WEI INTEGRATED DEVELOPMENT PROJECT: A SUCCESS STORY IN DESERTIFICATION CONTROL

By
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1 INTRODUCTION

The Wei Wei Integrated Development Project (WWIDP) was started in 1987 following the signing of a development co-operation agreement between the Ministry of Foreign Affairs of the Government of Kenya (GoK) and the Italian Development Co-operation. According to the project design, the planned key outputs of the project were as follows:

- Construction of intake weir on the Wei Wei river with a maximum intake flow of 1.2 cubic metres per second;
- Laying of an underground steel and PVC pipeline network that would distribute water through gravity fed sprinkler irrigation units on each plot;
- Land reclamation and improvement over 700ha;
- Setting up of a pilot farm (50ha) to provide logistical, equipment and other inputs support to the whole scheme;
- Development and allocation of 540 individual plots of 1ha each;
- Construction of a fully equipped service centre to provide workshop, stores and office facilities.

2 BIOPHYSICAL BENEFITS AND IMPACTS

2.1 Land Reclamation And Technological Innovations

Phase one of the project was implemented over the period 1987-90. This involved construction of an intake weir 9km away from the project site, land clearing and reclamation, laying the irrigation pipe network and establishment of the pilot farm of 50ha. Water is carried by a 1000mm diameter pipe from the intake point to the project farm on the valley floor. The system operates by gravity and supplies irrigation water 24 hours a day and 365 days a year with a head of 3.5 bar at the plot hydrant. Before the project, the valley floor was marginally productive because of water scarcity. As a result of the new technology introduced, gravity-fed overhead irrigation has been developed and this has dramatically improved crop productivity and yields by farmers.

A total of 300ha out of a target of 700ha of badly degraded land have been reclaimed (see Table 1).

225 plots on the on the valley floor have been allocated to farmers. Each plot has a hydrant fed from an underground pipe network and is equipped with galvanised steel irrigation laterals, raisers and sprinklers. The plots were levelled at a slight slope to allow adequate drainage into the natural drainage channels on the valley floor.

[1] The authors, Socio-economics and Natural Resources Experts, respectively were hired by UNEP to evaluate the success of the Project.

Table 1 Area reclaimed: 1st and 2nd phases and proposed area for 3rd phase

		1st Phase	2nd Phase	3rd Phase
Plots	No	70	205	265
Increase in No. of plots	No	70	275	540
Not Irrigated Area	Ha	74	216	279
Increase in Net Area	Ha	74	290	569
Serviceable Gross Area	Ha	91	265	344
Increase in Serviceable Gross Area		91	325	700

2.2 Erosion Control Measures

The sprinkling of irrigation water can be adversely affected by winds and to safeguard against this problem the project introduced an external vegetation windbreak between every four plots. In addition, at the perimeters of the plots natural vegetation was maintained. Tree species used as windbreak include Leucaena, Eucalyptus and Neem (*Azadirachta indica*). The project distributed Vetiver grass for planting across most water channels as a means to reduce the speed of water and its erosive capacity (photo 1). Planting of Vetiver grass to control erosion has been widely adopted in the project area. The grass is planted on the edges of plots, along watercourses, gullies and traditional irrigation furrows.

Photo 1 Vetiver grass planted around plot on pilot farm to control erosion (Photo by evaluation team)

2.3 Rejuvenation of Vegetation

The project has been successful in the establishment of orchards and woodlots around the pilot farm of 50ha. The tree care and management expertise of KVDA, Logadri and communities were beneficial to the project's agroforestry initiatives. Communities have planted fruit trees at their homesteads and the planted trees provide fruits as well as rehabilitate the abandoned watercourses that once dissected the homesteads. There is evidence of some abandoned traditional furrows that have been reclaimed by planting fruit trees like mangoes, paw-paws, lemons, avocados, oranges, etc. Neem tree, which is well known in the area, is found at almost every homestead. This tree is particularly important because of its valuable uses as an insecticide. Neem's active extracts are used against pests like caterpillars, grasshoppers, leafhoppers and beetles.

2.4 Soil Improvement

In all the activities carried out in the project area to date there is no evidence of any significant effort that has been made to promote the use of natural fertilisers for soil improvement. The

only activity that can be considered to be remotely related to natural soil improvement is the distribution of some Leucaena trees by the nursery. This tree is used for soil fertility improvement in agroforestry systems. The project also encourages farmers to practice crop rotation by planting legumes after cereals. Leguminous crops mainly grown are green gram, cowpeas and okra. These crops help in nitrogen fixation especially if plant residues are also used for mulching. However, residues of legume crops are not available for mulching because of the livestock that also benefit from browsing in harvested plots. The benefits of crop rotation are therefore not being fully realised.

2.5 Provision of Training and Supporting Research

The project has been effective in providing training to farmers on subjects such as Vetiver grass planting and management for erosion control; nursery establishment and management and tree planting and care. In addition the project has provided (and continues to provide) training to farmers on tillage practices that enhance soil conservation; crop rotation and agroforestry practices and farm management. Table 2 presents a comparison of farming practices before and after the introduction of project innovations.

Table 2 Comparison of traditional and improved farming systems

Production Factor	Traditional Irrigation	Modern irrigation
Water	Restricted	Unrestricted
Soil Nutrients	Natural/Moulding	Chemical and fertilisers
Farming System	Irrigated staple food crops	Irrigated food & cash crop production
Cropping	Subsistence oriented	Market oriented
Water Delivery	Flood irrigation	Overhead irrigation
Planting	Manual	Manual
Land Preparation	Manual	Mechanical
Fallow Period	3-4 years	None
Cropping Intensity	1 crop/year	2 crops/year
Output	Local trade & consumption	Local trade, consumption and external trade

2.6 Sustainability of Project Innovations

Currently irrigation water is available 24 hours a day and allows farmers to grow and harvest crops twice a year. Project benefits to the agricultural Pokots are also being shared with the pastoral Pokots who have access to crop residues and water for their livestock. Pastoralists are also guaranteed of adequate food to buy in years of poor harvest. The rejuvenation of agriculture on the valley floors has withdrawn pressure to cultivate on the hill slopes. These once degraded slopes are slowly regenerating vegetation cover. Some project beneficiaries interviewed during fieldwork alluded to positive climatic changes in the area due to bio-diversity regeneration. There is an unmistakable total sense of ownership of natural resources amongst the farmers, which is critical for sustainability.

Gravity-fed irrigation introduced by the project does not require energy to operate it. In fact if desired, the water could be used to generate electricity as an additional benefit. The simple technology thus needs no external inputs, which would reduce benefits. Maintenance costs for the irrigation system are minimal and there is no wastage due to seepage and evaporation as was the case with the traditional furrows. All these aspects strengthen the sustainability of the innovations.

The uninterrupted availability of water on the valley floor has brought a lot of confidence amongst farmers who have now moved away from the old practice of shifting agriculture to adopt a sedentary type of agriculture.

3 SOCIO-ECONOMIC BENEFITS AND IMPACTS

3.1 Crop yields, Earnings and Food Security

Prior to the project, crop yields among the Pokot people who inhabited the project area were very low. Production was entirely for subsistence and in years of drought food scarcity was pervasive. Pokot's response to this problem was to move into other districts or even across the border into neighbouring Uganda in search of food. As a result of the project, the lives of the Pokot in the project area have been completely transformed. Crop yields have increased from about 0.5 tonnes/ha for maize and sorghum to a mean of 3.5t/ha and 4t/ha respectively (photo 2). In addition, new crops that include okra, cowpeas and green gram have been introduced into the local farming system.

Photo 2: Sorghum crop nearing maturity (evaluation team)

Table 3 Crop yields for farmers in tonnes/ha: 1987-99

YEAR	CROP			
	Maize	Sorghum	Green gram	Cowpeas
1987	0.50	0.50	Na	Na
1988	3.00	3.45	Na	Na
1989	4.20	5.80	1.10	1.00
1990	5.53	3.72	0.95	0.82
1991	6.29	3.68	0.74	0.91
1992	5.79	3.04	1.05	0.97
1993	4.87	3.83	-	1.08
1994	4.78	3.50	-	-
1995	4.85	-	1.20	-
1996	4.80	-	1.00	-
1997	4.80	-	-	-
1998	4.85	4.00	1.25	0.80
1999	4.85	4.00*	1.25*	1.20*

Source: Project activity reports and interviews with staff and farmers
N.a. means not applicable, i.e. crop had not yet been introduced to farmers
- means figures not available
* 1999 figures are forecasts based on harvests already received.

Farmers have continued to realise consistently improved yields on these crops over the years. Table 3 shows that significant improvement in crop yields has been recorded over the last 12 years. In particular, yields for maize and sorghum, the two main crops traditionally grown by farmers in the project area, increased by 870 and 800% respectively.

At present, farmers have contracts with three seed companies, viz., Kenya Seed Company, Western Seed Company and East Africa Seed Company. The first two companies have regional offices in Kitale (100 km away) while the last company is based in Nairobi. These companies

currently buy maize and sorghum at KSh 30/kg and KSh 18/kg respectively at the farm gate. These prices are at least 250 percent higher than those offered by food companies. On average, farmers realise a net annual income of KSh 40,000/year.

3.2 Employment and Incomes

The WWIDP has made a significant contribution on employment and income generation in West Pokot district. During the implementation of civil works in 1987-88, at least 300 people were employed on the project. At an average daily wage of KSh 25/person /day during that period and assuming a 200-day working year, it means that at least KSh 3m was injected into the local area during the two years. Since the start of the second phase in 1991, KVDA has had at least 50 staff employed on the project each year. At present, the annual salary and wage bill for KVDA staff stands at KSh 4.6m. Clearly, the earnings of KVDA staff help to stimulate consumption and commercial activities at Sigor and in other parts of the district.

Due to the increased demand for labour on farmers' plots, each farmer currently hires at least 60man-days of labour per season. The present daily wage rate for hired labour is KSh 45. There are two growing seasons each year and thus each farmer hires at least 120 man-days of labour (photo 3). With 275 ha under crop production, it means that approximately KSh1.5m is paid in wages each year. There is no doubt that this is significant income that has helped to uplift living standards in an area that was once very poor and marginalized.

3.3 Expansion of commercial activities at Sigor

As would be expected, increased employment and incomes stimulate the development of commercial transactions. This is what has happened at Sigor, the business centre located next to the project area. A thriving and rapidly expanding market has developed at Sigor. Before the start of the project, the population in Sigor division was a mere 40,000. Today, the population of the division is estimated at nearly 200,000. The rapidly growing population at Sigor has in turn stimulated the expansion of commerce at the centre. Increased population at the centre has in turn led to the development of education and health facilities at Sigor. Before the project, there were only two primary schools at Sigor.

Photo 3: Hired labour harvesting sorghum (evaluation team)

Enrolment of children in schools was as low as 30 percent. At present, there are six primary schools and two secondary schools at the centre. Two of the primary and both secondary schools offer boarding facilities for pupils who stay far away from the centre. This increases opportunities for school attendance. Enrolment of children at school has now increased to an average of 70 percent each year. There is no doubt that increased access to education by local children will in the near future create a good pool of qualified people who will be able to spearhead development initiatives in the local area. The potential for more development activities in the area in future is therefore great.

4 COMMUNITY PARTICIPATION AND EMPOWERMENT

Local people were consulted and involved in the implementation of the project right from the beginning. A distinct strength of the project is that it built on local indigenous knowledge and farming practices. Pokot people living in the project area were already accustomed to growing crops using the traditional furrow irrigation system. The project recognised this and all what is has done has been to improve the irrigation system through the construction of a modern gravity-fed pipeline system. This now conveys water to all the 275ha so far developed at minimum cost and water loss. Water is available 24 hours a day and 365 days a year on each plot. Farmers use pipes and sprinklers for irrigation on each plot and water is supplied at a pressure of 3.5 bars at the plot hydrant.

A plot allocation committee was created at the beginning of the project to ensure fairness in the allocation of plots. The committee consists of JMS staff, the executive committee of the Wei Wei Farmers Association (WWFA), the local councillor and local traditional leaders.

The WWFA was created in 1991 by project beneficiaries to promote farming activities in the area. The WWFA consists of the general assembly, executive committee and the board of directors. The general assembly is the supreme organ of the association and consists of all the 225 plot holders. It meets at least once in two years to elect members of the board of directors and the executive committee. The board of directors is made up of block representatives and members of the executive committee. The project area has been divided into 8 blocks and each block is represented by at least two people. At present there are 18 block representatives The board of directors is responsible for discussing and finding solutions to all problems faced by farmers such as pest control, seasonal budgets and crops to be grown, crop rotation and soil fertility management, etc. Any expenditure from the WWFA account that exceeds KSh10 000 has to be approved by the board of directors. Meetings of the board of directors are held as and when necessary.

Finally, the executive committee consists of five members, viz., the chairperson, vice chairperson, secretary, vice secretary and the treasurer. The WWFA constitution provides for employment of three staff – accountant, plumber and agronomist – to run the affairs of the association. The executive committee is responsible for recruitment and supervision of the three staff. It has authority to approve and make expenditure not exceeding KSh 10,000. The committee holds meeting every month.

5 ADOPTION OF INNOVATIONS

Innovations introduced by the project are being widely adopted by communities involved in the project and those outside the project as well. For example, farmers involved in the project have taken the initiative to clear extra pieces of land adjacent to their plots to expand the land available for irrigation and crop production. We also observed many households not involved in the project, that have cleared pieces of land next to the project. They hire pipes and sprinklers and draw water from plots of farmers who are beneficiaries.

The availability of tree seedlings from the nursery established by the project has encouraged farmers to plant fruit trees around their homesteads. Trees that provide windshields are also planted around homesteads and fields. Growing of Vetiver grass to control gully erosion is now widely practised both within and outside the project area.

6 COST-EFFECTIVENESS OF INTERVENTION

Project costs during phase one are estimated at approximately US$ 7m. The major costs during this phase were construction of the weir and pipe that takes water to the valley floor, construction of the irrigation pipe network, land reclamation and development and purchase of farm machinery and equipment. Since the completion of phase one, no major capital investment has been made by the project. The irrigation system is gravity-fed and requires

minimum maintenance. Cost-benefit analysis shows that the benefits created by the project far exceed the costs incurred. When costs and benefits for the period 1987-99 are compared, the projects yields and internal rate of return (IRR) equal to 24 percent which is an impressive result. Clearly, despite the initial high capital costs, the project is cost-effective when returns are considered and the fact minimum the irrigation system requires minimum maintenance.

7 STRENGTHENING OF SOCIAL CAPITAL

Increased economic prosperity now enjoyed in the Sigor are has helped to enhance family structures and cohesion by turning people who were largely Pastoralists in the past to adopt a sedentary life style. A growing and thriving market for food crops, chicken, goats, sheep, cattle and fruits has developed at Sigor centre. It is well known that commercial activities play an important role in strengthening social structures and building relationships between buyers and sellers.

Farmers outside the project are replicating project activities by developing their own plots next to the irrigation scheme and hiring irrigation equipment and drawing water from farmers involved in the project. While this could have potential for creating conflict in future, so far this practice has helped to enhance the sense of communal ownership of the project and the need to bring all interested households into the project. With strong sense of communal ownership in place, it will be very difficult for outsiders to interfere with the project. It also means that sustainability of project benefits will be guaranteed.

The WWFA has developed into a viable and strong organisation that articulates and promotes the interests of its members. It holds regular meetings with seed buying companies to argue for better prices for its members. It has a written down constitution which continues to be updated regularly to reflect the changing needs of farmers and project development. To ensure future sustainability of project activities and benefits without external support, the constitution has been revised to allow the association to employ and an accountant, an agronomist and a plumber to run the business of the association. It is anticipated that once these modern management practices are fully inculcated into the culture of the Pokot farmers, they will also filter into the management of the affairs of the wider community.

8 REPLICATION OF PROJECT INITIATIVES

At the local level, communities have been actively involved in replication of project activities as already described above. Not much has however taken place in other parts of the district and other parts of the country. A dam project on the Turkwel River was built with funding from the French government to generate electricity and also provide gravity-fed irrigation along the same principles as the WWIDP. To date, the dam only generates electricity and no irrigation activities have been implemented. It appears like funding is the key constraint but the interest to develop a gravity-fed irrigation scheme exists.

Replication of the WWIDP has also been carried out by KVDA in the Arror irrigation scheme in Marakwet district. A furrow has been developed to feed water into a reservoir. Water is gravity-fed from the reservoir to irrigate acres of land using sprinkler irrigation technology. Project was started in 1991 and each farmer was allocated one acre of land. The main crops grown by farmers on the project are green gram, cowpeas and okra. KVDA and the Italian Development Co-operation jointly provided funding for the project. The Sondu Miriu dam project in Nyanza province was initially designed to generate electricity and later to provide water for irrigation following the design of the WWIDP. Foreign donors have funded the project.

Despite their few examples of attempts to replicate the WWIDP, the evaluation team is convinced that the project is highly replicable. Although initial investment costs may be high, these are far outweighed by the benefits the project creates as has been shown above. Maintenance costs of the project are minimal and can be carried out by the beneficiaries while

water is gravity-fed and available 24 hours a day and 365 days a year. The project can therefore be replicated not only in locally and in other parts of Kenya but in other countries where terrain similar to that of the project area can be found.

9 GOVERNMENT SUPPORT TO SUSTAIN PROJECT BENEFITS

The government has demonstrated its commitment to make the project sustainable by creating a joint management structure that involves KVDA, Italian Development Co-operation and the WWFA. After completion of phase three of the project, the Italian Development Co-operation will pull out leaving the management of the project in the hands of KVDA and the WWFA. KVDA operates 50 ha on the project and is therefore destined to remain an active participant on the project for a long time into the future. The 50 ha produce a gross annual income of at least KSh 12m. This is nearly three times the annual salary and wage bill of KVDA staff. It is therefore plausible to expect KVDA to continue to operate the farm and work closely with the WWFA to sustain project benefits for farmers.

The project was the result of a development co-operation agreement between the Government of Kenya and the Government of Italy. Consequently, the project has direct linkages with the Office of the President and the Ministry of Foreign Affairs. Because of these direct linkages between the project and government departments, the project has a direct influence on government policy and practices in agriculture.

10 INFLUENCE ON LAND USE POLICY

The project has demonstrated to government that more investment needs to be directed to promotion of irrigated agriculture in ASAL. For example, studies carried out have shown that at least 200 ha of land are required by one household in Turkana district to be able to attain the level of productivity and food self-sufficiency now enjoyed by households involved in the WWIDP. In other ASAL areas, the mean land required has been estimated at 100 ha per household[2].

11 LESSONS LEARNT

11.1 Balancing Economic And Environmental Benefits

It is well known that communities usually cause damage to the environment out of basic necessity. A double-pronged approach as evidenced in the Wei Wei Integrated Development Project is critical for both success and sustainability. Communities get motivated to participate in a project if there are some tangible benefits to be derived from such participation. Project beneficiaries in Sigor have realised major socio-economic benefits and this has encouraged them to get fully involved in the project. Environmental conservation came as a second benefit and has therefore been readily accepted. If conservation of the environment had been emphasized right from the beginning, project results could have been completely different from what they are today.

11.2 Building on Indigenous Knowledge and Practices

An important lesson from the project is that projects that build on indigenous knowledge and practices stand a better chance of scoring success. The WWIDP recognised that local people had a long tradition of growing crops using irrigation and intervened to improve on irrigation. If the project had been introduced in an area with no irrigation tradition, the impact of the project might not have been as phenomenal as is the case today.

[2] Information provided by Vincenzo Avitabile during debriefing meeting following completion of fieldwork. Vincenzo is project co-ordinator from the Italian Development Co-operation.

11.3 Taking Advantage of Local Conditions

Project implementers took advantage of the fast flowing Wei Wei River and the slope in the river valley to introduce gravity-fed irrigation system. The system supplies water to farmers for irrigation 24 hours a day and 365 days per year. It requires little or no maintenance costs and this is a distinct strength for the system that enhances sustainability of project activities and benefits.

12 CONCLUSIONS

The WWIDP project is an extremely innovative and successful project that has created immense biophysical, economic and social benefits for both project beneficiaries and the local community. The project is sustainable and the technological innovations introduced in the project area can be readily replicated not only in other districts of Kenya but even in other countries.

In our view, the project is a success story that deserves to be awarded the UNEP certificate of recognition for successful dryland management and desertification control.

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