is characterized by a short rainy season (July- October) and high evaporation potential. Air temperature values fluctuate and show marked rise in May and drop in July and August due to the incidence of rains.

Vegetation

El-Rawakeeb area lies in semi-desert scrub and the Grassland on Basement complex soils and part of the Acacia Desert Scrub, where can be included in the "*A cacia tortilis – Maerua crassifolia*" subdivision of semi-desert.

Land Use

The system of land use in El-Rawakeeb is mainly pastoral. Traditional agriculture activities are usually carried out, while fodder crop, vegetables and shelterbelts are cultivated and irrigated artificially.

Aspects of Desertification at RDLRS

Desertification gives result in sand dunes formation and sand creep, that cover buildings in the area as shown in Figures 1 and 2. Desertification also affects plant cover in the area becomes scattered.

Fig. 1 & 2. Sand covers houses at RDLRS. Source: [6]

Combating Desertification at RDLRS

Women at El Rawakeeb Area

Women always stay in the El Rawakeeb area because men should go to nearby towns to seek jobs. 97% of the El Rawakeeb women are housewives and illiterate. They take the following tasks to sustain family life:

- ✓ Provision of water for domestic use
- ✓ Collection of fuel wood for cooking
- ✓ Take care for children

Reasons for Choosing Women

- Some of the activities carried by women to sustain family have adverse environmental such as cutting wood from trees and grazing animals, which intensify desertification process.
- Women are the ones who face desertification and suffer directly and thus are the ones who accept the idea and can participate directly.

Methods Applied to Empower Women Skills to Combat Desertification

a. Awareness seminars. The seminars are done through direct communication with women by gathering them and tell them about the causes of desertification, as well as the methods needed to mitigate desertification process. Figure 3 shows one of the gatherings of women for awareness.

Fig. 3. Gathering women for verbal awareness. Source: [6]

b. Incentive method. This involves distribution of *Azadirichta indica* and *Prospis chilensis* seedlings for home planting, and then an annual cash prize is given as an incentive for the best grown seedlings.

c. Technical training.

The women are trained to restore plant cover by planting seeds suitable to be grown in desert environment. They are also trained to prepare seedlings in nursery, as follows:

1. Seeds of *Acacia mellifera*, *Acacia sayal*, *Acacia nubica*, *Acacia tortilis*, *Eucalyptus* sp. and *Conocarpus iancifolius* are planted at the RDLRS nursery.
2. The seedlings are transferred after hardening, to be planted as shelterbelts where seedlings of Acacia species are planted in three rows, followed by two rows of *Eucalyptus* sp. and *Conocarpus iancifolius* seedlings.
3. Gas cylinders with cookers are distributed as the alternative fuel source. Gas cylinders and cookers are provided by DRI in collaboration with the National Authority of Forestry.

III. Results and Discussion

1. *Awareness Seminars*

The knowledge about desertification cause and effect is greatly improved when the oral seminars were conducted. Women are persuaded not to cut trees and also to participate in combating programs. They have showed appreciated efforts to help researchers in planting trees and preventing animal random grazing. Women also share their indigenous

knowledge with the researchers in desert control issues. [4]. Indicated that many opportunities are created to increase awareness of the land degradation and empower women, in order to combat desertification. However, the success of these activities varies within communities and depends on the objectives, ambition, determination and interest, as well as the relation they possess with the community members in the society.

[13]. illustrated that women know the best trees for fuel, which plants have medicinal uses, where to find water in the dry season, and the best conditions for growing local crops. Thus, they are actually the invisible managers and practitioners in combating desertification.

2. *Incentive Outcome*

The seedlings grown by women have received great attention and care. This attention is manifested in annual prize given to more than one woman every year. Acronym is usually done at the area to celebrate best growing tree or trees. This celebration is held in synchronization with the World Desertification Day. Figure 4 shows one of the best growing tree or trees celebration at RDLRS.

Fig. 4. The best growing tree or trees celebration at RDLRS

3. *Restoring Plant Cover*

Women have participated successfully in growing seeds in the nursery and transferred the seedlings to construct the shelterbelts, as appeared in Figures 5 and 6 respectively. Restoring plant cover induces positive environmental effects, where sand creep is significantly reduced. The results of [2]. Indicated that the construction of shelterbelts revealed that wind speed was reduced significantly and thus made the sand movement decrease.

Fig, 6. Growing seeds at RDLRS nursery

Fig. 5. Construction of shelterbelts at RDLRS

4. *Distribution of Gas Cylinders as Alternative Energy Source*

The action of cutting trees and shrubs in RDLRS by women is greatly influenced the plant cover in the area. According to [1], most of the women at RDLRS use wood for cooking and very few use it for lighting, whereas the majority of them use wood for both cooking and lighting as given in Figure 7.

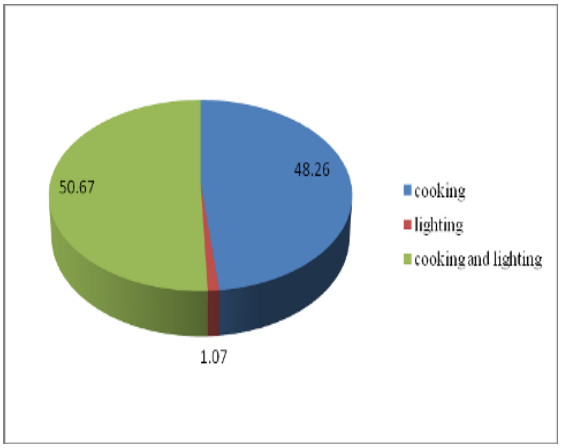

Fig. 7. Domestic use of gas at RDLRS

[7] Recorded the changes in the number of plant species for two different periods of 1985 and 2000. The data obtained is shown in Figure 8, indicates the decreased number of plant species for both tress and grasses. Trees were cut as fuel wood whereas grasses were used as pasture plants.

The data obtained by [7].) Indicated that 100% of women use gas cookers and 27% of women replace them with potages, as gas cookers are easily to be used and saving their time for collecting fuel wood. They have no effect on health as they do not produce smoke and reduce tree cuttings efficiently. The results shown in Figure 9 illustrate the time spent to collect fuel wood. It is clear that the majority of women spend twelve hours in collecting fuel wood. By using gas will help women to save their time and efforts to collect fuel wood. The use of gas for fuel has benefited the country in improving health, environment, economy and energy conservation.

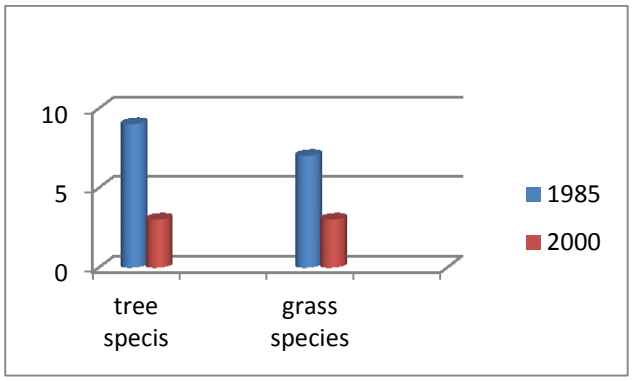

Fig. 8. Change in tree and grass species as recorded for the period of 1985 and 2000

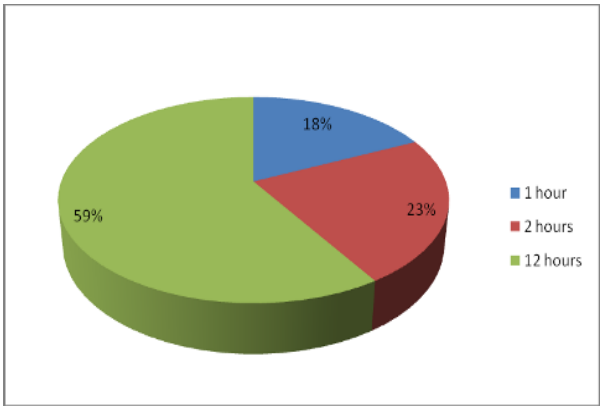

Fig. 9. The different time to be consumed to collect fuel wood at RDLRS

IV. Conclusion

Desertification is a complex and serious environmental phenomenon. Dry land communities have developed important strategies and repository of knowledge and expertise, which allows them to respond and to survive in challenging conditions. Although women's social position is often subordinate, they perform many essential survival tasks and have developed valuable skills and practices that complement men's knowledge. Severe environmental degradation, however, puts extra burdens on women, who are often left behind to run households when their men migrate to seek jobs. Although traditions and social norms may hinder women's roles in participation and decision making in dry land management, there are many examples where women have organized themselves to combat desertification. These actions include participation in combating desertification through participating in restoring plant cover.

Desertification is a serious problem to be featured by Sudan, that resulting from the interaction of natural and human factors. The problem affects women in different productive roles. While stress and hardship rise for everyone as the nearby natural resource began to deteriorate, women usually spend great efforts to sustain their family. They are the primary custodians of indigenous knowledge system. They have acquired extensive understanding of the natural environment, of its flora, fauna and ecological processes.

The case study carried out at the RDLRS indicated positive roles of women in combating desertification. They participated significantly in restoring plant cover and preventing trees cutting by using an alternative energy source.

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Appendix

Species of plants recorded in soil seed bank at EL Rawakeeb dry land area Source: [6]

+	Botanical name (Local name)	Family name	Life form
1	*Aristida adscensionis* (El Gaw)	Poaceae	Annual
2	*A. hordeacea* (Gaw)	Poaceae	Annual
3	*Sporobolus pyramidatus* (Aish el far)	Poaceae	Annual
4	*Tragus beteronianus* (Um gandowl)	Poaceae	Annual
5	*Dactyloctenium aegyptium* (Um assabi)	Poaceae	Annual
6	*Enneapogon brachystachyus* (Adom Gash)	Poaceae	Perennial
7	*Cenchrus biflorus* (Haskaneet)	Poaceae	Annual
8	*Eragrostis megstachya* (Gadafa)	Poaceae	Annual
9	*Echinochloa colona* (Difera)	Poaceae	Annual
10	*Indigofera hochstetteri* (Sharaia)	*Fabaceae*	Annual
11	*Crotalaria saltiana* (Sofaira kabira)	*Fabaceae*	Perennial
12	*Amaranthus graecizans* (Lisan tair sagair)	*Amaranthaceae*	Annual
13	*Corchorus tridens* (Khudra)	*Tiliaceae*	Annual
14	*Gisekia pharnacioides* (Safal)	*Phytolaccaceae*	Annual
15	*Glinus lotoides* (Turba)	*Molluginaceae*	Annual
16	*Zaleya pentandra* (Rubaa)	*Aizoaceae*	Annual
17	*Ipomoea verticillata* (Tabar)	*Convolvulaceae*	Annual
18	*Citrullus colocynthis* (Handal)	*Cucurbitaceae*	Annual

ABBREVIATIONS

DRI	DESERTIFICATION RESEACH INSTITUTE
RDLRS	RAWAKEEB DRY LAND RESEARCH STATION
UNCCD	UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION
FAO	FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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