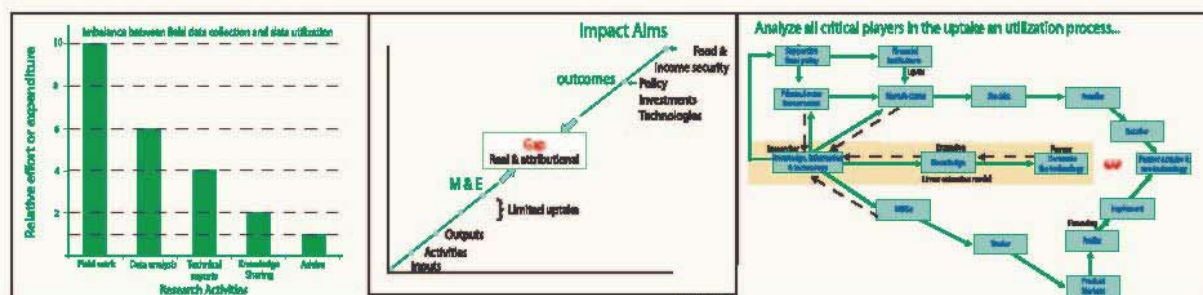


Institutionalized Scaling-up and Uptake Promotion of Outputs from Soil and Water Management Research in East and Central Africa (SWMnet R8381)

Sudan Country Report on Constraints & Barriers



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Turning Knowledge into Action

SWMnet Working Paper 3

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Sudan Country Report on Constraints & Barriers

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About SWMnet & SWMnet Working Paper

The Association for Strengthening Agricultural Research in East and Central Africa (ASARECA) is a non-political organization of the national agricultural research systems (NARS) of ten countries: Burundi, the Democratic Republic of Congo (DRC), Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Sudan, Tanzania and Uganda. SWMnet aims at supporting the generation of wealth by coordinating the efforts of ASARECA to support effective utilization of land and water resources in profitable crop, livestock and other natural resources-based enterprises.

The SWMnet Working Papers are designed to encourage members of SWMnet to share initial findings from research and other investigations facilitated by SWMnet in order to encourage wide scale peer review during the research process. These are raw documents which have not been reviewed and edited and are released to encourage discussion of work in progress. Readers are therefore welcome to send comments to: sdawelbeit@yahoo.com or hudhud103@yahoo.com

Institutions Participating in the Project



Agricultural Research and Technology Centre (ARTC) of Sudan



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ABBREVIATIONS AND ACRONYMS

ABS	Agricultural Bank of Sudan
ARTC	Agricultural Research and Technology Corporation
CIM	Conceptual Impact Model
E&M	Monitoring and Evaluation
FAO	Food and Agriculture Organization
FFS	Farmers' Field Schools
HRS	Hydraulics Research Station
ICARDA	International Centre for Agricultural Research in Dry Areas
IPMRTC	Integrated Pest Management Research and Training Centre
KAP	Knowledge, attitudes and practices
LS	Sudanese pound
LWRC	Land and Water Resources Centre
MANR	Ministry of Agriculture and Natural Resources
MOIWR	Ministry of Irrigation and Water Resources
MRR	Marginal rate of Return
NED	National Extension Department
NGO	Non-governmental organization
NVRP	Nile valley regional program
O & M	Operation and maintenance
PP	Pilot Project
SAAKSS	Sharing, Analysis, And Knowledge Support System
SD	Sudanese Dinars
SGB	Sudan Gezira Board
WMII	Water Management and Irrigation Institute

EXECUTIVE SUMMARY

The Sudan has a long history of agricultural research. During the last century, more than one hundred new crop varieties were released and many recommendations of agro-technologies for yield enhancement approved. However, very limited impact has been registered from the outputs. The rapid appraisal described in this report was conducted to determine the main reasons for the apparent lack of uptake and utilization of results from research in soil and water management. This was done as part of a regional project for Eastern and Central Africa (ECA) countries under the Soil and Water Management Research Network (SWMnet) of ASARECA. The project titled “institutionalized scaling-up and uptake promotion of soil and water management research outputs in ECA” was funded by the United Kingdom department for International Development (DFID) and implemented in four countries, Kenya, Tanzania, Ethiopia and Sudan. The major objective of the project was to initiate a process of institutionalization of a culture of scaling-up and uptake promotion of outputs from S & WM research.

The appraisal was guided by eight hypotheses developed jointly at regional level. The appraisal included the i) collation of documents on policies and strategies, programmes, project and university curricula, ii) interviews with policy makers and senior officers conducted and iii) questionnaire administered to most of the researchers dealing with soil and water management. From this rapid survey the constraints limiting uptake promotion by research institutions and individual researchers were identified and elaborated to include:

- Very few policy and strategy documents mention effective communication and uptake promotion of research results in relation to S&WM;
- Strong communication with farmers through the extension service is in place but other stakeholders in the technology uptake pathways are not targeted;
- Communication and uptake promotion are not included in the majority of agricultural research projects and programmes and therefore only limited time and budget are allocated to these undertakings;
- Monitoring and evaluation of research programs and project does not assess aspects of communication or promotion of uptake;
- Most of the researchers are not adequately trained for communication and uptake promotion while universities and other agricultural training institutes do not offer training in these aspects; and also,
- Researchers’ motivation and rewards system at the institution, local and national levels is still poor, inconsistent and occasional.

It is therefore recommended that:

- Policies and strategies should be reviewed to put more emphasis on the utilization of existing knowledge;
- The existing extension and dissemination policies and institutional arrangements should be reviewed;
- Regulations should be established to ascertain that all new research programs to contain robust communication and uptake promotion plans; and
- Researchers should be trained in communication, promotion of up-take and scaling-up through professional development programmes, and university programmes should include training in these aspects to ensure that the new crop of researchers is well equipped.

1 INTRODUCTION

The Agricultural Research and Technology Corporation (ARTC) in the Sudan was founded in the year 1902 and is entrusted with planning and execution of applied research and agro-technologies. Its mission is to provide realistic technologies in order to improve and sustain crop productivity in the country.¹ During the last century, more than one hundred new crop varieties were released and many recommendations of agro-technologies for yield enhancement were approved. In spite of these achievements, Sudan is regarded as one of the poorest countries in the world.

The ARTC in Sudan comprises more than 18 research stations scattered all over the country covering most of the agro-ecological zones that are suitable for the production of a wide range of crops, natural rangelands and forests. In addition, ARTC has six specialized research centres, one of which specializes in land and water management. Since its foundation, ARTC has been affiliated to the Ministry of Agriculture and Natural Resources. The Extension Department has a separate administration under the same Ministry. In the mid 1990s, ARTC was affiliated to the Ministry of Science and Technology and a new administration was formed under the Ministry of Agriculture and Natural Resources to cater for technology transfer and extension.

For decades ARTC continued to generate technologies through three highly specialized technical committees namely: i) Pest and Disease Committee, ii) Variety Release Committee and iii) Crop Husbandry Committee. The rate of technology transfer to end users remained a major challenge and source of debate as well. In the early nineties an idea was pushed forward to complement the role of technology generation with that of the extension under the ARTC but, the idea did not find enough backup to be realized. Thus the debate on the efficiency of the extension services continued and has been further aggravated by the institutional barriers since now technology generation and technology transfer and extension are under separate ministries.

It is with the back-ground mentioned above that the current rapid appraisal was conducted in the Sudan as part of a larger regional project for Eastern and Central Africa (ECA) countries under the Soil and Water Management Research Network (SWMnet) of ASARECA. The project titled “institutionalized scaling-up and uptake promotion of soil and water management research outputs in ECA” was funded by the United Kingdom department for International Development (DFID) and implemented in four countries, Kenya, Tanzania, Ethiopia and Sudan. The major objective of the project was to initiate a process of institutionalization of a culture of scaling-up and uptake promotion of outputs from S &WM research. It is expected that the results can be used to create awareness on the existing gaps with respect to institutional set-ups and pave the way for new ideas on how researchers can

¹ National work plan 2003-2008

play more proactive role in the process of uptake of knowledge and information rather than focussing on technology generation alone.

The appraisal was guided by the following eight hypotheses developed jointly at regional level:

- Hypothesis 1:** The role of research systems, institutions and researchers in uptake promotion is rarely recognized or promoted in policies and strategies that guide research in soil and water management.
- Hypothesis 2:** The mind-set of most research planners, managers and researchers in soil and water management are still fixated in the linear dissemination approach of reaching the ultimate beneficiaries through the extension service.
- Hypothesis 3:** Research programs and projects rarely include communication and uptake promotion plans.
- Hypothesis 4:** Research programmes and projects are rarely evaluated for communication, knowledge sharing, up-take and utilization of knowledge and technologies produced.
- Hypothesis 5:** A very small proportion of programs and project budgets and activities are committed or used in the communication and uptake promotion of research results.
- Hypothesis 6:** Research outputs rarely include specific advice to farmers, input suppliers (e.g. fertilizer suppliers), extension service, policy makers and other clients.
- Hypothesis 7:** Researchers are not adequately trained for communication and uptake promotion.
- Hypothesis 8:** The reward and incentive systems like salaries, promotion and prizes to researchers do not demand evidence of utilization and impact of research.

This report constitutes four main parts, where the second chapter presents the methodology and a brief description of the materials used to implement the appraisal. In the third chapter, results are presented and discussed. The last part represents the conclusions and recommendations based on the critical analysis and results of the current situation with respect to the 8 hypotheses.

2 MATERIALS AND METHODS

Many documents in Sudan regarding strategies, policies, research programs and projects as well as universities curricula, were collected as basic materials for this study and analyzed with regard to the eight hypotheses. Direct interviews with policy makers and research managers were carried out regarding hypothesis 2. A semi-structured questionnaire (Appendix I) addressing the researchers and university staff was employed as a tool for collecting data. Some of the enquiries in questionnaire were indirectly related to the tested hypotheses. The intention was to provide more information regarding the whole process of communication and uptake promotion of research results. A total of 50 questionnaires were distributed to the relevant institutions concerned with soil and water management. Out of these, 41 were returned and analyzed.

The questionnaires were distributed in a way to reflect the opinions of the researchers, university staff and related institutions working in soil and water management (Appendix II). The bulk of the questionnaire was distributed to the ARTC staff spread across 18 stations and four specialized research centres. This was done because the ARTC represents the major official body in Sudan regarding agricultural research and is the sole organization responsible for the approval of agricultural technologies through its three committees.

Two main universities (University of Khartoum and University of Gezira) in the country with considerably large agricultural faculties were also chosen for the study. Another two institutions (Hydraulic Research Station that is part of the Ministry of Irrigation and Water Resources and the Institute of Irrigation and Water Management) were included in the study. Therefore, the appraisal covered nearly all the most important researchers and research managers in S&WM in the Sudan.

Furthermore, case study evaluation of three long term programmes and projects was done to provide qualitative data for testing hypotheses 3, 4, 5 and 6. The case studies were chosen according to the available information as most of the previously executed projects lacked proper documentation especially during project planning phase. To avoid being biased the selected projects represented the most well documented projects in the history of the ARTC. Several programmes and projects were selected for review of extent of communication and uptake promotion in the planning, implementation and evaluation.

The data was analyzed and presented in terms of percentages. Since the questionnaire often contained multiple choices with more than one suitable answer some of the participants chose more than one answer within the same question resulting in total percentage higher than 100. This was done to reflect the preferences of the participants regarding some important information that may be attributed to more than one source. In some cases the respondents did not select any of the available choices, thus the total % of answers may not sum to 100%. The results are presented using graphs showing the percentage of respondents answering each question related to the 8 hypotheses.

3 RESULTS AND DISCUSSIONS

3.1 Policy and Strategies with Respect to Uptake Promotion

This section presents the findings with respect to key elements of higher policies and strategies, as well as questionnaire responses on policy issues, such as the awareness of researchers about the contents of higher policy and strategies. It is perceived that such knowledge is a prerequisite for researchers to work in harmony with the higher policies and to undertake more proactive role in the dissemination of their research results.

3.1.1 Ministry of Science and Technology

The main thrusts of the strategy included:

- Contribution to the achievement of a complete economic and social development;
- Support to spread peace in the country, by concentrating on research programs and plans that are directly related to the economic and social development and those that have a direct impact on the life of the people and on the environment; and
- The understanding that research findings have no value unless they are communicated to the stakeholders and adopted by the beneficiaries.

Special emphasis is given to agricultural and animal health research. It is stressed that research should address economic and social problems of the different states and find solutions to them. Documentation of all research findings and publication is highly encouraged so as to facilitate the spread and adoption of the technologies that are technically sound, economically feasible and socially accepted. The strategy calls for special attention on innovators, inventors, and pioneers, particularly those in the fields of biotechnology, information and engineering. Therefore, it is clear that the strategy includes good will regarding the tested hypothesis but, this good will has not been institutionalized or translated into real cooperation between the different institutions such as technology generation and technology transfer bodies as the mandate of the different institutions remains a major constraint in dissemination and promotion of research results.

3.1.2 Strategy of the Agricultural Research & Technology Corporation (ARTC)

The agricultural research strategic plan addresses issues and targets that are of national concern. These include increased production (quantity and quality), self-sufficiency in food and industrial commodities, alleviation of poverty, increased exports, promotion of industrialization of agricultural products to add value, and increased mechanization and more opportunities of labour. These objectives are to be achieved concurrently with the conservation and promotion of national resources and protection of the environment from pollution.

The strategy covers all major crops and commodities on which Sudan has a comparative advantage. Soil and water management is described as an activity within the above context and particularly as part of natural resource management. Recognizing the great diversity in the Sudan, a special strategy was put for the region of Southern Sudan. Sustainable development, establishment of new research stations, rehabilitation of projects, and transfer of existing technology are of prime concern in that strategy. The research strategy works in harmony with other strategies such as those of ministries of agriculture, industry, social welfare.

With regard to technology generation, in all cases, it is the responsibility of the ARTC with some contribution from (some) academic institutions and a few private companies. Communication of information and research results to farmers is usually through the extension in a linear dissemination model. Farmers and other stakeholders are rarely consulted during planning and implementation of research programs, but are generally encouraged to give feedback through the extension service. The participatory approach, well favoured in technology transfer, and farmers' field schools as a concept and approach are becoming increasingly common and popular. However, the appraisal findings show that this is not yet the case for research in soil and water management.

The strategy of the Land and Water Research Centre is part and parcel of that of the ARTC. It goes in line with the overall objectives of ARTC and the national strategy for sustainable agricultural development. The strategy is based on generation and provision of technologies that deal with water management, land evaluation and soil conservation. These technologies are, thereafter, transferred and adopted by stakeholders. The water management research concentrates on the effects of irrigation and soil moisture depletion on crop yields and determination of crop factors, water loss or maximizes its value in rain fed areas.

The strategy also calls for a structured plan for technology transfer as the centre is one of the research arms of ARTC. The stakeholders targeted are usually farmers but managers of large scale agricultural schemes, government institutions and departments and the private sector, are also included. Evaluation of research programs at the centre level is always carried out as projects transit from one phase of execution to the next and feedback evaluation by the stakeholders which is highly appreciated.

It is evident that the promotion of research results by ARTC is framed within its mandate as a technology generator. ARTC has realized the importance of transferring those approved technologies in its strategy but again this is the mandate of another administration. There is some degree of dissemination as the new technologies must pass through the main technical committees representing most of the relevant stakeholders. One of the main constraints that prevent farmers from participating in such committees is that it is highly technical. ARTC management holds the opinion that approved technologies are to be further simplified and transferred through other administration (Technology Transfer) which belong to another ministry.

3.1.3 Strategy of the Hydraulic Research Station (HRS)

The HRS is an arm of the Ministry of Irrigation and Water Resources (MoIWR). It is entrusted with the adoption of research technologies that help the ministry in the area of improvement and best utilization of water resources. The national, economic, social and environmental issues related to water resources are addressed by the station. The station has no written document for its strategy. However, its main activities and achievements are documented as:

- Engineering tasks in the use of water research, hydraulic operation and maintenance of irrigation schemes of hydraulic structures and works for other water utilization (hydro-power, river navigation, flood, protection and control of water supply).
- Flood protection and control along the rivers to prevent destruction of riparian settlements.
- Discharge calibration of structures and canals within irrigation schemes to minimize water loss and improve water balance for economic water use.
- Development of hydraulic engineering and research co-operation with interested institutions to solve research problems of mutual interest.

The research studies carried out by HRS are of great concern to many stakeholders e.g., state and regional ministries, national irrigation schemes, service departments in urban and rural sectors, farmers and small land-holders. The programs are usually discussed and agreed upon at the departmental and ministerial level and in some cases with the interested users and beneficiaries. No specific plan for the dissemination of information has been established for that purpose, but the flow of information is normally through private or public meetings, discussions, publications, training sessions and personal contact. Monitoring and evaluation, though not officially stated, is carried out during the course of execution of a project or a program, which is usually of applied nature. In this context, the whole communication plan needs to be structured and strengthened.

3.1.4 Strategy of the Water Management and Irrigation Institute (WMII)

This institution, belonging to the University of Gezira, caters for the development of methods of water management and efficient use of the water resource, aiming at better production and a better water use efficiency on a national scale. The philosophy of the institute, stemming from that of the university as a whole, is to achieve local and rural development. It is based on:

- Problem solving oriented research, focusing on major issues,
- Efficient utilization of available resources,
- Multi-disciplinary approach that amalgamates engineering, agriculture, economics, environmental sciences, health and sociology, and
- Cooperation with national and international institutions working in the field of water management.

3.1.5 Summary of findings

The main strategies dealing with soil and water research and management in Sudan are those of the Ministry of Science and Technology, ARTC - Land and Water Research Centre, the Hydraulic Research Station and the Water Management and Irrigation Institute. They include specific objectives, and activities to achieve their goals, each in its field. Success has been made in many areas, but limited funding was reported as a constraint to others. The stakeholders are many and diversified, ranging from large irrigation schemes and government departments to small business and farmers. Means of technology transfer and communication plans are not always clear in the strategies and are sometimes absolutely lacking due to mandate. Moreover, monitoring, evaluation and feedback, at all stages of strategy development, are not clearly stated.

3.1.6 Results from the researchers' questionnaire

This section deals with the response of the researchers to the semi-structured questionnaire given in Appendix I. Section A of the questionnaire (part 1, 2 and 4) is directly related to hypothesis 1 in showing the awareness of the researcher about the higher agricultural policies, the accessibility of such policy documents and their research work in relation to those policies.

a) Knowledge about higher agricultural policy: More than half of the respondents were aware of the higher agricultural policy totalling to about 59% but out of this only one third of the respondents were from ARTC. The percentage of the respondents who were not aware of the agricultural policy was about 39 with majority from ARTC. Figure 1 shows the total percentage of the respondents in response to knowledge about higher agricultural policy. This reflects the absence of clear agricultural policy at the level of the main research organization.

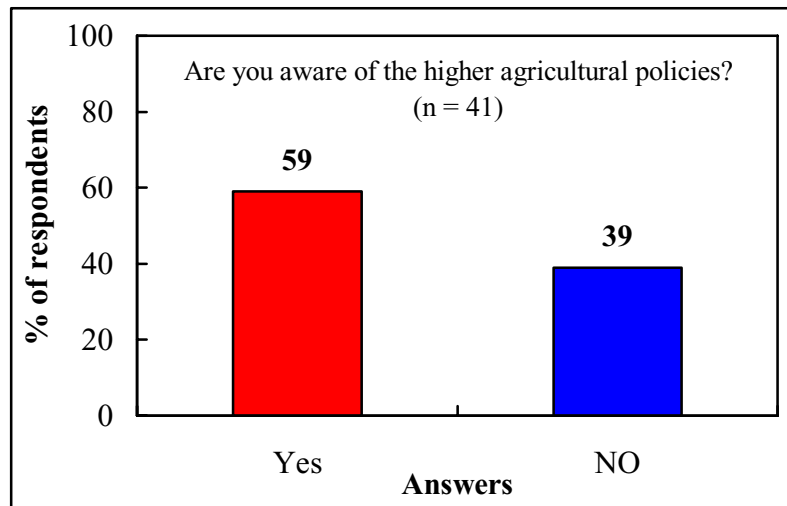


Fig. 1: Higher policy knowledge

b) Accessibility of information and documents related to higher agricultural policy and strategy: The majority of the respondents were of the opinion that the accessibility to such documents is difficult with similar percentage from ARTC and Others. About 41% of the respondents declared that such documents are inaccessible while only 2% indicate that they are easily accessible. This may be attributed to the lack of a clear agricultural policy and to the fact that currently most of the respondents do not belong to the Ministry of Agriculture and Forestry (Fig 2).

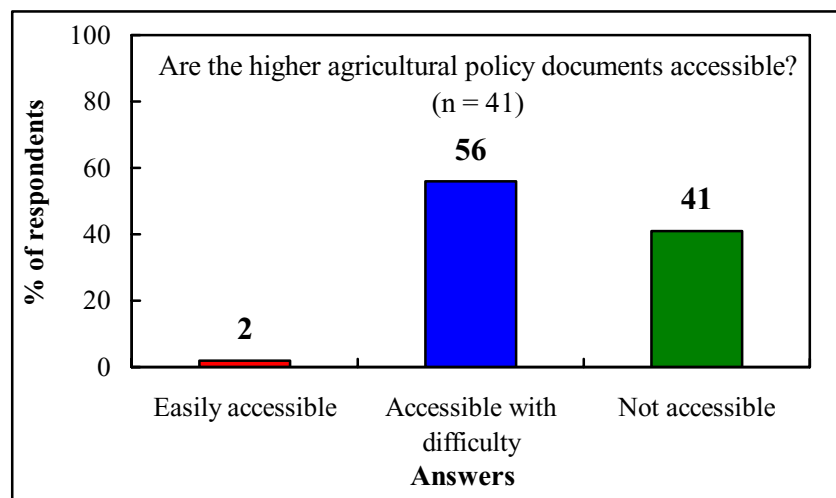


Fig. 2: Level of information accessibility

c) The extent to which the respondents think their research activities follow the higher policy: This part is an echo of the first question in as far as the judgment of the respondents depend on their knowledge of the higher policy. Although 41% in question 1 declared that the higher policy is inaccessible, only 20% indicated that their research activities were poorly related to higher policy. This is because most of the respondents think that their research activities are somehow linked with the higher policy. About 78% were in the combined fair and medium level (Fig.3).

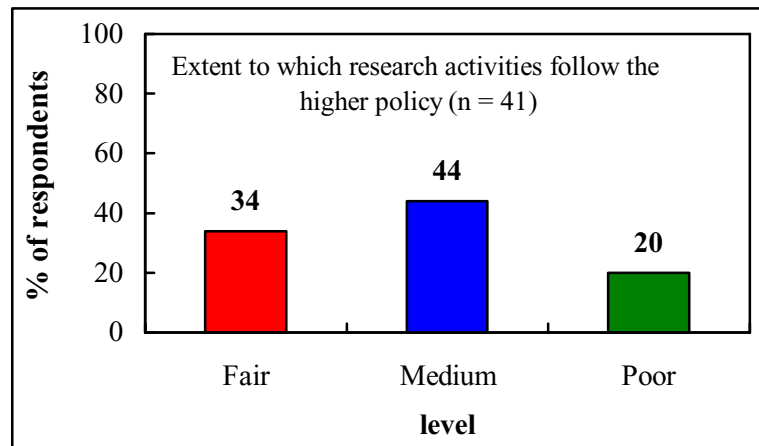


Fig. 3: Research fitting higher policy

3.2 Minds are Set in the Linear Dissemination rather than Communication and Sharing

This section deals with the results of the personal interviews with the relevant research managers and planners related to hypothesis 2. Regarding this issue, however, a total of 26 respondents thought that research results dissemination can only take place through the extension service body using multimedia tools and pilot projects. This certainly reveals the fixation of their mindset. Other ideas emphasized by the same respondents are shown in Figures 4 and 5 and can be summarized as follows:

- i) Dissemination of research outputs can be through published annual reports, workshops & seminars proceedings, journals and technical committees' decision regarding the release of new technologies.
- ii) Transfer of research findings is also possible through the adoption of the participatory approach making use of the various kinds of trials such as on-farm trials, demonstration plots, pilot testing sites, farmer field schools and field days at farm level, whereby researchers can directly convey the message to the end users.
- iii) Uptake promotion of research findings can as well be through effective networking and coordination between institutions.

However, data synthesis and interpretation, revealed that effective uptake promotion of research outputs with emphasis on soil and water management can be through stakeholder meetings, participatory approaches, feed back from field visits and discussions, monitoring and evaluation and involvement of CBOS, GOS & NGOS (Fig. 4). However it was deduced that constraints limiting the uptake promotion and utilization of research results were:

- i) Inadequate finance, and
- ii) Lack of an efficient extension service body mainly because of the reduced number of the properly trained & qualified extension staff.

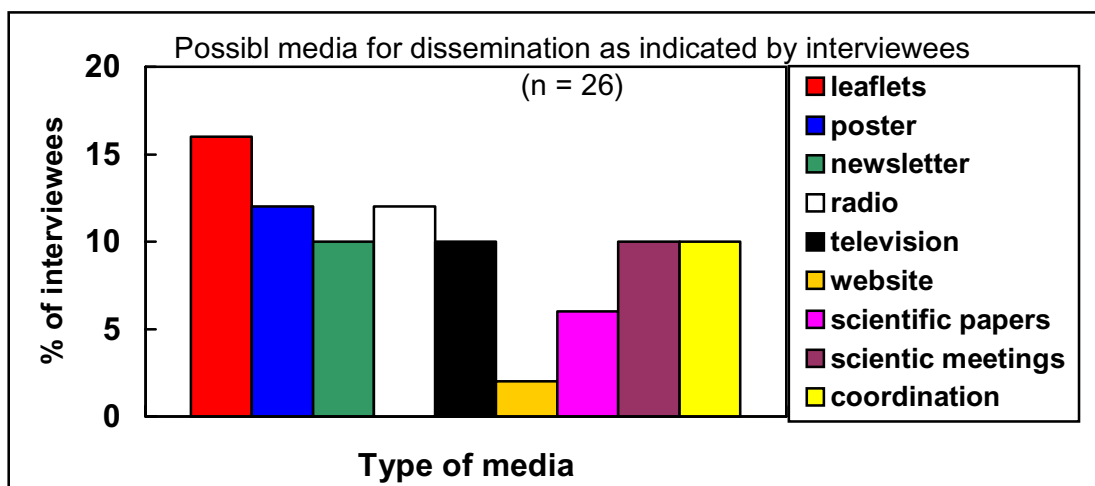


Fig.4: Most effective media for KSP promotion as seen by interviewees

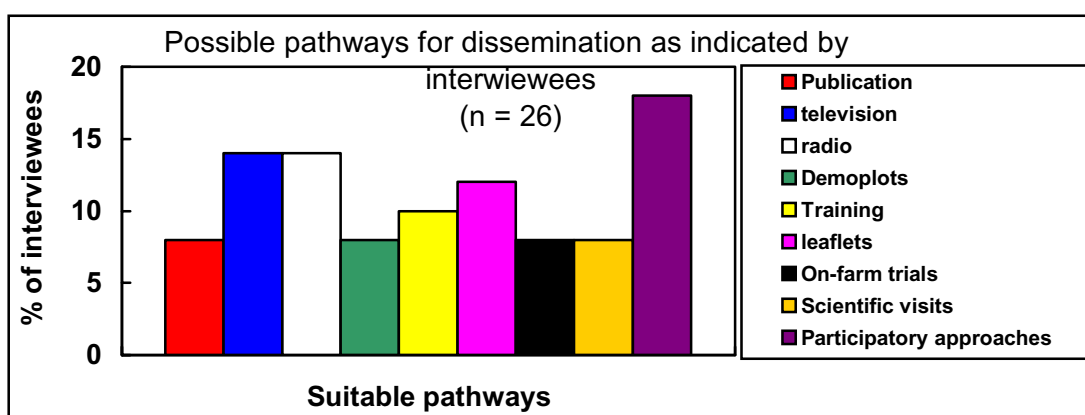


Fig. 5: Effective pathways for uptake and utilization

3.3 Inadequate Plans for Promotion and Uptake in Project Proposals

Six projects were selected to test this hypothesis. As mentioned in the methodology, the selection was dictated by the availability of information as most of the projects even lacked minimum documentation. The first four projects were taken as evidence of lack of promotion and uptake plans in the project proposal and later stages. The second set of two projects was taken as an example of success stories to draw lessons from and to understand the reasons behind their success. A general description of the first four reviewed projects is given below.

3.3.1 Project 1: FAO Fertilizer Program and Related Inputs in Sudan

The plan of operation for project GCPF/SUD/009/DEN, fertilizer program and related inputs was signed by the Government of the Republic of the Sudan and by FAO on 23 March 1977. The initial planned project duration was 3 - 5 years. The project was subsequently extended into a second phase (4 years) and a third phase (3 years). The project terminated operations at the end of 1990. The development objective was to assist the Government of the Sudan in attaining its goals of increasing agriculture productivity, especially among small-scale farmers. The immediate objective was to raise crop yields through the availability at suitable places and times, in both quantity and quality, of fertilizers and related inputs, together with

the extension to farmers adequate fertilizer recommendations and related improved practices. Scaling up of the research outputs were conducted through seminars and training.

As a result of these efforts, fertilizer consumption in the Sudan increased substantially during the last six years of the project, especially at small-scale farmer levels. Overall production of crops for export had not increased appreciably implying that the benefits were gained locally. To that extent, the project had achieved part of its development objective. The immediate objectives of providing the basis for crop production improvement were achieved through many trials and demonstrations that provided the data on which to base future work. The only problem with this project was that there was no built-in mechanism for sustainability. Follow-up activities after the end of project life were not planned.

3.3.2 Project 2: Regional network for supplementary irrigation under rain-fed agriculture and water management at farm level

The project was initially conceived to include 11 countries with the goal to increase food and cereal production through supplementary irrigation and improved water management at farm level. The project focussed on:

- the evaluation of available information and filling the gaps through research,
- improve irrigation efficiency through researchers, extension and farmers,
- establish a regional technology transfer system at the farm level, and
- up-dating the manpower and institutional capability of the participating countries through research, training, seminars, study tours and courses.

Valuable investigations have been conducted in five countries on irrigation scheduling. However, the results have not been disseminated throughout the target areas because of absence of strong extension services that would allow the relevant technologies to reach farmers. In the Sudan, the role of supplementary irrigation on sorghum productivity has been clearly demonstrated. Application of 1-2 irrigations during critical growth stages has saved the crop from complete failure. The productivity of rain-fed sesame crop has increased 3-5 fold under supplementary irrigation. Provision of the crop factors will enable the concerned to assess the actual water needs and find a place for the crop in the rotation plans of the irrigated national schemes. Under rain-fed agriculture application of water harvesting techniques have boosted the grain yield of several sorghum cultivars by nearly 90%. Analysis of the communication plan revealed the following:

- The main stakeholders, namely agricultural scheme managers, irrigation engineers, and extension experts were not involved in the initial stages of the project.
- M & E was not implemented until 3 years after the start of the project.
- Little efforts were made to analyze key stakeholders and package results and advice accordingly.
- The project did not fulfil its goals properly due to two basic reasons namely:
 - Lack of focus because the addressed problems were very broad.
 - Absence of scientific and technical capacity and mechanism in the form of a regional scientific board or panel.

3.3.3 Project 3: The Sediment Monitoring Program

This is a continuous program that started in 1988 at the HRS, Wad Medani. The overall objective of the sediment-monitoring program was to establish a database on the sediment various characteristics of the river Nile system and the irrigation schemes. The planned outputs, included:

- Establish a database on the sediment various characteristics of the river Nile system and the irrigation schemes,
- Device the most cost effective sediment control options, in the river system,
- Establish optimum methods for the management of sediment in the Gezira irrigation scheme, and
- Enhance regional cooperation in watershed management.

3.3.4 Project 4: Irrigation water use efficiency program

This project commenced in 1999 and is still on-going at the HRS with object to determine and evaluate how different irrigation practices affect irrigation water use efficiency at field level with the aim of increasing the irrigation efficiency in the current and future irrigated sectors.

3.3.5 Project 5: Participatory water management in the Gezira scheme

The history of the Gezira scheme (0.88 million ha) goes back to the year 1925 when the first dam on the Blue Nile, Sennar dam, started operation. In the year 2000 a pilot project titled “Raising productivity through broadening farmers’ choice and farming system and water management” was initiated in Abdel Hakam Block in Centre Group to train and prepare farmers to assume responsibility for the minors O&M. The project pilot was supported by the Food and Agricultural Organization (FAO). More details can be found in FAO, 2001 and Mohammed *et al.* 2004. Through this project farmers field schools (FFS) philosophy was first applied in the Gezira scheme in 1993/94 after it has been effectively used in South-East Asia by FAO. The FFS were designed at that time as part of an Integrated Pest Management (IPM) program that aimed at reducing the chemical spraying of cotton pests and reducing the pollution of the environment. It rapidly expanded to include other crops.

One of its outputs has been the approval of the regulations for the legal backing of the water users groups which was approved in December 2002. According to the laws of the Gezira scheme the committees were legalized and given authorities and their rights and obligations were defined by a set up of rules and regulations agreed upon by all the farmers in the pilot project (PP). The committees were able to allocate funds, make contracts and penalize farmers who do not pay back. The FAO deposited seed money as a revolving fund for the purchase of various inputs. The seed money was recovered by the committee members after the crops were harvested and most of the tenants were willingly paying back to keep the revolving fund alive for the next seasons. According to the reports of the PP the recovery of the fund was above 80%. This was achieved by the following measures:

- The assistance from the revolving fund was given only to the farmers whose performance at the field level was satisfactory to the agricultural input and financial committees along every minor canal.
- If for any reason the farmer did not pay back, the financial committee had the right to recover the money from the payment of the cotton profits directly from the Gezira scheme administration office.
- The capital of the revolving fund can be increased by the farmers through allocating some of their yields from different crops to the fund.

The evaluation of the project was implemented regularly throughout the project period together with follow-up periodical reports and workshops. These have shown that the pilot project is succeeding in producing the desired results. Several reasons have been identified by the evaluations to have contributed to the success, and these are:

- The successful application of participatory approaches led to accumulated indispensable experiences in technology transfer and better interaction with farmers under the prevailing local traditions and social setup.
- Building of farmers' confidence and proving that farmers can successfully handle the O&M of minor canals provided that they received adequate training.
- The introduction of free choice of crops as long as their water demand does not exceed the canal capacities and providing them with crucial knowledge on other agricultural production related matters.
- The enormous efforts exerted by the IPMRTC, trainers, extension staffs, national consultants together with the full support of the scheme administration and the farmer's union in addition to the FAO were positively implemented.
- The introduction of the revolving fund as a tool for financing part of the agricultural inputs.

3.3.6 Project 6: Nile valley regional program on cool season food legumes and wheat

The objective of the program (financed by the Netherlands Government) was to increase the production of wheat, faba bean, chickpea and lentil, which are the main cool season crops in the region. These crops represent the basic food for the population. The Nile Valley Regional Program (NVRP) was carried out in two phases: 1989 to 1992 and 1993 to 1995. In phase I, the program emphasized backup research to generate technology and in phase II, it emphasized the transfer of technology. The program addressed the problems of crop production in a multi-disciplinary approach. Experimentation was carried out in eight research stations, many testing sites and hundreds of farmers' fields covering the production areas of the four crops. In addition to the production problems, the NVRP worked towards building capacities by training personnel and improving the working facilities of the institution.

Adoption studies have been conducted and Table 1 shows the level of adoption for the different technology components in Gezira. Generally, encouraging levels were reported especially among farmer participants in on-farm trials. Almost all farmers used the recommended varieties and complied with the recommendations of land levelling, mechanical planting and sowing during November. The irrigation regime was sub-optimal and adoption of fertilizer recommendations was often moderate and variable.

Table 1: Adoption levels of wheat technology across three seasons in Gezira Scheme (% of farmers adopting, irrigation is in number of applied watering)

Package factor	1989/90*	1990/91	1991/92
Cultivar	89	97	100
Disc harrow	40	NA	66
Levelling	31	100	90
Planting	44	100	100
November sowing	97	100	87
Fertilizers			
Opt., N dose	22	93	100
Opt. P dose	18	97	100
Irrigation No **	5	64	7.1
Yield (t/ha)	1.4	NA	2.8
No of farmers	80018	30	68

- All Gezira average. ** Optimum number of irrigation is 8

3.3.7 Some lessons

The six examples given in this section have served to show that systems in the Sudan are still struggling to ensure that projects have robust communication and uptake promotion strategies. Out of the six evaluated projects only two implemented deliberate uptake promotion activities. Within the limits of the appraisal nature of this report, this observation seems to explain the difference in achieving project objectives between the first set of four projects and the second set of two projects. In the first set of projects, monitoring and evaluation are not mentioned at the proposal stage of the project. The records also show that monitoring and evaluation was not apparent either during implementation or after the end of the projects.

3.4 Low Budgets (time and funds) for Communication and Uptake Promotion

Evaluation of documents of the projects described in the previous section showed that no budget or time was allocated to communication and uptake promotion. The projects did not include any separate budget even during the implementation or after termination. This also came out during the interviews with the higher decision makers and deans of agricultural faculties, in the sense that very little budget is allocated even for the mandated activities. From the questionnaire the results show that experience of majority of the respondents is the fact that budget allocation for communication and uptake promotion within research budget is often zero (Fig. 6).

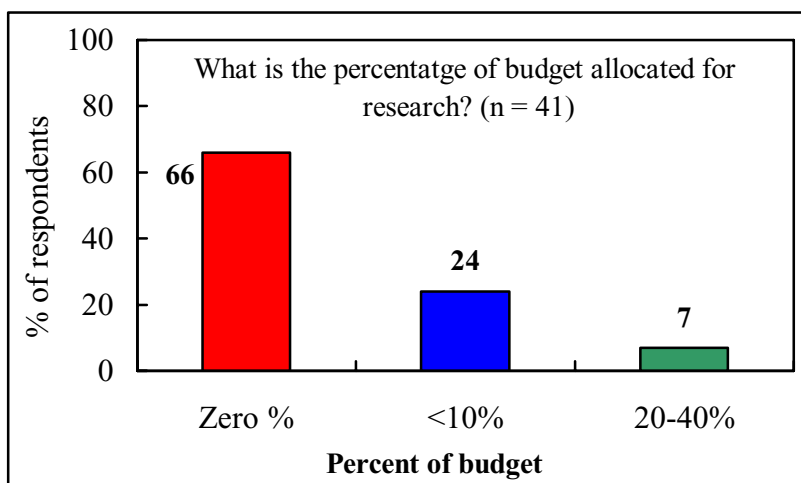


Fig. 6: Budget allocated for communication

With respect to time allocation, the respondents were asked to estimate the proportion of time allocated to communication as a percentage of the time spent in the entire research activities. As it was difficult to reflect all the answers in one graph, the answers were fitted to those who provide zero time for communication activities, those who afforded less than 10%, those who provided 20 to 50% and those who provided more than 50% for communication activities. The results are given in Figure 7 and it is clear that the majority (70%) allocated less than 10% of research time to communication and uptake promotion activities.

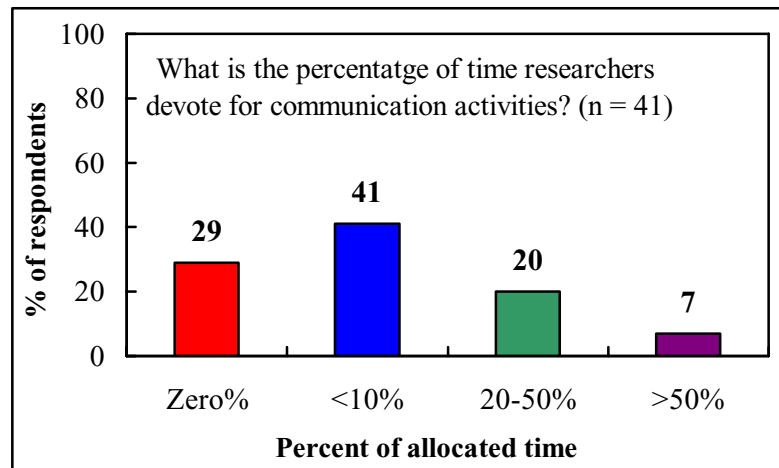


Fig. 7: Time allocated for communication

3.5 Research outputs not targeted to specific clients

The results show that about 24% of the respondents think they have produced enough information, while about 54% of the respondents estimated they have produced only a few products that were used to advice the concerned stakeholders while 17% did not produce any information. The bulk of this 17% came from others (86%) who are mainly involved in academic activities but there is a recent trend showing that some of the universities were actively participating in technological packages through their post-graduate programs (Fig.8).

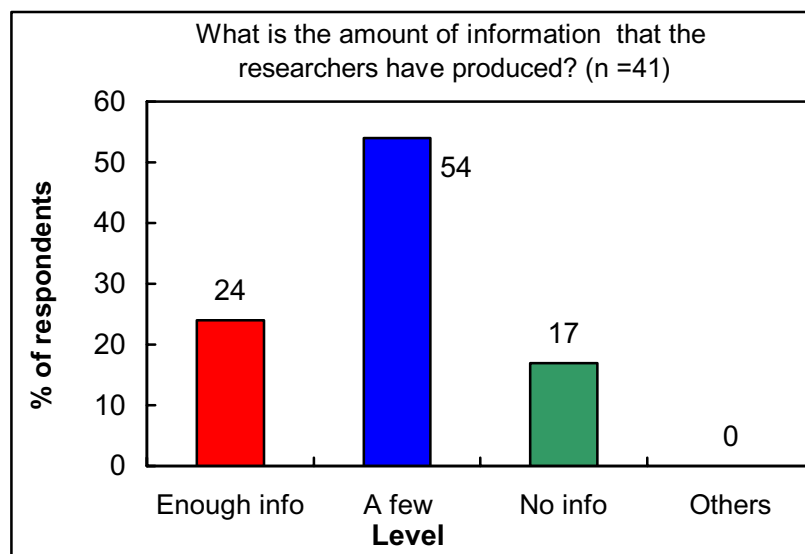


Fig. 8: Specific advice

3.6 Inadequate capacity of researchers in communication and uptake promotion

This was a simple and direct question indicating whether the respondent had received any training on communication and uptake of research result or not. The overwhelming majority indicated that they had not received such training with the exception of one respondent from the university (Fig. 9). At the level of university training, diagnosis of the courses offered at the M.Sc. level, revealed that postgraduate students are well equipped with the relevant scientific information for the discipline in question, but none of these courses covered the

subject of communication, knowledge sharing, monitoring, evaluation and impact assessment of projects theoretically and practically.



Fig. 9: Training in communication & uptake of research results

3.7 Reward and Incentive Systems for Researchers: *not linked to impact*

Researchers' motivation and reward system at the local and national levels is still poor, inconsistent and occasional. Criteria set for motivation varies from one organization to another and researchers are rarely rewarded. Researchers always complain that salaries are low, fringe benefits are meagre, and their future is uncertain. Recently, however, the Minister of Science and Technology decided to grant honorarium to researchers who produce technologies or release varieties that promote production in quantity, quality or added value. This incentive though little has been highly appreciated by researchers as one means of motivation. However, this system is fragile as it depends on availability of funds provided in the fiscal budget. Also researchers complain that there are many constraints to conduct research. These include poor infrastructure and inadequacies in the availability of scientific equipment, laboratories and training.

At the national level, motivation and reward systems were almost lacking or absent for extended periods. Once in a while, a researcher may be motivated or rewarded for an excellent work. However, recently the President initiated a legal body to provide rewards and prizes to pioneer scientists who show excellent dedication and innovations in all fields of science and arts. To date those who have been rewarded are still very few in proportion to the kind of achievements recorded. This can be attributed to many factors and limitations, among which is the limited mandate of the reward committee. The researchers were also asked about their opinions on the main barriers and the suggested solutions to overcome such barriers in order to undertake effective role in communication and out-scaling of research results. The following section summarizes their response.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

With reference to policies and strategies it was found that effective communication of research results, particularly results of soil and water management were not mentioned in most of the strategies surveyed, but it has a sizeable share in the farmer field schools and participatory approach systems nowadays.

Most of the policy makers & research managers think that soil & water research outputs can be promoted and utilized through efficient extension service body using multimedia tools and pilot projects. Therefore the low utilization of research outputs with special reference to soil and water management disciplines, can be attributed mainly to this fixed mindset as well as financial constraints. This was deduced from the high effort exerted in the dissemination of released technologies through the classical procedure i.e., researchers-extension service - farmers. This has no doubt resulted in a gap between technology release and adoption. It is also concluded that the dissemination of research results does not cover all the concerned stakeholders.

Thirdly, most of the reviewed projects lack an effective communication plan and uptake promotion strategy at their proposal stage. Moreover they also lack a mechanism for follow up, monitoring and evaluation (M&E) and specifically for the impact assessment of the projects. In some institutions there are no guidelines for M&E, and in others where they exist, they are not activated.

In most of the projects there is no specific budget or time allocated for the communication of research outputs to the different stakeholders.

Special advice is normally given only to farmers. The other stakeholders are very often not addressed.

Almost all researchers lacked training in communication.

Post graduate student courses lack information on communication, knowledge sharing, monitoring and evaluation and impact assessment of projects.

A system of motivation and rewards for researchers has recently been adopted but it is very fragile as it depends on the availability of funds.

4.2 Recommendations

In view of these constraints, the following recommendations are proposed:

Review the current policies and regulations so as to provide a framework for ensuring that robust communication and knowledge sharing plans are part and parcel of research programs and projects;

Review current institutional structures for the dissemination of research outputs to increase the role of researchers themselves;

Monitoring, evaluation and impact assessment of research projects should put more emphasis on the extent to which outputs are promoted, adopted and put into use;

Review the relevant curricula in universities to increase the level and quality of training of future researchers with respect to communication skills;

Provide on-the-job training of researchers in communication and uptake promotion; and

Extend the awareness raising activities initiated by this project to more stakeholders.

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APPENDIX I: QUESTIONNAIRE

Promotion and up-take of research findings and knowledge in Soil & Water Management (S&WM ASARECA)

Please answer and complete

A) Strategy and Scientific Research

1. Do you have any idea about higher agricultural policy and strategy?

(a) Yes (b). No

2. Accessibility to information and documents related to higher agricultural policy and strategy is;

(a). Easily accessible (b). Accessible with difficulty (c). Not accessible

3. Do you think the allocated budget within the agricultural policy for scientific research is;

(a) Enough (b). Reasonable (c) Not enough

4. To what extent do you think that your research follows the higher strategy?

(a). Fair (b). Medium (c) Poor

B) Scientific research and means of information gathering

1. How do you get information for your scientific research?

a. Previous technical reports and scientific journals.

b. Workshops and seminars

c. Mass media and Internet

d. Others, indicate -----

2. How much of the information you collected in your field in the past 5 years came from technical reports produced within the same period?

a. Almost all the information published

b. Only the most relevant information

c. A few

d. Other opinion -----

C) Scientific Research and Communication

1. Indicate the level of information from your research results and approved recommendations that have been used to produce specific advice to farmers and other involved stakeholders.

a. Enough information

b. A few

c. No information

d. other opinion, indicate -----

2. If the answer in the last question is either (a) or (b), what was the most used method in disseminating the research results and recommendations to stakeholders?

a. Mass media, such as radio, TV and newspapers

b. Workshops and field days

- c. Booklets and leaflets
- d. others, indicate -----

3. Do you think the method of dissemination and sharing of research findings has ever been evaluated for their effectiveness?

- a). Yes
- b). No

4. Indicate the percentage of time you have allocated and used in communication and uptake of research results with reference to the time of the research itself; ----- %

5. Indicate the percentage of budget that you have allocated and used in communication and up-take of research results with reference to the budget of the whole research ----- %.

6. Have you ever been trained in communication and up-take of research results?

- a). Yes, indicate -----
- b). No

(D) Barriers and Suggestions

1. What do you think are the most critical barriers to undertake more active role in communication and promoting up-take utilization of results from soil and water management research.

2. What are your suggestions to overcome these barriers mentioned above?

Please use additional sheets if needed.

APPENDIX II: STAKEHOLDER ANALYSIS

Stakeholders	Q4: What are the issues and CP?	Q5: What are the current KAP1 of the identified stakeholders	Q6 What do we want the stakeholders to do after we communicate?	Q7: What media/channels are most viable?
Minster & Director for the transfer of technology at the Ministry level	Provide evidence why Sudan is still within the tenth poorest countries due to absence of communicating in S&WM findings	Not satisfied with the current practice of dissemination and are trying to put more effort in that ,but do not knowing how to achieve	Include the communication plan in the higher policy of the Ministry with financial support for the research program as proposal and final out put disseminating	Policy Briefs and fact sheets T.V. news-
General Director of the ARTC	Provide scientific evidence of the communication gap between research and extension Inform them that there are more communication stakeholders than the traditional extension experts and farmers e.g. manufactures, stockiest, etc Convince the DG on the importance of CS. Consult planning department for provision of budget	Get satisfied with the three committees which are the crop husbandry, and pest and diseases, and the variety committee. Also satisfied with technical reports, workshop and seminars	Ask to be included in the Agricultural research strategy. Ask for support for the capacity building	Technical papers Brief notes
Deputies Director of (ARTC) for the Programs & bilateral relationships and external stations and transfer of technology	To get impact we need to go beyond production of technical reports There is a need to provide support and resources for implementation of CS	Get satisfied with technical reports. They are more enlightened on the need for effective communication. They demand for impact but not clear how impact would be achieved .They are aware and support adaptive research but lack understanding of what adaptive research entails	Enforcement of the need for scientist to include CS in their programs and proposals. Mobilize resources to enable that to happen. Ensure that capacity building is provided to scientist to be able to CS. Ensure that CS is captured in the M&E plan. Ask for support for capacity building.	Technical reports Briefs T.V. interviews Fact sheets
Stakeholders	Q4: What are the issues and CP?	Q5: What are the current KAP1 of the identified stakeholders	Q6 What do we want the stakeholders to do after we communicate?	Q7: What media/channels are most viable?
Director of the Training & Publication of the Agricultural	Provide scientific evidence that is a lot of repetition due to absence of better	Satisfied with the current dissemination practice. They are aware and support	They should support the idea of having. They should be instrumental in	Technical reports& papers. . Work shop Seminars

Research & Technology Corporation (ARTC)	communication which lead to loosing effort, money and time especially in poor countries like Sudan. Ensure them there is no regional and international communication which can put the country in better situation. Communication is given low priority , there is the first to suffer from any budget cut .They should support the idea of having	adaptive research understand better what adaptive research entails	changing the mind set of the scientists They should now that they are the key in ruling the communication	
Directors of (Land & Water Research Centre, Hydraulic Res. and desertification institute.)	Give evidence of the gap between research and farmers due to absence of information .Non promotion of the out put research to other stakeholders such as fertilizer companies Show communication may promote researcher themselves to ovoid repetition and have new technologies	Satisfied with current dissemination practice .Demand for impact but not clear how to achieve	Insist that proposal plans for research program should include communication .All stakeholders should be communicate and identified at inception period. Communication budget should be separate from research .Ask for capacity building	Technical reports & papers brief notes, Seminars & pamphlets
Deans faculties of Khartoum &Wad Medani universities	Communication plans helps the post-graduate student in his future research T here is a need to balance between basic and applied research	They think that role is to give basic information .And due to limitation it had adopted later sometimes .They satisfied with the extension job.	Ask for more collaboration and coordination with researcher in the field .Courses for post graduate students should include communication a	Text books Technical reports
Stakeholders	Q4: What are the issues and CP?	Q5: What are the current KAP1 of the identified stakeholders	Q6 What do we want the stakeholders to do after we communicate?	Q7: What media/channels are most viable?
Researchers	Communication is an issue which be strongly considered by and will give high sounds for your research nationally, regionally and internationally. This will give you promotion in your qualification .The	Low- medium .They are satisfied by dissemination by annual reports and scientific papers	Identification of all the stakeholders and their information by the project at proposal , midterm and at output stage	Technical annual reports Website Published scientific refereed papers Seminars Books

	different stakeholders will direct you to their needs.			
Public Extension System	To be more aware of the most suitable communication activities for the different stakeholders.	Medium-high	More efficient in conveying the research findings	Proceedings of technological packages released, Pamphlets and Posters
Private Service providers	To be aware with the research findings.	Low	Provide inputs with accessible prices	Posters and Pamphlets
Organization Targeted for regional level communication by SWMnet-ASARECA	Problems and solutions	High	Provide training for researchers	Technical annual reports Website
International Development Partners (FAO, UNDP)	More support for communication plan	Medium-High	Provide training and support for researchers in communication	Booklets, Web site
