NATURAL RESOURCES SYSTEMS PROGRAMME
FINAL TECHNICAL REPORT[1]

DFID Project Number

> **R8390**

Project Title

> Needs assessment and uptake promotion of rainwater harvesting research in Nigeria

Project Leader

> John Gowing

Organisation

> University of Newcastle upon Tyne

NRSP Production System	**Date**
Semi-arid	February 2006

Contents

ANNEXES

Annexes

A   Project completion technical report

B   Project inception report

C   Report on a visit to Tanzania by Dr Adekalu

D   Proceedings of stakeholder workshop

E   Communications plan

   (includes appendix E1 Radio talk scripts)

F   Analysis of soils and rainfall data

G   PARCHED-THIRST simulation study

H   Economic analysis of RWH

I   Market chain analysis

J   PRA in sample villages (Part 1: Knowledge, attitudes and practices;
                                                Part 2: Environment and resources)

K   Overview of policy environment

   (includes appendix K1 Extract from National Water Policy)

L   Proceedings of policy workshop

M   Proceedings of training workshop

N   Report of the evaluation of communication activities

O   Report of pilot RWH field trials

Abbreviations and Acronyms

NRSP	Natural Resources Systems Programme
OAU	Obafemi Awolowo University
OSADEP	Osun State Agricultural Development Programme
RWH	Rain Water Harvesting
SUA	Sokoine University of Agriculture
UNUT	University of Newcastle upon Tyne

1 Executive Summary

Previous NRSP funded research has made a significant contribution to pro-poor sustainable development within Tanzania through demonstrating scope for improving crop production by adopting rainwater harvesting. The purpose of this project was to test transferability of research products and processes from Tanzania to Nigeria.

The project aimed to raise awareness amongst key stakeholders of the scope for improving rainfed agriculture through better water management whilst gaining an understanding of key factors affecting uptake and promotion of research findings in Nigeria. Work was focussed within Osun State (one of 36 states within Nigeria). Primary stakeholders are poor rural households whose livelihoods are dependent on rainfed agriculture. Other key stakeholders were identified as Osun State Agricultural Development Programme (OSADEP) and news media.

On the basis of a detailed systems analysis of constraints faced by rice and maize farmers at the study site, potential for adoption of RWH research findings by the target group was evaluated. Primary data collection in four sample communities using PRA techniques was undertaken to complement these analyses and gain insight into knowledge, attitudes and practices of farmers.

Climate related cropping constraints are: uncertain start of the cropping season, long break in August, frequent dry spells of 5-9 days duration and very low rainfall during November – March. The study shows RWH has an important place in the Nigeria strategy to promote all-season farming. In order to alleviate the August break and extend the cropping season beyond October, systems with storage and supplementary irrigation may be more beneficial than those RWH techniques tested in Tanzania.

An important outcome of the earlier work in Tanzania has been the degree of positive engagement in policy issues. Processes for informing policy discussions on RWH in Nigeria were therefore identified during the stakeholder workshop. A policy paper presenting an overview of the policy environment was delivered as a basis for discussion during a workshop with policy makers, which resulted in a commitment from the state governor to support further RWH demonstration activities.

The project is not concerned with generating new research products; rather it has focussed on communicating findings from previous research in Tanzania. On the basis of stakeholder consultations, radio was selected as the most appropriate medium and a series of broadcasts were designed and delivered in close collaboration with OSADEP. It was found that effective dialogue was constrained by lack of direct knowledge of alternative practices amongst farmers and extension workers. A pilot field study was therefore established at one of the four sample communities. Unfortunately adverse weather conditions affected the trial.

In Tanzania a twin-track approach was adopted in which advocacy and demonstration were equally important activity strands. Initial fieldwork was done in an area where water scarcity was known to be a constraint to dryland cropping. A second focus was added later at a site identified as having pre-existing RWH practices developed by farmers with no external assistance. An important lesson learned from this project is that the success story from Tanzania was an excellent entry point for transfer to Nigeria, but was not sufficient to bring about adoption. RWH innovations are knowledge intensive and require careful adaptation to local circumstances. Passive dissemination will not bring about adoption. An approach which combines advocacy and demonstration activities is proposed. Preliminary analyses supported by a simulation study with the PARCHED-THIRST model will assist targeting interventions.

2   Background

This relatively short-term investigation in Nigeria aimed to contribute to the NRSP goal of *"developing and promoting strategies for improving the livelihoods of poor people living in semi-arid areas through improved integrated management of natural resources under varying tenure regimes"*.

The project was located in Osun State, which experiences a tropical climate with distinct wet and dry seasons. Annual rainfall varies from >1200mm in the rainforest belt to <1000mm in the derived savannah belt. Even in wetter parts, the number of rainy days seldom exceeds 80 and dry spells are common with a particularly pronounced break in August effectively dividing the rainy season into two shorter cropping seasons.

The most important crops are maize, cassava and yam, which are grown by 90%, 70% and 60% of farmers respectively. Rice cropping is ranked fourth overall, but is grown in a more restricted area of the state where about 30% of farmers plant rice. Yields are low, cultivated areas are small and there is abundant evidence of rural poverty. Poor people are dependent on the natural resource base for their livelihoods and the most important cause of poverty is poor utilisation of these resources.

Access to relevant knowledge and technologies is an important contributing factor. Support services within the state were badly affected by government policy during the period 2000-2003, but have now been revived. The project has worked closely with the Osun State Agricultural Development Programme to raise awareness of the scope for improving rainfed agriculture through transferring lessons learned from rainwater harvesting research in Tanzania.

Rainwater harvesting research in Tanzania began in 1992 on the basis of collaboration between the University of Newcastle (UNUT) under project R5170 and Sokoine University of Agriculture (SUA) under project R5752. The research was continued and expanded in a second phase 1996-99 under NRSP funding (R6758). UNUT involvement ended in 2000 following hand-over of the PARCHED-THIRST model to SUA under project R7949, while SUA involvement continued under projects R7888, R8088, R8115 and R8118. This concerted effort over more than ten years resulted in demonstrable impact from the level of individual target households to communities, districts and national level.

Pilot sites in two target areas provided opportunities for local level research, demonstration and uptake promotion through direct engagement with poor farmers. At the same time they provided a foundation for a sustained effort that kept stakeholders at all levels well informed of the research and its findings. The philosophy adopted was that the process of promoting uptake is as important as the knowledge or technologies being promoted. An important lesson from project R7888 was that expected users of outputs from research are more likely to use them if they are made aware of how and why they are being produced.

A multitude of terms is used by different practitioners to describe participatory approaches, which aim at ensuring relevance and impact of agricultural research. These include participatory rural appraisal, farmer participatory research and participatory technology development. These approaches have become institutionalised within the research-extension system in Nigeria, but they retain the essentially linear transfer of technology paradigm and even when successful, they are likely to result in islands of success. Where the experience in Tanzania differs is that a wider focus was adopted, which encompassed stakeholders at all levels from farmers to policy makers.

Two thirds of Nigeria's people are poor; the majority (including 85% of the extreme poor) live in rural areas. Nigeria is ranked third highest in the world in terms of the number of poor people in its population. Indications suggest that poverty in many rural areas is worsening. The Voices of the Rural Poor poverty assessment in 1999 found that increased vulnerability of rural poor is linked to reduced access to markets and declining productivity of the natural resource base. It is widely acknowledged that previous over-reliance on the oil economy has failed to bring about improvements for the rural poor.

Previous NRSP funded research has made a significant contribution to pro-poor sustainable development within Tanzania through demonstrating scope for improving crop production by adopting rainwater harvesting. The aim of this project was to test transferability of research products and processes from Tanzania to Nigeria.

Activities within the scope of this project have been part-funded by DFID/British Council HE Link project Rural Environments and Livelihoods (REAL).

3   Project Purpose

The purpose of this project was to test transferability of RWH research products and processes from Tanzania to Nigeria.

The project aimed to raise awareness amongst key stakeholders of the scope for improving rainfed agriculture through better water management whilst gaining an understanding of key factors affecting uptake and promotion of research findings in Nigeria.

Work was focussed within Osun State (one of 36 states within Nigeria), where participation in national agricultural improvement programmes (FAO Special Food Security Programme, World Bank Fadama II Project and UNDP Women-in Agriculture Programme) provides an entry-point and means for scaling up beyond Osun State.

 It was anticipated that the ultimate beneficiaries would be poor households whose livelihoods are dependent on rainfed agriculture. Both men and women will benefit from increased availability of knowledge and enhanced capacity of research and extension on water management for agriculture in Nigeria.

4   Outputs

4.1 An inception phase delivered an Inception Report (Annex B) detailing the stakeholder analysis and initial communication plan. This was informed by interactions with the SUA research team in Tanzania (Annex C). Consultations with stakeholders aimed at identifying knowledge gaps in Nigeria (Annex D). A plan for subsequent follow up analysis and communication activities was agreed with stakeholders (Annex E).

Key stakeholders were identified as Osun State Agricultural Development Programme (OSADEP) and news media. It was clearly indicated that there are certain circumstances of RWH interventions, which tend to differ from technology packages (seed / fertilizer / pesticides) because they are (a) knowledge intensive and (b) easily divisible. It is not simply a matter of communicating a standard package of inputs, but requires more careful problem analysis by the individual farmer to decide what to do. There is no single recognizable "improved practice". The farmer may decide to adapt current practice and move part of the way towards the improved RWH practice.

4.2 On the basis of a detailed systems analysis of constraints faced by rice and maize farmers at the study site, potential for adoption of RWH research findings by the target group was evaluated. Available data on soils and rainfall were analysed to establish the frequency and severity of dry spells (Annex F). A simulation study using PARCHED-THIRST software with this data provided an initial assessment of the likely benefit of rainwater harvesting (Annex G). Economic analysis (Annex H) and market chain analysis (Annex I) were undertaken in order to help identify constraints to adoption. Primary data collection in four sample communities using PRA techniques (Annex J) was undertaken to complement the analyses based on secondary data.

The dry season extends from November to March. Dry spells of 5-9 days duration occur throughout the wet season and represent an increasing constraint towards the north of Osun State and further north into the savannah zone. The rainy season is effectively split by a period of low rainfall in August when dry spells longer than 15 days are common. There is evidence of climatic variation such that the start of the rainy season is later than pre-1970. Cropping constraints can be summarized as follows:

- Uncertain start of the cropping season (effectively shifted from March to April)

- Long break in August

- Frequent dry spells of 5-9 days duration

- Very low rainfall during November – March

The simulation study shows RWH benefits for maize, but in order to alleviate the August break and extend the cropping season beyond October systems with storage and supplementary irrigation may be more beneficial.

4.3   An important outcome of the earlier work in Tanzania has been the degree of positive engagement in policy issues. Processes for informing policy discussions on RWH in Nigeria were therefore identified during the stakeholder workshop. A policy paper presenting an overview of the policy environment was prepared (Annex K) as a basis for discussion during a workshop with policy makers (Annex L), which resulted in a commitment from the state governor to support further RWH demonstration activities.

The broad development policy context is expressed in the National Economic Empowerment and Development Strategy (NEEDS) which recognizes that in order to achieve the target of 7% growth within a pro-poor agenda it will be necessary to prioritise productivity gains in the agriculture sector. Within Nigeria's Agriculture Policy (2001) a key objective is identified as the promotion of all-season farming and the role of RWH is recognized alongside fadama agriculture and small dams. The Water Policy (2004) does not make explicit reference to RWH, but recognizes the need to shift away from the previous emphasis on water resource development towards proper conservation and management of resources. Workshop participants agreed that an integrated approach to land and water management is required and recognized a role for RWH as part of this strategy.

4.4   The project has sought to raise awareness of RWH potential amongst primary and secondary stakeholders through a combination of advocacy and demonstration activities in close collaboration with OSADEP. In order to assess attitudes of stakeholders to any agricultural innovation it is essential that they first understand what is being proposed and this is best achieved through demonstration. A pilot field study was therefore established at one site (Mafikuyomi village) as a focus for engagement with farmers (Annex O) and a training workshop was arranged with extension workers (Annex M).

A short-term RWH demonstration was established at Mafikuyomi Village in order to :
- provide a means for monitoring the response of maize and okra to different RWH treatments and hence inform choice of appropriate RWH technology;
- provide a platform for field training and extension;
- create an opportunity for stakeholders to review research findings.

Work on the pilot demonstration plot commenced in June 2005. Based on the Tanzanian experience, the demonstration consisted of two separate plots; one for micro-catchment and the other for macro-catchment RWH systems. Unfortunately, the cropping season suffered poor rainfall with an exceptionally long August break. Consequently the trial was unsuccessful and could not be used as a means to foster direct stakeholder engagement. Output 4 therefore could not be fully delivered within the timeframe of the project but the OAU research team is committed to continuing the trial in the 2006 cropping season.

Radio was adopted as the medium for communication through three types of activity: short jingles were used to generate interest followed by a weekly series of technical talks and a participatory phone-in programme. Farmer groups were established in the four sample villages and provided with bush radios by OSADEP. These groups were monitored regularly and feed-back from them was used in subsequent broadcasts. Letters and calls received for the phone-in programme were comparable to those for others on malaria and road safety that were broadcast in the same slot. A survey across Osun State (Annex N) indicated that >70% of respondents had listened to the radio talks with 30% having listened more than 5 times and 37% had listened to the phone-in programme.

5 Research Activities

The inception phase began with a workshop involving the research team from UNUT and OAU in which the achievements and highlights of NRSP research in Tanzania were reviewed and project methodology was agreed. A collaborator from Tanzania participated and provided briefings on the SUA experience with the research process. This phase included identification of case study sites within Osun State and preliminary engagement with primary stakeholders. A member of the research team then visited Tanzania to review current RWH work undertaken by SUA and collaborators in project target areas, to become familiar with RWH practices adopted by farmers within these target areas, to discuss with SUA staff and stakeholders their experiences with RWH promotion/communication with a view to helping with championing of work in Nigeria. This experience was then fed into a stakeholder workshop which was convened in Ife during early June 2004.

In order to evaluate the transferability of RWH research findings, key constraints were investigated as parallel activity strands focussed on (i) technical (ii) economic and (iii) socio-cultural issues. Technical appraisal was supported by simulation analysis using the PARCHED-THIRST model. Other aspects of the investigation were addressed largely through participatory appraisal. The full market chain was examined, taking account of possible post-harvest processing, storage and distribution constraints. Issues of resource access and use rights were explored with a view to mobilising community participation and identifying scope for policy interventions through local government and service delivery agencies (such as OSADEP). Consideration was given to the needs/attitudes of contrasting target groups (ie. men/women, old/young, poor/less-poor). Engagement with primary stakeholders was focussed in four sample communities.

The project is not concerned with generating new research products; rather it has focussed on communicating findings from previous research in Tanzania. The decision on communication materials and methods to be used was influenced by understanding developed through stakeholder consultations. Communication activities aimed to generate awareness of possibilities for improving crop production through improved soil-water management. Radio was selected as the most appropriate medium and a series of broadcasts were designed and delivered in close collaboration with OSADEP. It was found that effective dialogue was constrained by lack of direct knowledge of alternative practices amongst farmers and extension workers. A pilot field study was therefore established at one of the four target communities previously surveyed as a demonstration of RWH techniques and as a means of focussing stakeholder engagement. A training workshop for 23 extension workers took place in December 2004.

Processes for informing policy discussions on RWH in Nigeria were identified during the stakeholder workshop. A policy paper presenting an overview of the policy environment was prepared as a basis for discussion during a follow-up workshop with policy makers which took place in June 2005.

6 Environmental assessment

6.1 What significant environmental impacts resulted from the research activities (both positive and negative)?

Direct impact of research activities was minimal. A small-scale field demonstration took place on one site for one season.

6.2 What will be the potentially significant environmental impacts (both positive and negative) of widespread dissemination and application of research findings?

Widespread dissemination and adoption of RWH techniques will permit intensification of crop production. While this carries a risk of negative environmental impact, there is evidence from elsewhere in Nigeria (Kano close-settled zone) and from Kenya (Machakos district) that sustainable intensification can be achieved through improved land management. This risk must be set against the greater risk of negative impact through encroachment of agriculture into new areas.

Additional risks include possible health impact of water storage ponds (eg. mosquitoes) and possible land-use conflict between farmers and pastoralists.

6.3 Has there been evidence during the project's life of what is described in Section 6.2 and how were these impacts detected and monitored?

The project duration was too short to detect any impact.

6.4 What follow up action, if any, is recommended?

Given that RWH work in Tanzania has been in progress for 10 years it would be advisable to begin environmental impact assessment there and transfer any lessons learned to Nigeria.

7 Contribution of Outputs

7.1 NRSP Purpose and Production System Output

This project has sought to contribute to the NRSP purpose: 'to deliver new knowledge that enables poor people who are largely dependent on the NR base to improve their livelihoods'. The specific resources being targeted are land and water with the intention of increasing productivity of rainfed agriculture through RWH innovations. The project was not concerned directly with generating new research products; rather it focussed on communicating findings from previous research in Tanzania. The contribution made here therefore was to establish the transferability of the outcomes and processes under different circumstances.

The response amongst stakeholders in Osun State was positive and the policy environment is conducive to successful transfer of experience from Tanzania. The state agricultural support service (OSADEP) was an active participant and is willing to take on the responsibility for promoting RWH. Extension staff gained new knowledge through participation in training activities and communication activities. Policy level discussion achieved agreement that an integrated approach to land and water management is required and recognized a role for RWH as part of this strategy. At present it is doubtful that

OSADEP has the capacity to implement such a policy effectively. However, a measure of impact is the commitment from the state governor to support further RWH demonstration activities.

The relevant NRSP production system output is: 'to develop and promote strategies for improving the livelihoods of poor people living in semi-arid areas through improved integrated management of natural resources'. This project has sought to promote the RWH strategy previously developed through research in Tanzania. Its novelty lies in its attempt to understand the realities of up-scaling and transfer of NR management research findings and project outputs should be seen as providing a means towards this end.

Output 1 provided an entry-point for the project. It was found that the success story elsewhere in Africa was an excellent entry point for engagement with stakeholders at all levels. The South-South collaboration between partners in Tanzania and Nigeria was effective.

Output 2 sought to evaluate the potential for adoption by target beneficiaries through a number of activities analyzing different aspects of the production system. Such studies are inevitably somewhat speculative in that they seek to evaluate the potential for adoption of an innovation. Nevertheless, the nature and extent of the moisture constraint in dryland cropping was usefully explored through a combination of dry spell analysis and cropping system simulation using the PARCHED-THIRST model. Such analysis provides an excellent basis for targeting interventions and should be seen as the first stage in transfer of findings to a new target area.

Output 3 sought to replicate the Tanzanian experience of early engagement with policy makers. The entry point of a success story elsewhere in Africa and participation by the SUA research team leader stimulated interest and engagement with key institutions, but it was found that advocacy alone was not sufficient. There is an important lesson here in that, despite demonstrable success in Tanzania, passive dissemination is unlikely to stimulate adoption elsewhere. There is a need for advocacy to be supported by demonstration within the new target country.

Output 4 sought to extend the opportunity for stakeholders to evaluate RWH innovation and thereby for the project to assess their attitudes and the likelihood of adoption. Radio was found to be an effective medium of communication with target beneficiaries which stimulated interest. However, RWH innovations are knowledge intensive and require careful adaptation to local circumstances. Unfortunately, this short-term project was unable to deliver a successful demonstration, but this disappointment does not negate the conclusion that successful transfer requires capacity building and demonstration activities.

7.2   Impact of outputs

The intermediate target institutions in Osun State were the state ministries with responsibility for water resources, agriculture and rural development. They were represented in the policy workshop convened as part of the project and recognized the need for a more integrated approach to land and water development. Adoption by these target institutions is seen in commitment of the state governor to support three further RWH demonstration sites.

The project has built upon existing capacity within Obafemi Awolowo University for interdisciplinary research and promoted closer engagement with agricultural support services (OSADEP). South-South linkages with SUA, Tanzania have also been established. Staff within the research team and collaborators in OSADEP have gained experience in

participatory research methods.

Close and continuing dialogue with farmers as part of the communication process has strengthened capacity to operate in responsive rather than didactic mode. However, it is apparent that the research-extension system in Nigeria still follows the essentially linear transfer of technology paradigm. Also it is apparent that the relationship between farmers and support services is problematic. There is a need for capacity building which was beyond the scope of this short-term project.

Whilst there is reason to believe that the project did achieve demonstrable impact with partners and stakeholders, the main achievement was in developing practice for transfer of NR management research findings which has relevance beyond the project itself. Passive dissemination - whereby research results are reported, guidelines are produced and would-be adopters are left to pick them up – is not likely to be successful. Experience in Tanzania and Nigeria indicates that an effective strategy involves the following:

(i)   problem analysis and selection of suitable transfer sites through a combination of rainfall reliability and dry-spell analysis with a simulation study using the PARCHED-THIRST model;

(ii)   investigation of pre-existing water harvesting and conservation practices within the country to provide local context on which to build advocacy activities;

(iii)   advocacy/dissemination/communication activities direct to target users via radio and participatory community-level engagement together with capacity building amongst target institutions;

(iv)   demonstration of improved RWH techniques within the target area to provide a focus for participatory evaluation and capacity building.

7.3   Uptake Promotion

Following the experience gained in Tanzania, the promotion pathway adopted for engagement with target institutions involved two-way dialogue which was facilitated by a stakeholder workshop held early in the project. Close collaboration with the key institution (OSADEP) was then maintained in developing and delivering the communication plan and in direct contacts with target beneficiaries.

The communication plan was devised as the mechanism to reach target beneficiaries with radio as the chosen medium. Direct engagement with four selected sample communities provide a means to monitor responses to radio programmes, whilst also providing insight into knowledge, attitudes and practices of target farmers.

The project was successful in stimulating interest in RWH within the target area, but was not designed to strengthen local capacity to respond to the demand for assistance with screening and implementing appropriate improvements. There is a need for follow-up to strengthen the knowledge base within agricultural support services (OSADEP).

Osun State was selected pragmatically as the location for this project, but receives higher rainfall than RWH target sites in Tanzania and extension of uptake promotion and demonstration activities into the savannah zone is more likely to result in demonstrable success.

8 Publications and other communication materials

8.1 Books and book chapters
Author or Authors, Initial. Year. *Title.* Publisher. XXpp. (Page numbers)

8.2 Journal articles

8.2.1 Peer reviewed and published
Author or Authors, Initial. Year. *Title.* Publisher/Journal. XXpp. (Page numbers)

8.2.2 Pending publication (in press)
Author or Authors, Initial. Year. *Title.* Publisher/Journal submitted to. XXpp. (Page numbers)

8.2.3 Drafted
Author or Authors, Initial. Year. *Title.* Institution. XXpp. (Page numbers)

8.3 Institutional Report Series
Author or Authors, Initial. Year. *Title.* Publisher/Institution. XXpp. (Page numbers)

8.4 Symposium, conference and workshop papers and posters
Faborode, M. O. et al 2004. *Best practices in research-extension - farmer linkages for rainwater harvesting: the Nigerian experience.* Workshop on restoration of African farm and range lands through integrative soil, water, nutrient and biota measures: a comparison of approaches and adoption experiences indifferent dryland regions of sub-Saharan Africa. Ile-Ife, Nigeria: Obafemi Awolowo University XXpp. (Page numbers)

Taiwo, K.A. and Faborode, M.O. 2005. *Transfer of rainwater harvesting technology: gender roles in the adopting community.* East Africa Integrated River Basin Conference Morogoro, Tanzania: Sokoine University XXpp. (Page numbers)

8.5 Newsletter articles
Taiwo, K. 2004. *Rainwater harvesting project.* Ile-Ife, Nigeria: Obafemi Awolowo University 3pp.

8.6 Academic theses
Shorrock, K 2005. *Farmer knowledge attitudes and practices and the transfer of technology* Unpublished MSc dissertation, University of Newcastle upon Tyne 102pp

8.7 Extension leaflets, brochures, policy briefs and posters
Author or Authors, Initial. Year. *Title.* Publisher/Institution. XXpp. (Page numbers)

8.8 Manuals and guidelines
Author or Authors, Initial. Year. *Title.* Publisher/Institution. XXpp. (Page numbers)

8.9 Media presentations (videos, web sites, TV, radio, interviews etc)

Faborode, M.O. 2004. *Rainwater harvesting technology: Creating awareness* Ile-Ife, Nigeria: Nigerian Television Authority Video

Faborode, M.O., Farinde, A.J., Adekalu, K.O. and Onifade, J. 2005 *Rainwater harvesting technology: technical demonstration, farmers participation and adoption* Ile-Ife, Nigeria: Nigerian Television Authority Documentary video

Faborode, M.O., Farinde, A.J., Adekalu, K.O. and Onifade, J 2005 *Rainwater harvesting technology: taming the erosion monster for better environment and harvest* Ile-Ife, Nigeria: Nigerian Television Authority Interview video

Faborode, M.O., Farinde, A.J., Adekalu, K.O. and Anwo, A. 2005 *Rainwater harvesting technology:harnessing rainfall for farmers' prosperity.* Ile-Ife, Nigeria: Osun State Radio Corporation Cassette

Faborode, M.O., Farinde, A.J., Adekalu, K.O. and Anwo, A. 2005 *Rainwater harvesting technology:the people's verdict on Eroya radio phone-in programme* Ile-Ife, Nigeria: Osun State radio Corporation Cassette

Faborode, M.O. 2005 *Radio interview on rainwater harvesting technology: motivation, justification and potential benefits* Ile-Ife, Nigeria: Osun State Radio Corporation Cassette

8.10 Reports and data records

8.10.1 Project technical reports including project internal workshop papers and proceedings

Faborode, M.O. and Gowing, J.W. 2004. *Needs assessment and uptake promotion of RWH research in Nigeria: project inception report.* University of Newcastle upon Tyne. 10pp.

Adekalu, K. 2004 *Report on a visit toTtanzania* Ile-Ife, Nigeria: Obafemi Awolowo University 6pp.

Faborode, M.O. et al. 2004. *Needs assessment and uptake promotion of RWH research in Nigeria: Proceedings of Stakeholder Workshop.* Ile-Ife, Nigeria: Obafemi Awolowo University. 39pp.

Farinde, A.J. 2004. *Needs assessment and uptake promotion of RWH research in Nigeria: communication plan* Ile-Ife, Nigeria: Obafemi Awolowo University. 20pp.

Osunbitan, J.A. and Adekalu, K. 2005 *Rainfall, soil and hydrological chareterisstics of the study area* Ile-Ife, Nigeria: Obafemi Awolowo University. 22pp.

Okunade, D. and Osunbitan, J.A. 2005. *Simulation study report.* Ile-Ife, Nigeria: Obafemi Awolowo University. 10pp.

Osotimehin, K. 2005. *The economic and financial potential of RWH at the project sites* Ile-Ife, Nigeria: Obafemi Awolowo University. 13pp.

Osotimehin, K. 2005. *Market chain analysis for rice and okra.* Ile-Ife, Nigeria: Obafemi Awolowo University. 46pp.

Farinde, A.J. et al 2004. *Participatory rural appraisal in target communities. Part 1:knowledge, attitudes & practices* Ile-Ife, Nigeria: Obafemi Awolowo University. 42pp.

Adekalu, K. et al 2004 *Participatory rural appraisal in target communities. Part 2: Environment and resources* Ile-Ife, Nigeria: Obafemi Awolowo University. 22pp.

Faborode, M.O. 2005 *Policy briefing paper on Rainwater Harvesting in Nigeria* Ile-Ife, Nigeria: Obafemi Awolowo University. 44pp.

Faborode M.O. et al 2005 *Needs assessment and uptake promotion of RWH research in Nigeria: Proceedings of policy workshop* Ile-Ife, Nigeria: Obafemi Awolowo University. 4pp.

Farinde, A.J. 2005. *Comprehensive Evaluation of the Communication Plan – Radio Programmes* Ile-Ife, Nigeria: Obafemi Awolowo University. 5pp.

8.10.2 Literature reviews

Author or Authors, Initial. Year. *Title.* Publisher/Institution. XXpp. (Page numbers)

8.10.3 Scoping studies

Author or Authors, Initial. Year. *Title.* Publisher/Institution. XXpp. (Page numbers)

8.10.4 Datasets

Author or Authors, Initial. Year. *Title.* Publisher/Institution. Format.

8.10.5 Project web site, and/or other project related web addresses

Web site address

Web site address

9   References cited in the report

Adams, W.M. (1990) Green Development: environment and sustainability in the third world. London: Routledge. 257pp

Adekunle, A., Onyibe, J., Ogunyinka, O., Omenesa, Z., Auta, S., Kuyello, A. (2004) Agricultural information dissemination: an audience survey in Kano state. International Institute for Tropical Agriculture (IITA), Ibadan, Nigeria.

Davis J.T. (1987) Agricultural development projects in Nigeria: experiments in induced diffusion. *The Canadian Geographer* 31 (2):127-139.

Fakorede, M.A.B. and Akinyemiju, O.A. (2003) Climatic change: effects on maize production in a tropical rainforest location. In: Fakorede, M.A.B., Badu-Apraku, B., Kamara, A.Y., Menkir, A., Ajala, S.O. (eds) Maize revolution in West and Central Africa. International Institute for Tropical Agriculture (IITA), Ibadan, Nigeria.

Kolawole, A. and Adewumi, J.K. (2001) Water harvesting in various farming systems in Nigeria. In: Water harvesting in western and central Africa, proceedings of a regional workshop held in Niamey, October 1999. FAO Regional Office for Africa.

Osunade, M.A.A. (1992) Identification of crop soils by small farmers of south west Nigeria. *Journal of Environmental Management* 35(3): 193-203.

Phillips-Howard, K. (1996) The rapid evolution of small-basin irrigation on the Jos plateau, Nigeria. In: Reij et al (op cit): 213-218.

Reij, C., Scoones, I., Toulmin, C. (1996) Sustaining the soil: indigenous soil and water conservation in Africa. London, Earthscan Publications. 260pp.

Shorrock, K. (2005) Farmer knowledge, attitudes and practices and the transfer of technology. Unpublished MSc dissertation, University of Newcastle. 102pp.

Sumberg, J. and Okali, C. (1997) Farmer experiments: creating local knowledge. London: Lynne Rienner Publications.

10   Project logframe

Narrative summary	Objectively verifiable indicators	Means of verification	Important assumptions
Goal			
1. Strategies for improving the livelihoods of poor people living in semi-arid areas, through improved integrated management of natural resources, under varying tenure regimes, developed and promoted	By 2005, strategies for improving the livelihoods of poor people, by increasing the productivity of water in rainfed agriculture, through the use of appropriate rainwater harvesting and/or soil nutrient management practices, developed and promoted in target areas in at least two target countries	Reviews by NRSP management Reports of research team and collaborating /target institutions Appropriate communication materials Local, national and international statistical data	Target beneficiaries adopt and use strategies and/or approaches Enabling environment exists Budgets and programmes of target institutions are sufficient and well managed
Purpose			
Potential for transfer of RWH research experience (outcomes and process) from Tanzania to Nigeria assessed.	Target institutions in Nigeria recognise scope for adoption of RWH research findings and define plan for follow-up activity in at least one target area by June 2005.	Reports of target institutions	Target institutions willing and able to act on findings
Outputs			
1. Knowledge gaps identified and interim communication strategy agreed.	By end of May 2004, stakeholder analysis and communication plan for case study site delivered.	Inception report	Experience in Osun State seen as having wider relevance in Nigeria
2. Constraints to uptake of RWH findings identified and potential for adoption evaluated.	By mid-February 2005, briefing paper on adoption/uptake constraints prepared and evaluated by stakeholders.	Briefing papers and workshop report	Technical and social constraints do not negate value of RWH interventions
3. Processes for informing policy discussion on RWH identified and target institutions engaged.	By end March 2005, policy briefs prepared and evaluated by target institutions.	Briefing papers and workshop report	Experience in Osun State seen as having wider relevance in Nigeria
4. Stakeholders assess RWH potential through evaluation of pilot field study	By mid September 2005, pilot field study completed and evaluated by stakeholders.	Briefing papers and workshop report	Success of field trials not affected by uncontrolled factors

Activities	Milestones (and budget if calculated by Activity)	
Output 1: Knowledge gaps identified and interim communication strategy agreed		
1.1 Review achievements and highlights of Tanzanian project and develop project methodology.	MS1a Project commences April 2004 with inception workshop. MS1b Team member from OAU visits SUA research sites in Tanzania in May 2004.	Stakeholders willing to collaborate
1.2 Identify knowledge gaps with stakeholders.	MS1c Stakeholder workshop completed by end of May 2004	Stakeholders willing to collaborate
1.3 Prepare interim Communication Plan for RWH in Osun State	MS1d Interim plan evaluated at stakeholder workshop at end of May 2004	Stakeholders agree with proposed plan
Output 2: Constraints to uptake of RWH findings identified and potential for adoption evaluated.		
2.1 Assess rainfall, soil and hydrological characteristics of the project area.	MS2a Data compiled and analysed by end January 2005	Access to available data will not be withheld.
2.2 Simulation study and consultation on PARCHED-THIRST decision tool.	MS2b Simulation study completed by end September 2005.	Stakeholders willing to collaborate with evaluation
2.3 Economic analysis of the arable crop production system in South-west Nigeria.	MS2c Data compiled and economic analysis completed by December 2004.	Access to available data will not be withheld.
2.4 Market chain analysis for rice and maize, including post harvest processing, storage and distribution constraints.	MS2d Data compiled and market chain analysis completed by December 2004.	Access to available data will not be withheld.
2.5 Participatory appraisal in selected communities to evaluate KAP of primary stakeholders.	MS2e Participatory appraisal completed and KAP of primary stakeholders evaluated by end September 2004.	Local communities and other stakeholders willing to cooperate
Output 3: Processes for informing policy discussion on RWH identified and target institutions engaged.		
3.1 Evaluate KAP of intermediary stake-holders.	MS3a Report on KAP of stakeholders completed by September 2004.	Stakeholders willing to cooperate

3.2 Inform and engage policy makers on scope for RWH adoption	MS3b Overview of policy environment and briefing paper completed by March 2005. MS3c Workshop on policy issues in Ife by March 2005.	Senior staff from key stakeholder institutions will be available
3.3 Promote farmer-agent dialogue on transferability.	MS3d Training workshop on RWH for extension agents completed by December 2004. MS3e RWH promotion through various extension media completed and evaluated by stakeholders by March 2005.	Stakeholders willing to cooperate
Output 4: Stakeholders assess RWH potential through evaluation of pilot field study		
4.1 Pilot field study established in one community by April 2005	MS4a Design completed by March 2005 and installed by April 2005	Local community willing to cooperate
4.2 Pilot RWH trials monitored for one season	MS4b Interim participatory evaluation during May 2005 and final participatory evaluation during September 2005.	Local community willing to cooperate
4.3 Field training and extension	MS4c RWH demonstration and extension completed and evaluated by stakeholders by September 2005	Uncontrolled factors do not affect field trials adversely
4.4 Stakeholders review research findings and evaluate outcomes.	MS4d Stakeholder workshop held in Ife September 2005	Stakeholders willing to cooperate
	Pre-condition	SUA project team willing and able to cooperate

11   Keywords

rainwater harvesting, communication, uptake, Nigeria, semi-arid