IMPROVING PERFORMANCE OF IRRIGATION SCHEMES THROUGH PARTICIPATORY DIAGNOSIS AND ACTION PLANNING

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ABSTRACT

Kenya has 582,000 km^2 of landmass out of which only 17% is of medium to high agricultural potential. Agriculture is the mainstay of Kenya's economy contributing over 50% of the country's export earnings and accounting for about 80% of rural employment with women providing 75% of the labour force. Agriculture contributes 60% of export earnings, 45% of annual Government revenue and produces almost all the raw materials for agro-industries. Future growth and development of the agricultural sector will rely on developing the 83% land that is Arid and Semi Arid Lands. Irrigation development is a viable option for increasing agricultural production and hence reducing poverty through creating employment and improving food security. The biggest challenge to irrigation development in Kenya is the low performance of the already developed schemes. In the effort to enhance performance a project on Improving the Performance of Irrigation in Africa was implemented in Kenya between 2003 and 2007 using a participatory diagnosis and action planning method. The overall objective of the project was to increase capacity for generation and exchange of information by farmers, technocrats and policy makers on improving irrigation performance. The approach used by the project contributed in increase of productive performance of irrigation schemes through: Improvement of irrigation systems, adoption of appropriate technologies, capacity building for farmers/irrigation water users associations and extension staff. This has led to improved production through enhanced water productivity, use of appropriate agronomic practices leading to improved irrigated enterprise profitability. In addition, networking among stakeholders has been enhanced.

Keywords*: Improving Performance, Irrigation, Participatory Rapid Diagnosis Method*

INTRODUCTION

Kenya has 582,000 km^2 of landmass out of which only 17% is of medium to high agricultural potential. Agriculture is the mainstay of Kenya's economy contributing over 50% of the country's export earnings and accounting for about 80% of rural employment with women providing 75% of the labour force. Agriculture contributes 60% of export earnings, 45% of annual Government revenue and produces almost all the raw materials for agro-industries. Future growth and development of the agricultural sector will rely on developing the 83% land that is Arid and Semi Arid Lands (ASALs). Irrigation development is a viable option for increasing agricultural production and hence reducing prevalence of poverty through employment creation and improved food security.

Kenya has an irrigation potential of 539,000 ha (based on available surface water) and a drainage potential of 600,000 ha. This potential can be increased substantially with enhanced surface water storage and exploitation of the ground water potential. Out of the total potential, only 105,000 ha (19%) has been developed for irrigation. One of the biggest challenges to irrigation development in Kenya is the low performance of irrigation schemes. The project on Improving the Performance of Irrigation in Africa (IPIA) was implemented in Kenya from 2003 to 2007 to address this challenge and used a participatory methodology applied in irrigation schemes.

MATERIALS AND METHODS

The Participatory Rapid Diagnosis and Action planning (PRDA) methodology (van Der Schans and Lemperiere, 2006) provides a tool to bring farmers and frontline workers together to conduct assessment of irrigation performance, identifying the constraints and design action plan to increase irrigation performance. The methodology is both rapid and cost-effective The PRDA makes a diagnosis of the main constraints of the irrigation scheme, which generates action plans for improvement through:

- Increase in capital investment/input;
- Changes to organization;
- Individual farmer's skills;
- Improve the capacity of organisations managing the irrigation systems;
- Increase individual farmers' skills,
- Improve irrigation support service (e.g. value adding and marketing).

Figure 1 presents the overview of the PRDA process involving preparation, diagnosis, action planning.

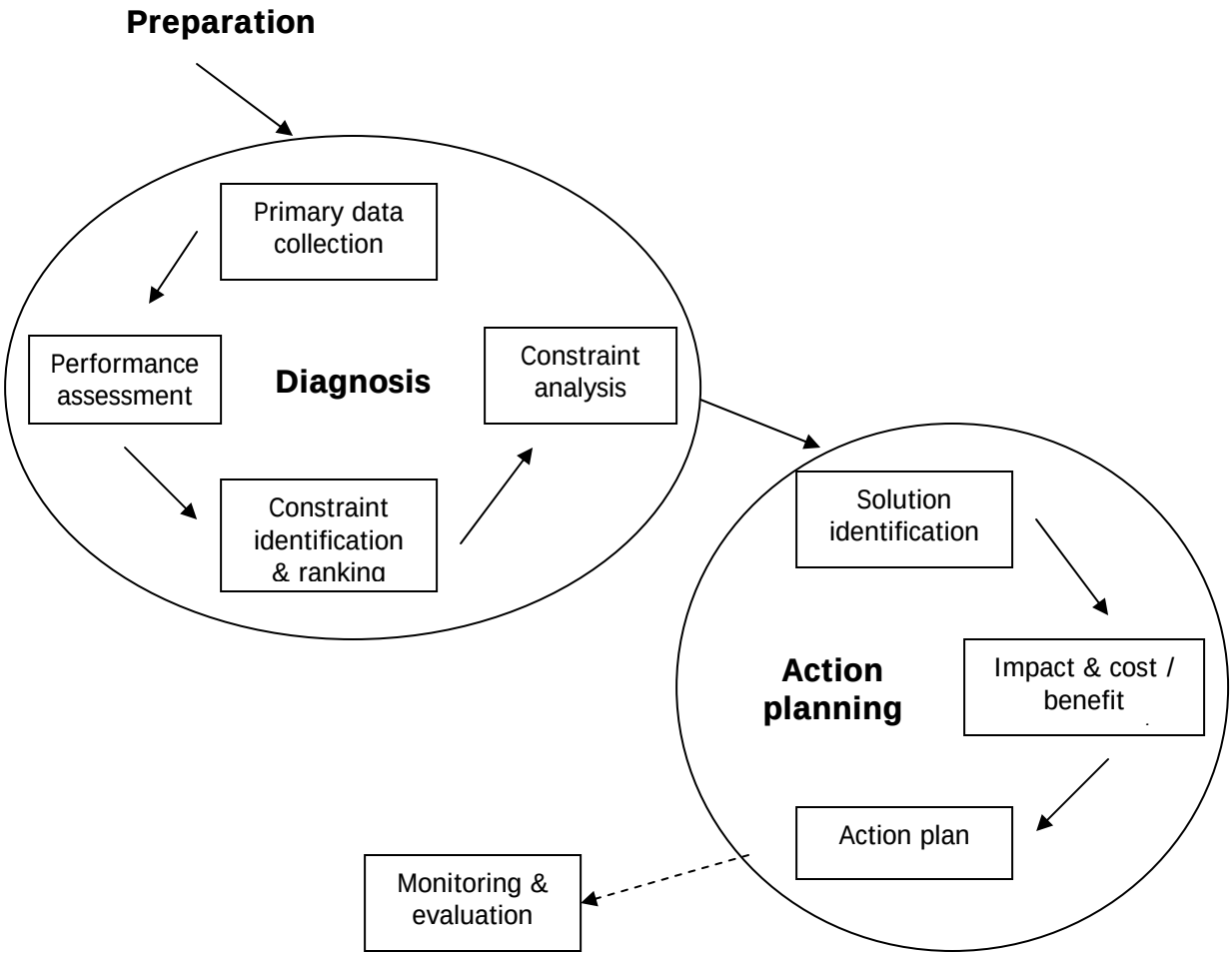
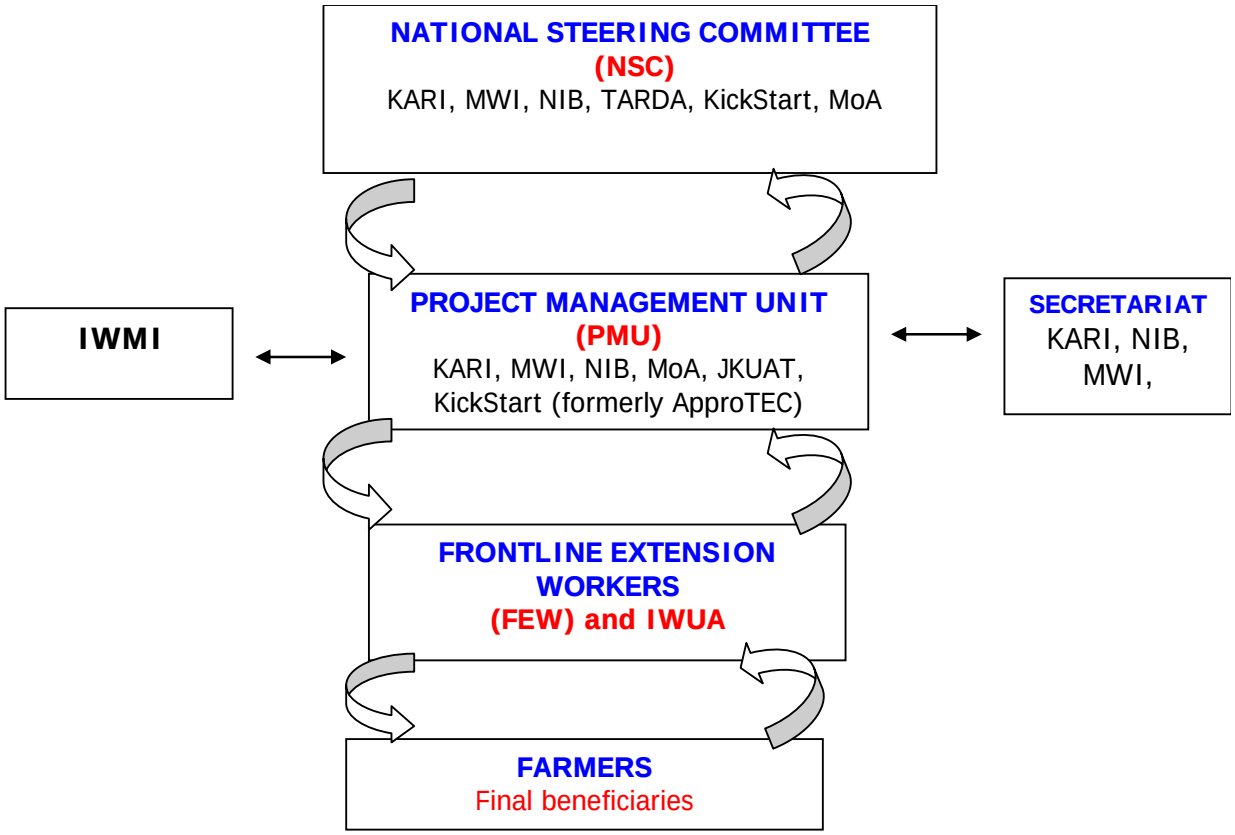


Figure 1: Overview of PRDA procedure

The IPIA project team was a three tier multidisciplinary team as shown in fig 2. A national steering committee (NSC) with members from Kenya Agricultural Research Institute (KARI), Ministry of Water and Irrigation (MWI), Ministry of Agriculture (MoA), National Irrigation Board (NIB), Tana and Athi River Developing Authority (TARDA) and KickStart International guided the project. A project management unit (PMU) with members from KARI, MWI, MoA, NIB, Jomo Kenyatta University of Agriculture and Technology (JKUAT), University of Nairobi (UoN) and KickStart International handled the overall project coordination and management. At the scheme level, frontline extension workers (FEW) and scheme Irrigation Water Users Associations (IWUAs) implemented the project activities with the farmers.



IWMI = International Water Management Institute

Figure 2: The IPIA management structure

To guide the selection of pilot schemes, the project first established a typology of irrigation systems in Kenya (Sijali et al, 2003). For the purpose of this selection, private schemes were left out since they usually perform better and require little support from the extension. Smallholder schemes were sub-divided into three categories resulting in the following overall categorisation of the targeted schemes: Large-scale Centrally Managed, Smallholder with Water Undertaker, Smallholder under IWUA, and Individually Owned schemes (see Table 1).

Table 1: Categorization of IPIA Irrigation Schemes

Large-Scale Centrally Managed	Smallholder with Water Undertaker	Smallholder under IWUA	Individually Owned schemes/systems
Mwea – gravity, Rice	Yatta furrow – gravity, horticulture	Hewani – gravity, rice	Naromoru - Treadle pump and drip irrigation-Horticulture
West Kano – Pump, Rice	South West Kano – gravity, Rice	Kibirigwi – gravity Sprinkler-Horticulture	Awach Cluster - Motorized pumps-Horticulture
		Qahira – Pump, horticulture	

		Nakwamoru – Food scheme	

Source: PMU-Kenya, 2004

Training on PRDA was done in three stages. The first stage was training of district personnel, frontline staff and IWUA representatives on rapid diagnosis tools and methods as well as to plan field activities in the pilot schemes. The second was discussion of findings and identified constraints in the field, including benchmarking indicators. The third was on developing action plans in consultation with farmers using "Cause-effect diagramming" technique of finding logical solutions to problems.

Rapid Diagnostic field activities were conducted in 2003 to 2004 after capacity building at national, district, divisional and scheme levels. Data gathering and development of scheme action plans were conducted by trained participants (frontline extension and IWUA leaders) using PRDA methodology. Scheme stakeholders' workshops were held to agree on the scheme action plans and work plans. Conventional method (using questionnaires and data analysis) was applied for comparison with the PRDA methodology. The action plans were developed in a participatory manner by farmers and field officers by use of cause-effect diagrams during stakeholders' workshops. These workshops had various components focusing on irrigation technology, plot use, organization and management and the socio-economic environment.

Implementation of the action plans was done from 2005 to 2007. As an intervention to identified knowledge gaps, the PMU developed four source books for use as reference materials when training farmers and these were made available to Scheme leaders and IWUA leaders. Trainers of Trainers (ToTs) were trained using the training source books and as a follow up the ToTs held several trainings depending on scheme identified training gaps. The training was funded by IPIA.

Several sensitization meetings were held, including a meeting on proper water use and management. Learning visits were organised for farmers to help them gain experience by visiting schemes identified as good examples in particular areas, for example, farmers from Hewani and South West Kano schemes visited Mwea to learn rice production, processing and marketing while Yatta furrow farmers visited Mwea to learn on IWUA organisation.

RESULTS AND DISCUSSION

The project resulted in significant increases in yields in most of the schemes particularly Mwea, Kibirigwi and Naromoru. Data from Hewani scheme indicated a three-fold increase in yields due to improved water availability and its application to plots. In the case of Kibirigwi scheme, increase in yields more than doubled between the year 2004 and 2005. This was in spite of less water availed to plot users whereby water available for irrigation to a farmer was 103 l/s shared by more users compared to the design value of 150 l/s (Table 2).

Table 2: The changes of baseline data over time in Kibirigwi irrigation scheme

Changing variable over time	Original status Design	Status in 2005	Change
Number of farmers	277	737	+460
Available water per farmer for irrigation (l/sec)	150	103	-47
No. of Sprinklers	546	1191	+645
Total irrigated land (hectares)	273	379	+106
Domestic water supply connections	0	160	+160
IWUA	None	In place	In Place

Source: Mwarasomba et al (2006)

In Mwea, where there had been no IWUA, after several sensitization meetings were held, a well-trained management committee was established. The National Irrigation Board (NIB), which had previously been rejected by the farmers due to its top down approach, has now been accepted as the water service provider. Farmers now benefit from the government services and can engage other stakeholders in their production systems. Infrastructure improvements have been undertaken, resulting in more equitable distribution of water among other benefits. Farmers have enjoyed an increase of 750 $Kg.ha^{-1}$ to 1,250 $Kg.ha^{-1}$ due to proper use of fertilizer and other crop husbandry techniques, in field block W3 (nicknamed '*Vietnam*' after the water conflicts in 2002) the increase is more than 100 per cent (Fig 3). Some farmers who harvested less than 25 bags of rice per ha reported yields of more than 62.5 bags per ha due to improved water supply brought about by their IWUA. Farmers now receive water in one to two weeks' rotation to avoid crop losses.

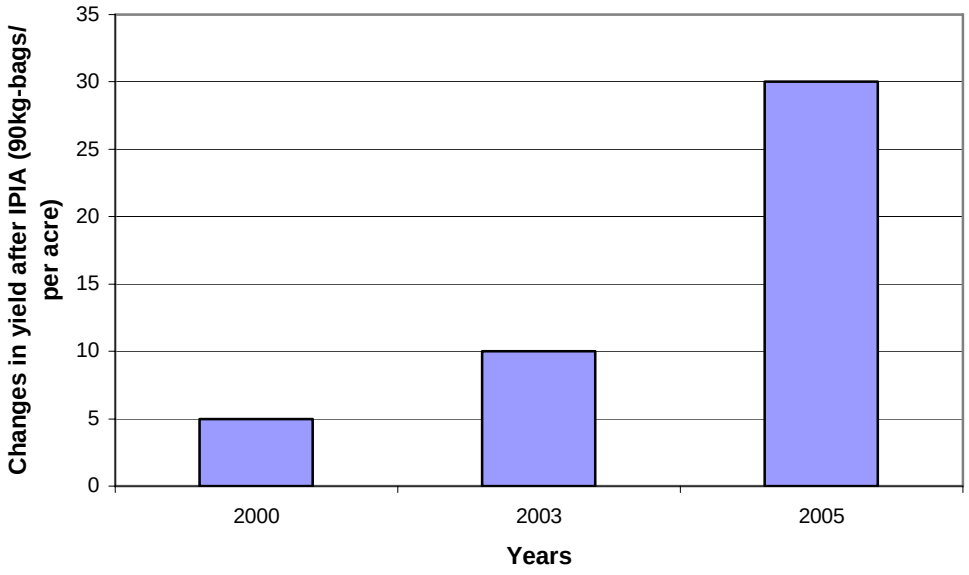


Figure 3: Comparison of rice yield from field block W3 with and without project.
Source: Mwarasomba et al (2006)

Another improvement was growing of more than one crop per year especially in Mwea scheme where only one rice crop was traditionally grown and the land left fallow the rest of the year. Farmers are now able to grow other crops immediately after harvesting the rice crop. Crops being incorporated on trial basis as part of rice rotation include soy beans, green grams, short season maize, sunflower, French beans, passion fruits, among others. The same trend was found in Naromoru and Kibirigwi schemes where new crops were introduced in order to increase farm profitability through improved plot use.

In South West Kano, the IPIA initiative was timely as it coincided with the planned revival of the scheme after five years of not being in operation. The project has contributed to reduced canal siltation and unauthorized water diversions through training farmers and extension staff on water management. The training included land levelling for basins to improve on plot water use efficiency. While other stakeholders contributed to improved plot use through training on agronomic practices, IPIA facilitated the formation of an operational IWUA in the scheme.

Having developed their action plans Qahira scheme farmers in Garissa district, managed to get additional funds to implement their work plans through funding by the French Social Fund for Development and the Constituency Devolvement Fund. The funds were used to buy two pumps the scheme required and lined the main canal to minimise water conveyance losses.

The results suggest that irrigation performance improves as the result of the interplay between technology, institutions, farmers' skills and socio-economics issues (Fig 4).

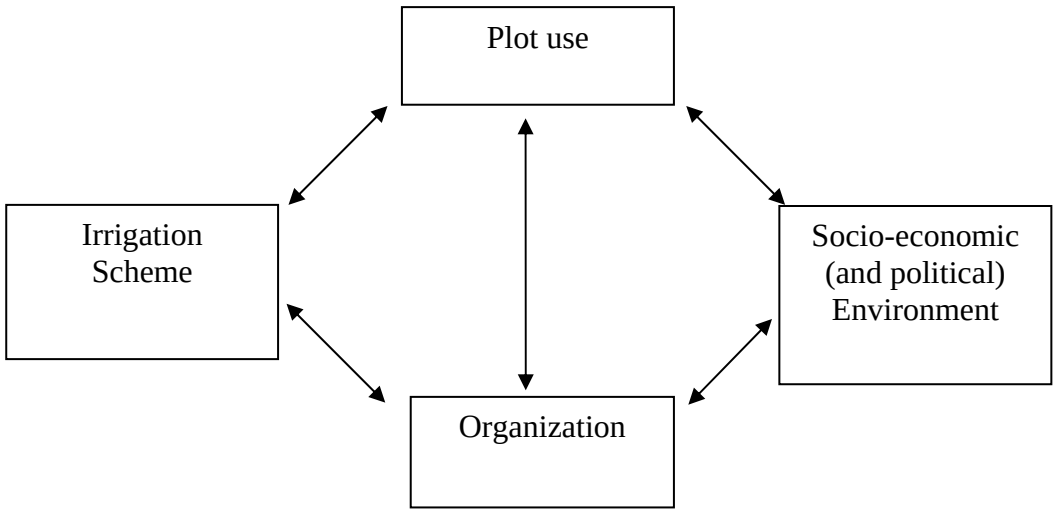


Fig 4: Results framework of the IPIA project approach

CONCLUSIONS AND RECOMMENDATIONS

Irrigation, which has been a relatively neglected sector in Kenya for many years, is now picking up, with farmers receptive to attention, particularly when their voices are heard,

as has been the approach of the IPIA project. Farmers are open to new markets and realize that cooperation over water allocation is essential if sustainable improvements in farming oriented income are to be realized.

Evidence from the pilot schemes showed that the PRDA methodology assisted the irrigating farmers to identify various problems (this was confirmed by the conventional method) facing them and planned on how to tackle them to improve the performance of the schemes. Increased production was reported in all pilot schemes. Part of the increased production was as a result of improved performance of IWUAs that resulted in equitably and efficiently distributing irrigation water to their clients, the farmers. There was improvement in plot use in the schemes through sensitization of farmers by IPIA. Alternative crops to rice such as sunflower, passion fruits, tomatoes and other leguminous and horticultural crops were introduced. The same trend was observed in non-rice producing schemes.

Water use efficiency characterizes the ratio of crop yield (biological or economic) to crop water use.

IPIA action plans have tested solutions to increase cops yields as for example:

- On-farm multiplication of improved seeds, increasing organic manure utilization and composting;
- Training and follow-up activities dealing with farm financial management and limiting market risk to provide farmers guidance in terms of crop selection, planning of production, inputs use;
- Improving cropping techniques through training and establishment of demonstration sites would also contribute to increasing irrigation productivity and farmers;
- Introduction of labour-saving irrigation technology such as drip irrigation

PRDA is relatively inexpensive and requires shorter time to conduct. Involvement of the scheme stakeholders creates ownership of the action plans and therefore overseeing their implementation. PRDA should be adopted by irrigation professionals as a tool for improving performance of irrigation schemes.

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REFERENCES

Mwarasomba, L.I., Ndegwa, G.M. and Nyang'wara, M.K. 2006. Evaluation of the project on improving the performance of irrigation in Kenya. IPIA project report.

P.M.U.-Kenya. 2004. Annual report for the year 2003/2004. IPIA project report.

Sijali, I.V., Muchangi, P.W. and Wendot, H. 2003. Typology of irrigation in Kenya. IPIA project report.

Van der Schans, M. and Lempérière, P. 2006. Participatory Rapid Diagnosis and Action planning (PRDA) for irrigated agricultural systems. IPTRID, IWMI, FAO publication.