Irrigated gardens reduce poverty and build empowerment

RIU

Validated RNRRS Output.

Scaling up of the productive use of water, especially through use of irrigated gardens, is cutting poverty in southern Africa. High livestock densities, damage to the environment and small, uneconomic holdings lead to widespread poverty. Developing strategies for sustainable livelihoods and managing common property resources is the best way to fight poverty. In particular, water points (wells, boreholes, dams) act as incubators for economic and institutional development and empowerment. They can therefore help to alleviate poverty while building capacity and self-respect. Various NGOs are using these approaches in the semi-arid zones of southern Zimbabwe and South Africa's Limpopo province. These include CARE (in small dam construction and rehabilitation), Plan (in water development and enhancing communities' livelihoods and empowerment), the Lutheran World Federation and GTZ (structured learning).

Project Ref: **NRSP18 :**
Topic: **6. Promoting Success: Partnerships, Policy & Empowerment**
Lead Organisation: **Shanduko, Zimbabwe**
Source: **Natural Resources Systems Programme**

Document Contents:

Description

NRSP18

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

Geographical regions included:

Southern Africa, Zimbabwe,

Target Audiences for this content:

Crop farmers, Livestock farmers, Fishers,

A. Description of the research output(s)

***1**. Working title of output or cluster of outputs.*

Partnerships and empowerment: Scaling up irrigated gardens in the semi-arid communal areas of southern Africa

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

Core funding was received from the Natural Resources System Programme (NRSP). Additional support funding was received from:

(a) the European Union Actions in Favour of Tropical Forests in Developing Countries for the 'Management of Miombo Woodland' project (facilitated by the Centre for International Forestry Research - CIFOR);

(b) the Swiss Development Corporation for research on 'Biodiversity and the Forests of the Future' (facilitated by CIFOR), and

(c) the US National Aeronautics and Space Administration through the University of Virginia (Grant NAG5-6384: Land-Cover and Land-Use Change in Miombo.)

***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.*

The R number is R7304 and the institutional partners were:

(a) the University of Zimbabwe's Institute of Environmental Studies (contact person: Bruce Campbell),

(b) CARE International (contact person: Kelly Stevenson);

(c) the Centre for Ecology and Hydrology (UK, contact person: Chris Lovell);

(d) Intermediate Technology Development Group, now known as Practical Action Southern Africa (contact person: Kuda Murwira); and

(e) the Zimbabwe Department of Research and Specialist Services (contact person: Ntombi Gata).

***4.** Describe the RNRRS output or cluster of outputs being proposed and when was it produced?*

Problems addressed

The project was undertaken between 1999 and 2001 in two micro-catchments in the semi-arid zone of southern **Zimbabwe**. The area is characterised by high livestock densities, environmental degradation and widespread poverty. Depending on the poverty measure used, 70-90% of households fell below the poverty line. High population growth under a customary system of tenure has created a myriad of small, uneconomic holdings that limit access to credit and farm

investments. Low and erratic rainfall and poor soils further limit agricultural production, which make perennial food handouts necessary. The purpose of the project was, therefore, to mitigate these problems by developing sustainable livelihood and **common property management** strategies. Inevitably, demand analysis using participatory techniques clearly showed that the communities' priority lay in developing water supplies for productive purposes.

Outputs

The project's objectives were to investigate three key interlinked outputs: the amount of water available (biophysical output); alternative **livelihood strategies**; and the functioning of local institutions.

Biophyiscal output: The availability of water in the **semi-arid regions** of **southern Africa** is dependent upon nine-year cycles of above-average rainfall that alternate with periods of below-average rainfall. Our results show that these fluctuations in rainfall had the greatest impact on both incomes and natural resource management because they affect grain yield, vegetation cover, erosion and siltation. It was found that water extraction by people was trivial compared to the natural recession of surface and groundwater caused by high evaporation and evapo-transpiration rates, respectively.

Livelihood outputs: Livelihoods were based on a combination of dryland cropping (the mainstay of most livelihoods), irrigated gardening, woodland-based activities, local wage labour and remittances. Our results showed that, by themselves, these and other single interventions are unlikely to reduce poverty substantially. A more integrated, sustained and multi-level set of interventions and support is required.

Institutional outputs: Results from our integrated Bayesian Model showed that whilst institutional interventions appeared to have modest impact in terms of cash income, they nonetheless permeated the entire livelihood system, impacting on by far the greatest number of other variables compared to other interventions.

We therefore see further scaling up of the **productive use of water**, especially **irrigated gardens**, as widening safety nets and reducing poverty in semi-arid regions. In particular, water points (wells, boreholes, dams) would act as incubators for economic and institutional development and **empowerment** to alleviate poverty whilst building capacity, self-respect, and a confidence that permeates all aspects of rural life.

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***		

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 focussed on horticultural products within a semi-arid livelihood system that included livestock and the subsistence production of maize.

The productive use of water could apply to almost any commodity. The objective, however, is to maximise the economic benefit of limited water supplies by finding markets for the highest value crops or livestock. Besides irrigated gardens, smallholder ostrich or game farming are feasible, especially as they make efficient use of feed resources and water in semi-arid areas.

7. *What production system(s) does/could the output(s) focus upon?*
Please tick one or more of the following options.

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).

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)?*

Interventions to scale up productive water points would provide an important safety net for the poor. However, sustainable pathways out of poverty can only become a reality if complementary interventions address key production constraints. Significant value could be added to production at water supply points by enabling the poor to produce higher value crops by their improved access to finance, technologies and export markets.

A micro-credit scheme facilitated during the project showed that they are problematic when faced with high transaction costs and risks associated with semi-arid areas. These costs could be significantly reduced on irrigated plots where the growers are sufficiently organised to enter partnership contracts with private companies. We see considerable promise in corporate-smallholder partnerships where smallholders provide their land, water and labour for production, while companies provide the finance (credit for inputs), technology (cultivars and techniques), and processing and marketing facilities for the commodity.

The success of these commercial outgrower schemes have been tried and tested in Zimbabwe and elsewhere. Kondozi, a Zimbabwean horticultural exporting firm, established a smallholder outgrower scheme in the semi-arid Marange communal area. Elsewhere in Africa, similar schemes have shown a considerable measure of success. Other high value commodities produced by smallholders include: sugar (South Africa and Swaziland), timber (South Africa), tobacco (Malawi), dairy and tea (Kenya), and poultry and ostriches (Zimbabwe).

The uptake pathway of similar schemes is predicated on institutional development (e.g. participatory by-law reform); the sustained empowerment of local organisations (that generate institutional and economic multipliers throughout the entire livelihoods system); and the building of capacity and alliances to enhance smallholders' bargaining power. In facilitating and monitoring these processes, and in brokering deals, NGOs play a key role.

We conceive smallholders, companies, NGOs, the government and international agencies forming an innovative platform we have called a 'smart partnership'.

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

A review of RNRRS outputs suggests that our outputs could be clustered with:

R8271, R8431	Management systems for export horticulture
R7830	Participatory irrigation management and technology development (India)
R7502, R6306	Decision tools for institutional change in public and private sectors
R8334 (India)	Building and sustaining consensus for change
R8438, R8297	Development of private sector service providers
R8381	Scaling-up through uptake promotion

Validation

B. Validation of the research output(s)

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

The research team relied on integrative analyses using predictive modelling approaches. This included a Bayesian network model to investigate ways to improve the cash income of the poor. Although the model showed that increases in productivity depended mostly on the broader macro-economic conditions and rainfall, it found that market development is crucial for improved earnings. It also showed that the building of organisational capacity had even more impact on reducing poverty than any single production intervention.

Our research project included a development component, which was facilitated by CARE International (alternatively CARE) and Practical Action. Project researchers and CARE validated the expansion of two garden projects: a groundwater site and a surface water (dam) site. At the groundwater site, the garden was doubled in size, which increased the number of direct and indirect beneficiaries from 400 to 900. Expanding the garden at the dam site entailed relocating the garden downstream of the dam, so as to allow for gravity-fed irrigation. Both are likely to increase abstraction rates. Plan International (alternatively Plan) showed that production at their sites increased, on average, by 10 -15%. Those who had mastered the drip system registered increases of 20 - 50%. These examples are only illustrative of the increasing demand for productive water supplies and the expansion of water supply programmes by these and other organisations. Water supply programmes are invariably directed towards serving the interests of the poor. A wealth ranking exercise is often used to identify the most vulnerable households and user groups that could benefit most from the projects. Plan's projects specifically target HIV and AIDS-affected families, especially orphans, and other vulnerable households, such as female-headed households.

However, our research shows that increasing incomes from gardens alone is not sufficient to enable people to break out of poverty. If markets could be secured for additional crop production by substantially increasing the area of irrigated gardens (by the technically feasible 7-8 times the current size), it would reduce the proportion of households below the food poverty line from 71% to 62%. Nevertheless, in expanding people's food supply, especially during times of drought, this intervention helps to strengthen their safety net and lessen their vulnerability to the intermittent failures in dryland crop production. We estimated the incomes at the groundwater site during a dry year to explore the impacts of doubling the garden area. We found that this increase would provide a major boost to average crop income in dry years. Incomes turned out to be 60% higher with the extra gardens.

Our research has also demonstrated the importance of institutional development and capacity building. Experience has shown that action learning approaches have proved to be effective empowerment tools. Action learning involves structured cycles of action and reflection by multidisciplinary teams of researchers, extension staff, development workers and users. The effectiveness of this empowerment approach is evidenced by high demand for them amongst a variety of funding and implementing organizations, including Practical Action, Plan, Lutheran World Federation, GTZ and the Kellogg Foundation.

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

The outputs were validated at two micro-catchment sites in the Chivi district of Zimbabwe's southern province of Masvingo between 2000 and 2001, as well as by other partners at various water points in this zone. The entire southern parts of Masvingo province, in which Chivi, Mwenezi and Chiredzi districts lie, is a dry zone that – following RIUP's classification – represents a rainfed farming system within a semi-arid production system.

Our findings show that poverty is a pervasive feature of the study sites, which typify conditions elsewhere in this semi-arid zone. For instance, 70% of the households fell under the food poverty line. Eighty seven percent of households fell below the December 1999 national poverty datum line; and only 3% of the households had an income greater than US$1 per person per day. Of the few people escaping poverty, *de facto* female-headed households stand out as a distinct group compared to the rest, including *de jure* female-headed households or male-headed households. This is because *de facto* female-headed households receive higher remittances, which enables them to accumulate more cattle. This underlines the importance of remittances to lift a household out of poverty. Despite such differentiation, the validation was carried out in the setting where the vast majority of the population is afflicted by pervasive poverty.

Community empowerment was not peculiar to the above two project sites, but is part and parcel of establishing productive water points in a variety of locations within the country (that are outlined under question 13). Elsewhere within the region, recent empowerment programmes are reputedly having a significant impact. One such programme operated, with GTZ support, in six pilot villages in the communal areas of the Limpopo Province of South Africa. It has since expanded from ward to province level, attracting direct line ministry interest and involvement.

Current Situation

C. Current situation

***12**. **How and by whom** are the outputs currently being used?*

Human abstraction of ground and surface water for productive use has a negligible impact on natural water reserves. Our outputs therefore suggest that an opportunistic strategy, involving the scaling up of the provision of productive water is probably the best bet for reducing poverty.

Many civil society organizations are currently involved in scaling up the development of productive water points, including CARE, Practical Action, Plan, the Lutheran World Federation and the Catholic Development Commission (CADEC). CARE's strategy centres mainly on the rehabilitation of small dams for expanded gardens. Other NGOs, such as Practical Action, Plan and the Lutheran World Federation currently promote groundwater development – including the provision of collector wells, boreholes and surface wells. These NGOs collaborate closely with various government departments at the grassroots level to address technical, equity and other constraints.

Their work subsumes a strong empowerment component that involves a repertoire of participatory approaches, including: leadership training, training for transformation, skills training, and initiating dialogue to increase participation in governance and decision making.

At their inception, these projects focussed primarily on the supply side by increasing production. More recently attention has shifted to the demand side and the marketing of produce. However, NGOs have not yet embraced the innovative solutions initiated by the business community; that is, to address the need for financing (credit) and the processing and marketing of high-value export crops. We need to match potential supply with international demand in order to pull significant numbers of people out of poverty.

***13. Where** are the outputs currently being used?*

There is very good fit between our research outputs and the core of CARE International's work in southern Africa: scaling up productive water points as entry points for reducing poverty whilst building capacity within the communities.

CARE International operates in 70 countries worldwide. In Southern Africa, Zimbabwe and South Africa are its target countries that are among the 25 DFID PSA countries that are characterized by semi-arid production systems. The small dam construction and rehabilitation programme currently applies to the semi-arid zones of both countries, i.e. south-central and south-east Zimbabwe and northern parts of South Africa's Limpopo province. In Zimbabwe's southern province of Masvingo, CARE is using the outputs in question in five districts including, including Zaka, Chivi, Bikita, Mwenezi and Masvingo.

Plan's water development and community livelihood enhancement and empowerment activities in Zimbabwe cover four provinces lying in the semi-arid zone, including Chipinge in Manicaland; Chiredzi and Mwenezi in Masvingo; Tsholotsho in Matabeleland North; and Zivagwe and Silobela in the Midlands. The Lutheran World Federation operates in 6 semi-arid districts spanning three provinces, with the specific locations being: Chivi and Mwenezi districts in Masvingo; Mberengwa and Zvishavane in the Midlands; and Gwanda and Beitbridge in Matabeleland South.

GTZ funded activities that involve structured learning approaches, are more regional, covering most of the provinces in Zimbabwe's, as well as six sites in South Africa's semi-arid Limpopo province. These sites are Ga Thaba, GaMogano, Spitkop, Thsikonelo, Tshaula and Mbahela. The work drew technical support from key personnel from Practical Action.

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

Most major facilitating organisations - including CARE, Plan and the Lutheran World Federation – use water points for community livelihood improvement and empowerment. Typically, these water points include hundreds of small catchments (about 5 km^2), spread throughout the semi-arid zone, complemented by thousands of ground water abstraction points: deep and shallow wells and boreholes. Although the extent of these water sites are restricted in physiographic terms, the

social and use boundaries are usually fuzzy and extensive. Thus, whilst some garden sites like Romwe in Chivi cater for about 100 direct beneficiaries, indirect beneficiaries range between 8 - 16% of the ward population. Many other wards have multiple water sites, with the number of new sites increasing rapidly. For instance, CARE's work on small dam rehabilitation commenced in 1994, peaking in 1998. It has now entered a revival phase after the damages exacted by Cyclone Eline in 2000. Meanwhile, Plan's work has also seen significant growth, covering the semi-arid Chiredzi, Chipinge and Tsholotsho districts. Its operations in Mwenezi district covers eight out of 21 wards. This rapid expansion appears to hinge on the relatively short periods of 12 months that is required to establish projects. CARE's work covers six out of the seven districts in Masvingo province and one district in the Midlands. Practical Action operates community empowerment projects (using action learning approaches) in many areas covered by CARE and Plan in southern Zimbabwe. Similar work in South Africa's Limpopo Province has drawn on technical support of personnel drawn from Practical Action.

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?*

A variety of policies, programmes and platforms have assisted the adoption of the outputs. In terms of international policy processes, the promotion of good sanitation and productive water use to enhance livelihoods is a key facet of the Millennium Development Goals. The sustainable management of common property resources – including water through community empowerment – is a high priority in international policy circles. At more national levels, both Zimbabwe and South Africa see water development as fundamental to raising the standards of living of their citizens living in semi-arid zones. More specifically for Zimbabwe, devising appropriate institutional arrangements for managing common property resources, including water, was part of the Land Tenure Commission of Inquiry in 1994. At a more programmatic level, the management of water resources in catchments (of various scales) fell under the Water Resource Management Strategy, which was further consolidated by the Rural District Council Capacity Building Programme.

Whilst these processes and programmes contributed towards promoting clusters of livelihood enhancing activities centred round improving the provision of water, there were other key factors at the project level: continuity and institutional memory and partnerships and funding support. Lessons from our project relating to institutional memory recognise that the project was sequel to a research programme that was initiated in the early 1990s, known as the Community Resource Management and Livelihood Strategy. The forthcoming RIUP initiative is therefore founded on a research tradition that stretches back for more than two decades. This process of appraising and sharpening tools for enhancing rural livelihoods has been sustained by DFID's commitment to invest substantial funding over the long haul. The gains of the programme have been consolidated by the forging of an alliance between key stakeholders that includes government, civil society and other partners, as well as actors at the local government level. This alliance, known as the National Action Committee for Rural Water Supplies and Sanitation, was promoted energetically by the Institute of Water and Sanitation, and coordinated by a unit within the Ministry of Local Government. The alliance operates through a system of decentralized district action committees.

Current Promotion

D. Current promotion/uptake pathways

***16. Where** is promotion currently taking place?*

A regional initiative for promoting the productive use of water, which brings together countries in East and Southern Africa, has been initiated by Plan International, which is working to share their experiences with other organisations. Zimbabwe is one of the pilot countries operating under a recently formed learning alliance for multiple water services. It is coordinated by an operational unit that has been established within the Ministry of Rural Resources and Water Development. The alliance brings together organisations involved in promoting the use of water for productive purposes. Given the number of organisations that have shown a keen interest in the alliance, and by the number of projects being implemented, the promotion can be considered a success.

CARE's work can also be considered successful since it has attracted a variety of collaborative partners at all its 50 dam sites in southern Zimbabwe, including the private sector, government departments, other civil society organizations, researchers, as well as line ministries, such as the Ministry of Health. Practical Action personnel have assisted the Department of Agriculture and other stakeholders in South Africa to promote its soil and water conservation activities in that country's Limpopo Province.

***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.*

The crisis of governance in Zimbabwe has seen the economy shrink by more than a third during the last 5 years. Rural poverty has increased markedly and infrastructure is collapsing. By maintaining unrealistic exchange rates, exports have plummeted, foreign exchange shortages have become acute, and a wide range of goods, especially fuel, make for a difficult operating environment. Agro-businesses that initiated innovative corporate-smallholder partnership, such as Kondozi, have been nationalised, stripped of their assets, and horticultural export markets lost.

In a period of national decline, it is difficult to sustain the economic and social fabric of stressed communities. Even before the crisis, however, our project found evidence of rent capture by local elites and numerous cases of failure of local organisations. Traditional leaders were involved in illegal land allocations or misappropriating funds, while elected leaders clung to power, subverted constitutions and were neither accountable nor transparent. Plan reports that conflicts have arisen where water users have agreed to use the water for domestic purposes only, compromising the development of water for productive purposes.

***18**. What changes are needed to remove/reduce these barriers to adoption?*

Good governance and sound economic policies are the bedrock for broad-based poverty reduction, economic empowerment and pro-poor development initiatives. These exist to a greater or lesser extent in most southern African countries; Zimbabwe being the exception.

The governance and policy framework should provide the basis of building trust, confidence and consensus. International agencies, NGOs and governments have made major contributions towards developing productive water supplies in semi-arid areas. The opportunity now exists for developing markets for produce. There are many examples of successful mutually beneficial corporate-smallholder schemes throughout Africa that can provide lessons for pro-poor use of water for production. These schemes should be developed in tandem with programmes for organisational development and institutional change that strengthens local capacity to manage water resources efficiently. They should also empower smallholders to negotiate deals, form alliances, and enable them to bargain with other powerful actors, such as business corporations. In particular, this process should be as inclusive and transparent as possible, and ensure that leaders are accountable.

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

The first lesson is that an enabling social and economic environment is essential. As the example of Zimbabwe shows, it is difficult to reduce poverty – whatever the merits of the output – in the absence of government policies that ensure macro-stability through prudent fiscal and monetary measures that form the basis of broad-based economic growth.

The second, as our research shows, is that single piece-meal efforts to reduce poverty have very limited impact. The major impacts on poverty will only be realised when a suite of measures are taken. The most important and all-pervasive of these measures is reforming the local organisational and institutional frameworks, not only to empower and include people, especially the poor and vulnerable, but in the longer term to transform the constraints of the farming system itself, especially the market constraints imposed by the land tenure system.

The third lesson is that partnerships need to be developed with organisations beyond the NGOs that have done so much to develop productive water points and empower local communities. Partnerships need to be extended to the business community to give smallholders access to finance and technology for scaling up horticultural production, and also to secure markets for their produce. These commercial relationships also have the merit of treating people as partners and producers rather than dependents and beneficiaries.

It can be expected that the more resourceful and economically active smallholders will respond positively to economic incentives and opportunities presented by partnership agreements with companies. On the other hand, there are inevitably those who will remain on the periphery of major development initiatives. The fourth lesson, therefore, is to ensure that pro-poor policies continue to offer safety nets for the very poor and vulnerable.

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? Please list studies here.*

1. CARE International in Zimbabwe 2004. Small dams and community resources managemnent project: project completion report. CARE International in Zimbabwe, Harare.

2. Campbell, B.M. Jeffrey, S., Kozanayi, W., Luckert, M., Mutamba, M., and Zindi, C. Household livelihoods in semi-arid regions: options and constraints. Centre for International Forestry Research, Bogor, Indonesia.

3. Mayers, J. and Vermeulen, S. 2002. Company-community forestry partnerships: from raw deals to mutual gains? Instruments for Sustainable Private Sector Forestry Series. International Institute of Environment and Development, London.

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).*

As acknowledged in the guidelines, robust impact assessment studies were difficult to come by, making it very difficult to comprehensively address the requirements of this question.

On the basis of material accessed from CARE, the small dam project appears to have made significant progress in improving *physical capital* among beneficiary communities in southern Zimbabwe. The programme has rehabilitated 50 dams since 1993, directly benefiting 7,300 households, most of whom fall into the extreme vulnerable poor and extreme dependent poor categories (Campbell et al. 2002). Furthermore, raising dam walls – a physical capital investment made at 5 dam sites – yielded a natural capital increase of 200% in water storage capacity. Replacing a bucket-cartage and pump-operated irrigation system with a gravity system was another physical investment that was accomplished at 90% of dam sites. These innovations were invaluable labour saving technologies that mainly benefited women, who usually do most of the gardening. In addition, investments in Blair toilets at dam sites enhanced human capital in terms of health. However, physical capital investments at dam sites inevitably benefit those participating in activities at the dam, and may leave out non-participants, including the extreme dependent poor.

Increased dam capacities represent a crucial investment in the semi-arid zones where water failure is frequent, especially during the dry cycles. Water failure often necessitates water rationing for crop production in order to retain reserves for domestic purposes and livestock. CARE's work suggests that irrigated gardens significantly improve *financial capital* inflows into households – though their work did not entail detailed procedures to account for all costs, such as opportunity

and transaction costs. However, the somewhat rudimentary 'before' and 'after' assessments indicate that the garden projects doubled the quantity of marketed crops. In general, wheat and maize were more marketable than other crops, with most markets typically seen as thin and volatile. A loosely structured partnership between communities and companies (located in Masvingo an Mutare) were attempted at one site, but these efforts were constrained by the inability by producers to deliver the quality and quantities required: a phenomenon largely attributed to input procurement and delivery constraints. But experiences from more formal partnerships elsewhere, particularly South African forestry out-grower schemes, indicate that such schemes hold considerable promise in reducing poverty (Mayers and Vermeulen, 2002).

Finally, the dams appear to be crucial entry points to social capital enhancement. A variety of empowerment activities are pursued at dam sites, including the setting up of dam rehabilitation, irrigation and agronomy-cum-conservation committees. A baseline survey suggests that the committees are good vehicles for addressing gender imbalances. Over time, women have come to represent 42% of the leaders in dam rehabilitation committees, 53% in conservation committees, and 80% in irrigation committees – although the last case probably reflects a gendered division of labour. Related social capital enhancement has involved the enactment of land-use, resource management and irrigation by-laws that are endorsed by the chiefs, the relevant Rural District Councils and the police.

Environmental Impact

H. Environmental impact

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

Whilst water provides the entry point to scaling up the proposed cluster of outputs, institutions are recognized as the crucial component that permeates all aspects of the biophysical, livelihood and social system. It is envisaged that 'empowerment' will have a broad range of direct and indirect environmental benefits. For example, skills training in soil and water conservation technologies in the expanded garden areas will directly increase infiltration and decrease runoff. This will have other indirect environmental benefits, such as improved soil moisture content, improved soil nutrient status, and reduced siltation and contamination of water bodies. Other related secondary and tertiary benefits will include improved water quality and quantity. Meanwhile, leadership training will enhance civic dedication and democratic performance, as training for transformation is expected to imbue communities with an improved problem solving capacity. This will provide the necessary ingredients for improved collective action – a prerequisite for improved management of resources in the 'commons', including soil, water and woodlands. And even more crucially, mindset and attitudinal empowerment will stimulate institutional changes that incrementally transform the structures of a natural resource governance system that marginalizes rural people, including district level by-laws that are essentially top-down in orientation. An overall improvement in by-law formulation and enforcement will directly improve resource status across the soil, woodland and water

sectors. Ultimately, the direct and indirect benefits are not mutually exclusive, but are interlinked, often building synergies among themselves. For instance, improved resource status could reduce runoff to improve water quality and quantity. Whether such synergies are beneficial or not depends on site specific factors including edaphic, topographic and other conditions.

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

Productive water points are a rendezvous for great numbers of livestock and humans. From the livestock side, adverse environmental impacts include overgrazing, soil erosion and compaction, and contamination of water by toxic dip chemicals. On the human side, garden plots at water points are often sites of intense human activity that worsens soil compaction. Intense crop production programmes within the gardens conceivably make use of pesticides and chemical fertilizers, which aggravate contamination of water bodies. Lastly, it is possible that improved vegetation cover arising from better operation of community rules and by-laws will increase natural water loss through evapo-transpiration.

26. *Do the outputs increase the capacity of poor people to cope with the effects of climate change?*

The major risk to semi-arid production is that low and erratic rainfall restricts agricultural production to low-production cropping regimes. Being rain-fed – and prone to frequent droughts that cause crop failure – the need often arises for government and international agencies to provide relief aid. Expanding irrigated gardens reduces reliance on rain-fed agriculture, and improves livelihood resilience among the poor by providing complementary sources of off-season food and income. Although climatic variation in the semi-arid production systems alternate between a 9-year wet cycle and a 9-year dry cycle, climate change trends generally indicate a gradual skew towards the dry side of the equation. The trend justifies further investment in productive water point development as a long-term strategy for coping with some of the effects of climate change. Whilst inter-annual droughts and gradual climate change are relatively easier to plan for (in terms of coping strategies), stochastic natural disasters, such as Cyclone Eline in 2000, potentially cause shocks and dislocations that are neither easy to anticipate nor plan for.