Fair shares for all from the common pool

RIU

Validated RNRRS Output.

Common pool resources (CPR) management systems must prioritise the needs of the poor. A knowledge base in Tanzania seeks to do just that by identifying aspects of institutional, regulatory and tenure systems for equitable access to runoff and related CPR in rainwater harvesting (RWH) systems. It includes information on agreed arrangements for tenure and management of CPR in target areas and guidelines for use by District Councils, wards, villages and communities in making CPR management plans. These plans therefore protect the interests of the poor while ensuring optimum and sustainable benefits to the communities using RWH systems. The knowledge base is in use by village communities, water users, District Councils and NGOs in the target areas of Tanzania.

Project Ref: **NRSP14:**
Topic: **4. Better Water Harvesting, Catchment Management & Environments**
Lead Organisation: **Sokoine University of Agriculture, Tanzania**
Source: **Natural Resources Systems Programme**

Document Contents:

Description

NRSP14

Research into Use
NR International
Park House
Bradbourne Lane
Aylesford
Kent
ME20 6SN
UK

Geographical regions included:

Tanzania,

Target Audiences for this content:

Crop farmers, Livestock farmers, Fishers, Forest-dependent poor,

A. Description of the research output(s)

1. Working title of output or cluster of outputs.

Rainwater harvesting and management of Common Pool Resources

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

Natural Resources Systems Programme and Government of Tanzania

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

Relevant R number is R8116

Institutional Partners and contact persons included:

- Ministry of Agriculture, Food Security and Cooperatives (Ms. Mary Shetto)
- University of Dar es Salaam (Prof. Bertha Koda)
- Agricultural Research Institute-Ukiriguru, Mwanza (Mr. Geophrey Kajiru)
- ASARECA - Soil-Water Management Research Network (Prof. Nuhu Hatibu)
- University of Nottingham, UK, (Sayeed Azam- Ali, Sarah L. Jewitt and Robin Burges)

*4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? **(max. 400 words)**. This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.*

The RNRRS output or clusters of outputs are Rainwater harvesting and Scaling up through uptake promotion.

The project sought to identify aspects of **institutional**, **regulatory** and **tenure** systems requiring improvement in order to enhance the capacity of stakeholders to plan, negotiate and implement **common pool resources** (CPR) management systems in ways that prioritise the needs of the poor. The outputs were: (i) Knowledge base on: institutional and regulatory systems for equitable access to **runoff** and related CPRs in **rainwater harvesting** (RWH) systems; mechanisms for CPR management; description of groups of the poor using both local indicators and generic definition; effects of **transaction costs** on the implementation and performance of CPR management mechanisms; (ii) Document on agreed arrangements for tenure and management of CPR in target areas; (iii) Guidelines for use by District Councils, wards, villages and communities in making CPR management plans that protect the interest of the poor while ensuring optimum and sustainable benefits to the communities using rainwater harvesting systems; (iv) **Communication products** for enhancing the capacity of stakeholders to plan,

negotiate and implement/enforce institutional, regulatory and management systems for CPR, in ways that protect the interests of the poor. These activities were conducted between 2002 and 2005.

5. What is the type of output(s) being described here?
Please tick one or more of the following options.

Product	***Technology***	***Service***	***Process or Methodology***	***Policy***	***Other Please specify***
x			*x*	*x*	

6. What is the main commodity (ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment

The outputs focused on the following main commodities: Maize, rice, lablab, vegetables (onions, tomatoes, water melons, cabbage) and livestock. These outputs could also be applied to other commodities such as tree planting, domestic water use, aquaculture, and brick making and construction.

7. What production system(s) does/could the output(s) focus upon?
Please tick one or more of the following options. Leave blank if not applicable

Semi-Arid	***High potential***	***Hillsides***	***Forest-Agriculture***	***Peri-urban***	***Land water***	***Tropical moist forest***	***Cross-cutting***
x							

8. What farming system(s) does the output(s) focus upon?
Please tick one or more of the following options (see Annex B for definitions).
Leave blank if not applicable

Smallholder rainfed humid	***Irrigated***	***Wetland rice based***	***Smallholder rainfed highland***	***Smallholder rainfed dry/cold***	***Dualistic***	***Coastal artisanal fishing***
			x	*x*		

*9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).*

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

Value would be added by incorporating outputs from RNRRS projects R8115 and R8381, and non RNRRS from SWMnet project ASA/CGS-SWMnet RP-04-01 titled “Market Oriented Approaches for Integrated Management of Soil-Water and Nutrients for Crops in East and Central Africa: Managing Nutrient and Water together in Response to Markets”. This is because Low soil fertility is recognised as the next most critical constraint to increased food production and farm incomes in semi arid areas once the water constraint is removed.

Furthermore, poor smallholder farmers are yet to benefit from opportunities created by liberalized markets for agricultural products.

The outputs from R8115 included: (i) a database of spatial and temporal variations in soil fertility patterns and management strategies in GIS; and (ii) communication products on improved strategies for integrated soil and plant nutrient management tailored to specific categories of RWH users, including extension agents and other farmers' support agents.

Outputs from R8381 included: (i) A knowledge base on barriers and constraints limiting uptake promotion; (ii) Communication and Uptake Promotion strategies for impact of research for development in soil and water management; (iii) Training manual for skills development in communication planning and uptake promotion.

From SWMnet project ASA/CGS-SWMnet RP-04-01, the outputs were: (i) knowledge base of effective and social economically best-bet options for integrating the management of soil water and nutrients in response to markets by smallholder farmers; (ii) Effective scaling-up to promote uptake and utilisation of the social economically best-bet integrated interventions in soil water and nutrients.

These outputs could be clustered with outputs from R7304 and R8280

Validation

B. Validation of the research output(s)

*10**. How** were the output(s) validated and **who** validated them?*

*Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc... This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation **(max. 500 words)**.*

The knowledge base (on the local institutions and regulatory systems for equitable access to runoff and related CPRs, transaction costs in managing CPR; and constraints faced by communities) was used by the communities to form and strengthen water users groups to ensure equitable distribution of water resources among different stakeholder groups. Key stakeholders (especially the relatively poor and politically weak) are currently adequately represented in planning committees compared to baseline levels of 2002. A M&E study conducted in 2005 indicated an increase of 11% of women and 102% of youths in institutions for CPR management. Stakeholders in the project villages have realised the need to review and change their tenure and management approaches. For example, in Tae (Western Pare Lowlands), during dry season, villagers have agreed to cultivate close to each other in order to reduce water losses. Furthermore, improved management of water during the dry season enabled farmers to cultivate high value crops like onions, water melons and tomatoes that increased their incomes to US $ 2583 per hectare of onions compared to maize, US $ 379 per ha and hence contributed to better

poverty reduction.

A planning guideline, in form of matrix, was used in dialogues among communities along the toposequence of the Makanya River catchment to address the problems of water resources distribution and management. The matrix was found to be a useful dialogue tool to guide the process of defining an effective strategy for the development of the catchment. The dialogue involved stakeholders from the Ministry of Agriculture Food Security and Cooperatives (MAFSC), including the Minister Ministry of Works; Pangani Basin Water Office, Members of Parliament; Researchers, District Councils, Extension subject matter specialists, NGO staff (MIFIPRO, SAIPRO and VECO) and the communities. The dialogue process enhanced the capacity of different stakeholders groups including women and youths to plan, negotiate and implement institutional, regulatory and management systems for CPRs, in ways that protected the interests of the poor.

The knowledge sharing products developed and used by different stakeholders enabled planners and policy makers at district and national level to link plans and programmes for CPR management with the requirements of national policies, strategies and legislation. District Agricultural Development Programs (DADPs) are now containing ex-ante analysis and economic benefits to justify programme activities in RWH. There is also a commitment by the Government and its partners to support investment in RWH.

*11. **Where and when** have the output(s) been validated?*

*Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above **(max 300 words)**.*

The outputs have been validated in Tanzania in Maswa District, Shinyanga region and Western Pare Lowlands (WPLL) in Kilimanjaro region. The validation was implemented between 2002 and 2005. The targeted groups were mainly poor smallholder farmers including men, women and youths. The production systems fall under semi arid category and the farming systems fall under smallholder rainfed highland and smallholder rainfed dry/cold categories.

In the WPLL the dominant farming systems are Coffee-Banana-Horticulture, maize-legume-vegetables, maize-legume, Maize – Livestock and Livestock - Fishing – Rice. Coffee-Banana-Horticulture is practiced in the highlands. Tree crops are grown on permanent plots within a highly intensive land use structure. Maize-legume-vegetable farming system is practised in the upper and middle slope areas; main crops being maize, lablab, vegetables, beans, bananas, sugar cane, cassava and sweet potatoes. Vegetables, especially onions, are the main cash earner to the farmers. Maize-Legumes is practised in both the highlands and lowlands, where maize and beans are grown. In the maize–livestock and livestock-fishing–rice systems, the main crops are maize, cowpeas, lablab and to a smaller extent beans and pumpkins. Few farmers practice conventional irrigation for rice production using water from the Pangani River. Livestock kept include cattle, goats, sheep and chicken. Fishing is another important enterprise for both domestic and commercial purposes.

In Maswa District, the dominant farming systems include sorghum-livestock-millet, sorghum-livestock-rice, sorghum-rice, rice, and maize-legume. Sorghum production is the most important enterprise in this system followed by livestock production. However, sorghum and millet are the dominant crops. In the sorghum-livestock-

rice system, crop production is the main preoccupation. The rice farming system is dominated by cultivation of rice under bunded rice fields locally called *majaluba.* In the maize-legume system, crops grown include maize, cowpeas, groundnuts and pigeon peas, sometimes grown in mixed or sole cropping.

Current Situation

C. Current situation

12. ***How and by whom*** *are the outputs currently being used? Please give a brief description* ***(max. 250 words****).*

- Village Communities and Water Users Groups in target districts are using the knowledge base in the on-going processes of reforming composition of membership in institutions formed to manage CPR. Hitherto, most water users groups were male dominated and youth were rarely represented.
- District Councils are now incorporating ex-ante analysis and economic benefits to justify programme activities in RWH in the District Agricultural Development Programs (DADPs).
- There is Commitment by the government and its partners including NGOs (such as MIFIPRO, SAIPRO, VECO, World Vision, and CARITAS) in supporting investment in RWH. For example, under the Agricultural Sector Development Programme under the Ministry of Agriculture, Food Security and Cooperatives, more emphasis is given to investment in RWH to improve rainfed production systems as an effort towards increasing productivity. Other development projects and programmes like the Participatory Agricultural Development and Empowerment Project (PADEP), UNDP in Rombo district; Water, Health and Education sectors are also promoting use of RWH to address problems of water shortage for both livestock and domestic use.

- The Planning guidelines and communication products are being used by village governments in making plans to ensure equitable use of CPRs in rainwater harvesting systems. For example, land use and land suitability maps are being used by target villages to depict current distribution of CPRs. In addition, the maps are being used by other research projects such as Water Research Fund for Southern Africa, Smallholder Systems Innovations, and the Challenge Programme for Water and Food.

13. ***Where*** *are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used* ***(max. 250 words).***

The outputs are currently being used mainly in Tanzania in targeted districts (Maswa, Same and Mwanga) and beyond (Mbeya, Njombe, Hai, Rombo, Handeni, Singida, Kwimba, Shinyanga, Bariadi and Misungwi).

14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading ***(max 250 words).***

The current use ranges between 30-40% for the whole country. This is a result of the benefits of RWH evident in pilot areas. Scaling-up efforts by researchers through back-stopping as resource persons in various workshops

and seminars has helped in spreading the RWH packages beyond target areas. Interaction with policy makers and planners at ministerial levels has led to increased awareness of the potential of RWH in improving livelihoods. As a consequence, the support from the government to promote RWH has increased substantially.

15. In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? ***(max 350 words).***

The programmes, platforms, policy and institutional structures that have assisted with the promotion and/or adoption of the outputs include:

Programmes: Agricultural Sector Development Strategy (ASDS), Agricultural Sector Development Programme (ASDP); Participatory Irrigation Development Programme (PIDP); Participatory Agricultural Development and Empowerment Project (PADEP); National Programme for Growth and Poverty Reduction (locally known as MKUKUTA). These programmes have incorporated aspects of RWH and set aside funds for their implementation nationwide.

Policies: The Water Policy of 2002; Agricultural and Livestock Policy of 1997; National Environment Policy 1997; National Land Policy of 1995; National Forest Policy of 1998 and National Irrigation Master Plan of 2003 support and provide guidelines for RWH implementation. For example, one of the goals of the National Water Policy is to make available more water to rural communities through RWH technologies. Furthermore the Water Policy states that RWH will be promoted through creation of awareness and training of various stakeholders.

Platforms: Parliamentary sessions, workshops, seminars and exhibitions, were used to create awareness on the potentials and benefits of RWH. Training sessions, demonstrations and study tours were used to impart skills to different stakeholders to manage CPRs.

Institutions: Local Government Authorities (LGAs); Ministry of Agriculture Food Security and Cooperatives; Ministry of Livestock; Land-use Planning Commission; Ministry of Natural Resources and Tourism; Ministry of Water, Health and Education, Department of Environment-Vice President Office and Tanzania Meteorology Agency (TMA) and NGOs (such as MIFIPRO, SAIPRO, VECO, ADP-World Vision, and CARITAS). Through their policies, regulations and programmes these institutions are supporting the promotion of RWH and management of CPR.

Current Promotion

D. Current promotion/uptake pathways

16. ***Where*** *is promotion currently taking place? Please indicate for each country specified detail what promotion is taking place, by whom and indicate the scale of current promotion* ***(max 200 words).***

The promotion of outputs is currently taking place nationwide. In districts like Maswa, Same and Mwanga, Mbeya,

Njombe, Hai, Rombo, Handeni, Singida, Kwimba, Shinyanga, Bariadi and Misungwi, development programmes are already supporting adoption of RWH for various purposes.

17. What are the current barriers preventing or slowing the adoption of the output(s)? Cover here institutional issues, those relating to policy, marketing, infrastructure, social exclusion etc. ***(max 200 words)****.*

Current barriers preventing or slowing the adoption of the outputs include:

- Lack of emphasis on land development: Although land is a key resource in the villages, matters related to land management are handled within social and welfare committees, hence limited focus on land management.
- Lack of proper land use plans leading to: (i) inequitable access to land by different users, (ii) conflicts among village members especially between agriculturalists and pastoralists.
- Land Acts are not diffused down to village institutions due to limited distribution and are in printed in English language, which is not known to the majority of the local communities.
- Weak coordination in the implementation of national policies. For example, implementation of National Mineral Policy at local level in some cases does not take into consideration environmental concerns.
- Limited integration between sectoral plans. For example, DADPs have not shown strong linkages with other sector development plans.
- Poor linkages between local level plans; institutional and regulatory mechanisms with the national policies, strategies and legislation.
- Poor access to market information, low farm gate prices and price fixing by cartels
- Poor infrastructure such as roads, post harvest processing, storage structures limiting benefits of CPR management
- Little representation of women and youths in decision-making organs, and
- Inadequate capacity for researchers and service providers on communication and knowledge management.

18. What changes are needed to remove/reduce these barriers to adoption? This section could be used to identify perceived capacity related issues ***(max 200 words).***

Changes required to remove/reduce barriers to adoption include:

- Formation of autonomous village land committees: the proposal is aimed at replacing the current set-up where land management issues are held under social welfare committees. The proposed autonomous land committee would have sub committees for residential land development, agriculture land management and grazing land management.
- More representation of youths and women in decision making institutions
- Preparation of land use plans to demarcate grazing and agricultural land.
- The Land Act should be translated to Kiswahili language and widely distributed.
- Improved CPR tenure systems and management through simplified procedures for land leases and capacity building in land policy and laws.
- Foster and strengthen inter-sectoral coordination and implementation of national policies and plans.
- Establishment of an appropriate planning forum in the districts and wards that would convene representatives from the various sectors engaged in CPR management.

- Facilitation of resources-user groups to register as CBOs or associations to give them legal recognition and empower these groups to access market information.
- Development of low cost, effective and efficient technologies to minimize transaction costs of managing RWH systems.
- Enhance the capacity of researchers and service providers (public and private) on communication and knowledge management and uptake promotion.

19. What lessons have you learnt about the best ways to get the outputs used by the largest number of poor people? ***(max 300 words).***

Important lessons, which could be drawn from the research project R8116, in order to get the outputs used by the largest number of poor people, are described as follows:

- Participatory planning, design, implementation and monitoring and evaluation with stakeholders are key.
- Provide enough resources (personnel, time and funds) for scaling-up activities. These include resources for development, production and dissemination of knowledge sharing products.
- Enhance capacity of researchers and service providers (public and private) on communication and knowledge management and uptake promotion.
- Development of CPR requires large investment, which is not in favour of poor communities. Fostering and strengthening of resource-user groups towards formation of Savings and Credit Cooperative Societies (SACCOS) is therefore essential.

Impacts On Poverty

E. Impacts on poverty to date

20. Where have impact studies on poverty in relation to this output or cluster of outputs taken place? This should include any formal poverty impact studies (and it is appreciated that these will not be commonplace) and any less formal studies including any poverty mapping-type or monitoring work which allow for some analysis on impact on poverty to be made. Details of any cost-benefit analyses may also be detailed at this point. Please list studies here.

A study on “Benefits of RWH in Poverty Reduction in Tanzania” was conducted in Maswa and Same districts. The study involved yield monitoring of paddy and maize crops to establish evidence of benefits of RWH in poverty reduction. The study showed that:

- RWH for crop production under different RWH systems in both Maswa and Same districts showed impressive returns to land and labour. The overall returns to land from paddy per hectare progressively increased from micro-catchment RWH (US $ 701.1), macro-catchment RWH (US $ 746.4) and macro-catchment RWH with road drainage (US $ 879.7) before declining to US $ 779.7 in the case of micro/macro-catchment with storage pond. The returns to labour were 8.7, 9.3, 11.0 and 9.7 US $ per person-day for micro,

macro, macro linked to road drainage and micro/macro with storage pond respectively during an above-average season. Returns to labour during below-average season were 6.2, 7.8, 7.4 and 4.9 US $ per person-day for micro, macro, macro linked to road drainage and micro/macro with storage pond respectively. (*Note: under rice based farming system, pure rainfed production is not common, therefore no data for comparison*).

Impressive performance of paddy under RWH linked to drainage suggests a need for integrating rural road drainage systems with RWH for agricultural production in semi-arid areas. Such integrated development plans will optimise the benefits from public investment in road drainage infrastructure.

- Intercropping of maize and lablab beans resulted to lower returns to land (US $1,011.9 per ha) compared to sole maize crop (US $ 1,594.7 per ha) under RWH. This was significantly higher compared to sole maize crop without RWH (US $ 414.2 per hectare). Similarly, returns to labour was US $ 43 and US $ 27 per person- day in sole maize and maize intercropped with lablab respectively.

However, for investments in RWH to have an impact on poverty reduction, increased linkages to profitable markets is critical.

21. Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) ***(max. 500 words):***

- *What positive impacts on livelihoods have been recorded and over what time period have these impacts been observed? These impacts should be recorded against the capital assets (human, social, natural, physical and, financial) of the livelihoods framework;*
- *For whom i.e. which type of person (gender, poverty group (see glossary for definitions) has there been a positive impact;*
- *Indicate the number of people who have realised a positive impact on their livelihood;*
- *Using whatever appropriate indicator was used detail what was the average percentage increase recorded*

The following positive impacts on livelihood have been recorded:

- In terms of human assets, the knowledge base of most communities has been enhanced through trainings, workshops, study tours, farmer field schools and provision of printed materials (KSPs).
- Membership in resource users groups and other social networks has empowered women and youths to influence decisions and access of CPRs in the target areas.
- Improved access to run-off and storage of water for longer period has reduced risks of crop failure and thus increased food security. Furthermore, land that receives adequate amount of run-off has increased due to better management of rainwater. Thus, land under crop production has increased substantially.
- Construction of water storage structures (charcodams and ponds, water tanks) has increased in the target areas. This has ensured more stable supply of water for crop, livestock and domestic use, and hence contributing to a stable income at household level. From the increased income, households have constructed better houses, acquired agricultural implements such as plough and rippers.
- Cash income obtained from higher crop yields and livestock have been converted in other assets such as education, housing, and running petty business.

The outputs have clearly indicated that RWH has a potential to reduce poverty and livelihood vulnerability in seasons with poor rainfall. Furthermore, they have shown that livelihood development requires a broad approach that encourages enterprises in and beyond agriculture. However, although RWH gave impressive returns to land and labour, even when seasonal rains were below average, female- headed households were more dependent on crop production and had less diverse livelihood activities than male-headed households. In Same District, for example, it was found that richer people had more access to run-off because of the location of their land relative to the water source in the RWH system combined with their power in the local society.

Environmental Impact

H. Environmental impact

24. What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? ***(max 300 words)***

This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

Application of the outputs would contribute positively towards the integrated water resource management in both the Lake Victoria basin and the Pangani basin. Both basins support a large number of irrigation projects and hydroelectric power plants (including Nyumba ya Mungu in Tanzania and Jinja in Uganda). Furthermore, the Lake Victoria basin is known worldwide as it contributes water to the Nile River basin, which is a trans-boundary River basin. On the other hand the Pangani River basin is very important in Tanzania and is often affected by water scarcity. Improved management of CPRs in these basins will reduce erosion effects to the wetlands, conserve the biodiversity and contributes positively towards their overall management.

25. Are there any adverse environmental impacts related to the output(s) and their outcome(s)? ***(max 100 words)***

None. Mainly positive environmental impacts are expected since the consideration of environmental needs would be part and parcel of the integrated CPR management plans.

26. Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? ***(max 200 words)***

Climate change threatens to damage the ecosystems on which poor people depend, thereby impeding their livelihood strategies. In the semi- arid areas, droughts are natural, recurring and endemic features of the environment and the prospect of variable seasonal conditions is a normal risk that must be incorporated into CPR management. The outputs contributed in helping poor people to strengthen their livelihoods and capacity to adapt to climate variability. Furthermore, the outputs contributed towards government's recognition of the potential of

RWH in mitigating the adverse effects of climate change, and the government commitment to promote RWH in rural areas. This will lead to more self-reliant management of CPR at farm level, and the development of agricultural systems that are physically, biologically, and financially sustainable.