

Republic of Kenya

FY2019 Ex-Post Evaluation of Technical Cooperation Project

“Sustainable Smallholder Irrigation Development and Management in Semi-Arid Lands Project”

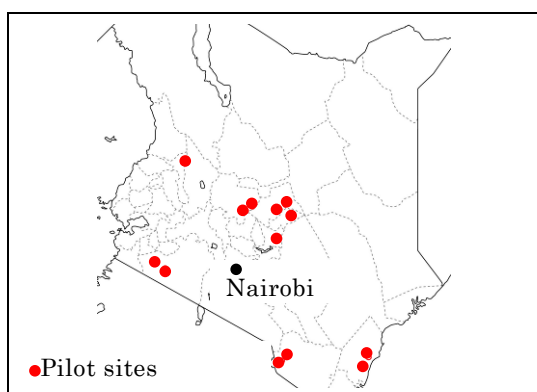
External Evaluator: Ayako Nomoto, International Development Center of Japan Inc.

0. Summary

The aim of the project was to investigate and summarize the application of a model for smallholder irrigation development which involves farmer participation to secure stable agricultural water supply in semi-arid lands and to strengthen the resilience to frequent droughts. The relevance of the project is high because the objective of the project was consistent with the development plan and development needs of Kenya both at the time of ex-ante evaluation and project completion, and it was also consistent with Japan's ODA policy to Kenya at the time of ex-ante evaluation. At the completion of the project, a draft guideline for the model was developed, and the capacity of Irrigation Water Users Associations (hereinafter called “IWUA”) and farmers at the pilot sites was strengthened; however, the objective was partially achieved because some of the smallholder irrigation facilities have not been completed. Goals after the project completion, such as utilizing the proposed plan and confirmation of the effectiveness of the model were partially met. Therefore, the effectiveness/impact are fair. Efficiency is fair as both project costs and period exceeded the plan. Concerning the sustainability of the project effects, there are some challenges in the institutional/organizational, technical, and financial aspects, and therefore, the sustainability of the project effects is fair.

In light of the above, this project is evaluated to be partially satisfactory.

1. Project Description



Project Locations



An intake weir constructed by the project and irrigation water users association members

1.1 Background

In the Horn of Africa (Ethiopia, Kenya, Somalia, and others), which includes the northern part of Kenya, most of the region is dominated by arid and semi-arid lands with low rainfall by nature, resulting in chronic and cyclical outbreaks of droughts and associated food crises. In recent years, it had become a severe problem not only in the northern part of the country but also in other semi-arid lands, which had a significant impact on agricultural production, and the resilience of the entire semi-arid lands had become an issue. In particular, the low rainfall at the time of the ex-ante evaluation (2012) caused the worst and most severe drought in the past 60 years, and the development of measures to strengthen resilience to the recurrent droughts was an urgent issue.

The small and uncertain rainfall resulting from the drought had affected agricultural production and livestock production, which in turn had affected the stable supply of food. Irrigation development was expected to solve these problems and make a significant contribution to improving farmers' incomes and increasing agricultural employment opportunities.

In the past, Japan International Cooperation Agency (JICA) implemented a technical cooperation project called “Project for Sustainable Smallholder Irrigation Development and Management in Central and Southern Kenya” (hereinafter called “SIDEMAN” project) (2005-2010). It was a project in South Central Kenya, where natural conditions were more favorable, to promote smallholder irrigation development with farmer participation to secure stable agricultural water supply. Since the application and dissemination of the model were considered to be effective in addressing the problems in semi-arid lands, JICA needed to conduct an immediate study and compilation of methods to apply the model to semi-arid lands and put them into practice, and decided to carry out a research on how to apply these methods to semi-arid lands.

1.2 Project Outline

Overall Goal ¹		<p><u>Expected utilization of the proposed plan</u></p> <p>Improved SIDEMAN (Sustainable Smallholder Irrigation Development and Management) model* is approved as a model for smallholder irrigation development and applied in Kenya (*The model means participatory smallholder irrigation development management practices implemented following the participatory irrigation project guideline, IWUA framework, and staff training master plan)</p> <p><u>Impact 1 (Expected goals through the proposed plan)</u></p> <p>Increase in the number of smallholder irrigation schemes in semi-arid lands using the proposed plan in this project.</p> <p><u>Impact 2</u></p> <p>The effectiveness of the SIDEMAN model is verified (stable irrigation water supply, improved farming technology, increased crop production, increased yield, and crop diversification at the pilot sites).</p>
Project purpose ²		—
Output(s)	Output 1	SIDEMAN model is improved.
	Output 2	Pilot projects are implemented.
Total cost (Japanese Side)		1,132 million yen
Period of Cooperation		August 2012 – June 2016 (Extension period: August 2015 – June 2016)

¹ As this project is a development planning project, there are no Overall Goal and Project Purpose set as there are for ordinary technical cooperation projects. Also, it is not mandatory to set Project Purpose to be achieved during the project period, as is the case with regular technical cooperation projects. This is because producing the outputs of the master plan, feasibility study, and others is generally a goal to be achieved within the project period. Thus, no Project Purpose was set for this project. In the evaluation of a development planning project, “Expected utilization of the proposed plan” and “Expected goals through the proposed plan” are equivalent to the Overall Goal in regular technical cooperation projects. Therefore, this ex-post evaluation organizes the logic of the project effects as follows: (1) Outputs ⇒ Outcome: Status of the utilization of the proposed plan ⇒ Impact: Goals expected to be achieved through the proposed plan. Meanwhile, since this project implemented many pilot projects, it is required to understand the current status of the pilot projects and confirm the development effects as impacts of the project.

² As noted above, no Project Purpose was set for this project.

Target Area	Pilot sites: 13 sites in eight counties	
	County	Pilot Site
	Taita-Taveta	Kasokoni, Challa/Tuhire
	Kilifi	Mdachi, Mangudho
	Narok	Olopito, Shulakino
	Laikipia	Gatitu/Muthaiga, Kiamariga/Raya
	Elgeyo-Marakwet	Kaben
	Embu	Murachake
	Meru	Tumutumu, Kaumbura
	Tharaka-Nithi	Muongano
Implementing Agency ³	Ministry of Water and Irrigation (Currently, Ministry of Water & Sanitation and Irrigation), Ministry of Agriculture	
Other Relevant Agencies / Organizations	County governments where the pilot sites are located	
Supporting Agency/Organization in Japan	Nippon Koei Co., Ltd.	
Related Projects	<Technical Cooperation> - The Project for Sustainable Smallholder Irrigation Development and Management in Central and Southern Kenya (2005-2010) - Smallholder Horticultural Empowerment Project (hereinafter called “SHEP”) (2006-2009)	

³ In September 2013, the Department of Irrigation and Drainage, which had jurisdiction over the irrigation, was transferred to the then Ministry of Agriculture, Livestock, and Fisheries and reverted to the Ministry of Water and Irrigation in April 2015. Subsequently, the Department of Irrigation and Drainage was reorganized into the Ministry of Agriculture, Livestock, Fisheries, and Irrigation after the completion of the project. However, it was again reorganized into the Ministry of Water & Sanitation and Irrigation in August 2019. Besides, the devolution system from January 2014 onwards led to the establishment of county governments as local administrative bodies, and the implementation structure was changed as follows. At the time of project planning: the national government (Ministry of Water and Irrigation (at that time) and Ministry of Agriculture), Provincial Director of Irrigation /Provincial Director of Agriculture and District Irrigation Officer/District Agriculture Officer). After county inauguration: the national government (Ministry of Agriculture, Livestock and Fisheries/Department of Water Irrigation), County (Director of County Irrigation/Director of Agriculture, Sub-County Irrigation Officer/Agricultural Officer)

2. Outline of the Evaluation Study

2.1 External Evaluator

Ayako Nomoto, International Development Center of Japan Inc.

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: July 2019 – August 2020

Duration of the Field Study: October 16, 2019 – November 8, 2019, February 5, 2020 – February 19, 2020

2.3 Constraints during the Evaluation Study

This project implemented pilot projects in eight counties in Kenya, of which the ex-post evaluation mission was not able to visit Elgeyo-Marakwet County for security reasons, and information could not be collected. Therefore, the evaluation judgment for the pilot projects was based on information from the seven counties.

3. Results of the Evaluation (Overall Rating: C⁴)

3.1 Relevance (Rating: ③⁵)

3.1.1 Consistency with the Development Plan of Kenya

The objective of the project was consistent with Kenya's development plan both at the time of ex-ante evaluation and at the completion of the project.

At the time of ex-ante evaluation, the Government of Kenya's national strategy, the *Kenya Vision 2030* (2008-2030) identified the agricultural sector as a pillar of economic growth. Also, "Development of irrigable area for cereals and livestock in arid and semi-arid lands" is one of the strategies for promoting the agricultural sector, intending to increase the irrigated area and increase productivity in irrigation schemes from the perspective of food security. The *Agriculture Sector Development Strategy* (hereinafter called "ASDS") (2010-2020), a strategy for the agricultural sector based on the *Vision 2030* states the importance of supporting small-scale farmers, improving market access, collaborating with the private sector, and strengthening extension services to promote crop production.

At the completion of the project, the *Vision 2020* remained in effect, and the *Second Medium-Term Plan* (2013-2017) of the *Vision 2030* aimed to increase the irrigated area by 404,800 hectares during the same period, especially in semi-arid lands, to ease Kenya's dependence on rain-fed agriculture. *ASDS* (2010-2020) mentioned above was still valid. The *National Water Master Plan 2030* also listed the development of smallholder

⁴ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁵ ③: High, ②: Fair, ①: Low

irrigation schemes as an essential strategy.

3.1.2 Consistency with the Development Needs of Kenya

The objective of the project was consistent with the needs for irrigation development in Kenya both at the time of ex-ante evaluation and the completion of the project.

At the time of the ex-ante evaluation, the irrigated area in the semi-arid lands of Kenya was only 1.7% of the arable area. Yet, irrigation schemes generated 18% of the agricultural output, implying the potential for improved agricultural production and productivity through irrigation. Agricultural production in the irrigation schemes had increased over the years, especially the production of horticultural crops, which amounted to 6% of the value of agricultural exports. Smallholder farmers accounted for 75% of the agricultural production value, 70% of production, and 25% of exports in Kenya, and therefore, support for smallholder farmers was essential to improve the productivity of the agricultural sector.

At the time of project completion, according to the *National Irrigation Policy* (2015), of the 1,342 thousand hectares of irrigable area, only 162 thousand hectares were irrigated and developed (2013). Of these, 43% were smallholder irrigation schemes. Besides, the lack of rainfall continued to affect the agricultural sector. The sector grew at a rate of 4.2% between 2013 and 2017; however, the growth rate in each year was weather-dependent. After improving from 5.4% in 2013 to 5.5% in 2015, the growth in gross value added in agriculture declined to 4.0% in 2016 and further fell to 1.6% in 2017 due to lack of rainfall. Prolonged rain shortages resulted in a decline in the production of principal food security crops - maize, rice, and wheat - in 2017. The output for 2013 and 2017, respectively, is shown in Table 1.

Table 1: Production of key crops

	2013	2017
Maize (million bags)	40.7	35.4
Rice (ton)	125,256	81,200
Wheat (ton)	194,500	165,200

Source: Third Medium-Term Plan (2018-2022) of Vision 2030

In 2016, agriculture accounted for approximately 31% of Kenya's GDP and occupied a significant position⁶. The importance of smallholder farmers was high, as they accounted for about 73% of the value of agricultural production, and their need to improve productivity was high.

⁶ Source: Kenya economic survey 2020

3.1.3 Consistency with Japan's ODA Policy

The objective of the project was consistent with Japan's ODA policy at the time of the ex-ante evaluation. The priority area of agricultural development in the *Country Assistance Policy for the Republic of Kenya* (April 2012) states that "it is necessary to ensure food security and increase the income of small-scale farmers by further promoting agriculture as a significant industry. To this end, it states that the Government of Japan will support the improvement of production technologies for rice and others, the development of irrigation facilities, and the development of market-needed agriculture such as horticultural crops.

Thus, this project was highly relevant to the Kenya's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Effectiveness and Impact⁷ (Rating:②)

3.2.1 Effectiveness

3.2.1.1 (Project Output)⁸

Outputs of this project were partially achieved. The expected outputs of this project are (1) "the SIDEMAN model is improved", and (2) "Pilot projects are implemented". Concerning (1), the draft guideline (2016 version) was prepared at the time of completion of the project. Thus, it can be said that this was achieved.

⁷ Sub-rating for Effectiveness is to be put with consideration of Impact.

⁸ Refer to footnotes 1 and 2.

facilities after the completion of the project, in two (Mdachi and Tumutum) of the eight sites with remaining works, the county governments (Kilifi County and Meru County respectively) partially carried out the remaining works. In Mangudho (Kilifi County), there were no remaining works under this project, but the County Government (Kilifi County) carried out the related actions. Similarly, in Muungano (Tharaka-Nithi County), the Ministry of Water & Sanitation and Irrigation carried out the related works (laying of pipelines) on the targeted irrigation system. Also, Kilifi County has budgeted for unfinished facilities. The Memorandum of Understanding (MOU) among (1) the Government of Kenya, JICA, the project team representative, (2) IWUA, and (3) the county government at each site did not specify the remaining works, and therefore, the responsibility for completion of the works is not always clear. Nonetheless, the Ministry of Water & Sanitation and Irrigation is exploring the possibility of implementing the remaining works at the time of the ex-post evaluation. Also, JICA Kenya office is considering the option of following up on some of the facilities.

Table 2: Status of achievement of outputs

Output	Indicator	Result															
1.SIDEMAN model is improved.	—	Achieved A draft guideline (2016 version) was developed upon completion of the project.															
2.Pilot projects are implemented.	1.The number of smallholder irrigation facilities constructed in the pilot projects	Not achieved Of the 13 sites in the pilot projects, eight sites had work remaining at the time of completion of the project. Of these, the remaining work on six sites had not been carried out at the time of the ex-post evaluation.															
		<table border="1"> <thead> <tr> <th>Site</th> <th>Remaining work (As of April 2016)</th> <th>Status of implementation (At the time of ex-post evaluation)</th> </tr> </thead> <tbody> <tr> <td>Kasokoni</td> <td>(1) Excavation of drainage canal (2) Rock excavation of drainage canal</td> <td>Not implemented</td> </tr> <tr> <td>Mdachi</td> <td>(1) Construction of the secondary canal (2) In-field system</td> <td>Partially implemented</td> </tr> <tr> <td>Olopito</td> <td>(1) Rock excavation downstream of the main pipeline (2) Sub-main Downstream (3) In-field system</td> <td>Not implemented</td> </tr> <tr> <td>Gatitu/Muthaiga</td> <td>(1) Material and labor cost for construction of chambers and crossing</td> <td>Not implemented</td> </tr> </tbody> </table>	Site	Remaining work (As of April 2016)	Status of implementation (At the time of ex-post evaluation)	Kasokoni	(1) Excavation of drainage canal (2) Rock excavation of drainage canal	Not implemented	Mdachi	(1) Construction of the secondary canal (2) In-field system	Partially implemented	Olopito	(1) Rock excavation downstream of the main pipeline (2) Sub-main Downstream (3) In-field system	Not implemented	Gatitu/Muthaiga	(1) Material and labor cost for construction of chambers and crossing	Not implemented
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Gatitu/Muthaiga	(1) Material and labor cost for construction of chambers and crossing	Not implemented															

			(downstream) (2) Feeder pipeline downstream (3) In-field system downstream		
		Kaben	—	—	
		Murachake	—	—	
		Tumutumumu	(1) Main and Sub-main: Material and labor cost for construction of chambers and crossing (downstream) (2) Construction of Main and Sub-main pipelines downstream (3) Distribution and in-field system downstream	(1) Implemented (2) Implemented (3) Not implemented	
		Muungano	—	—	
		Challa/Tuhire	(1) Lining works for secondary canals (2) Construction of road crossing	Not implemented	
		Mangudho	—	—	
		Shulakino	—	—	
		Kiamariga/Raya	(1) Construction of Distribution Pipelines in Kiamariga (2) Rehabilitation of intake weir (3) Rehabilitation of Raya pipeline system	Not implemented	
		Kaumbura	(1) Lining works on the main canal	Not implemented	
	2.Capacity enhancement of O&M of irrigation facilities and on farming technology	<p>Achieved</p> <p><u>Capacity enhancement of O&M of irrigation facilities</u></p> <p>The training was provided to farmers at all 13 target pilot sites between March 2013 and December 2015. The contents were based on the training program implemented in the SIDEMAN project and were improved based on the opinions of the participants. The main contents are as follows.</p> <table border="1" style="margin-left: 40px;"> <tr> <td> <ol style="list-style-type: none"> 1. Community revitalization and the formation and management of IWUAs (partially revised) 2. Leadership and conflict management (partially </td> </tr> </table>			<ol style="list-style-type: none"> 1. Community revitalization and the formation and management of IWUAs (partially revised) 2. Leadership and conflict management (partially
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		<p>revised)</p> <ol style="list-style-type: none"> 3. Financial management and bookkeeping (partially revised) 4. Field-level water management and practical irrigated agriculture (fully revised, adding soil fundamentals and food processing) 5. Irrigation system management (fully revised) <p>At the completion of the project, from the results of the training content evaluation questionnaire, comprehension test, and the IWUA’s basic competency survey, participants were judged to have acquired the knowledge of IWUA operations needed to strengthen resilience.</p> <p><u>Capacity enhancement of farming technology</u></p> <p>The training was conducted between August 2013 and December 2014. It was judged that awareness of model farmer group members on the market-oriented farm management was raised. The contents of the project are as follows.</p> <ol style="list-style-type: none"> 1. Part of the SHEP approach*, in particular, concerning improving market-oriented farm management capacity, training on baseline surveys, simple market surveys, production of crop calendars, and recording of farm income and expenditure was provided to model farmer group members in all 13 sites. (*SHEP approach is an approach for raising awareness of farmers towards market-oriented farming operations through strengthening capacity on awareness of costs and benefits of agricultural products, understanding market conditions, and improving horticultural technology.) 2. Low-input sustainable agriculture (LISA) techniques: introduction of Kenyan traditional vegetables, and introduction of push-pull technology (mainly for pilot farmers and farmer group members. LISA technology was introduced in four Batch 1 pilot sites for trial).
	3.Strengthening of the capacity of Ministry of Water and Irrigation staff for participatory irrigation development	<p>Achieved</p> <p>The workshops and training were conducted between April 2013 and January 2016. Primarily, the targets were the Sub-County Irrigation Officer (hereinafter called “SCIO”) and Sub-County Agriculture Officer (hereinafter called “SCAO”) for the eight counties to which the pilot sites belonged. The content of capacity-building includes sensitization workshops, feasibility studies, and design training, Training of Trainers (TOT) in IWUA capacity building training, contract management training, training of SCAOs on farming techniques, and others.</p>

Source: Documentation provided by JICA, interviews with the Ministry of Water & Sanitation and Irrigation and the county governments

Note: (1) Indicators for Outputs 2 have been set based on the description under the Record of Discussions.

Thus, the outputs can be said to be partially achieved, as the draft guideline was developed, and capacity-strengthening at the pilot sites was conducted; however,

smallholder irrigation facility development has not been completed.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

As described in footnote 1, three types of Overall Goal, namely, “Expected utilization of the proposed plan” (Outcome), “Expected goals through the proposed plan” (Impact 1), and “Verification of the effectiveness of the SIDEMAN model at the pilot sites” (Impact 2) were set, considering that this evaluation was conducted as a development planning project-type technical cooperation and that irrigation development was carried out on a relatively large scale at many of the pilot sites.

Concerning the “Expected utilization of the proposed plan”, the “status of approval by the Government of Kenya” (Indicator 1) was partially achieved, as the guideline has not yet been formally approved. However, the experience and issues of the project were included in the revised guideline. At the time of the ex-post evaluation, the *Irrigation Regulations* (2020) was being developed, and according to the Ministry of Water & Sanitation and Irrigation, revised guideline reflecting the experience of the project will be reflected in the document. As for the “status of utilization of the model” (Indicator 2), although it has not yet been formally approved and distributed, it has been utilized in some of the county governments interviewed (three counties), indicating that it has been partially achieved.

As for the “Expected goals through the proposed plan”, the proposed plan (revised SIDEMAN model) was not approved or distributed at the time of the ex-post evaluation, and therefore, the number of smallholder irrigation schemes and the number of newly developed irrigated area based on it cannot be verified.

The indicators to verify the effectiveness of the SIDEMAN model (stable irrigation water supply, improved farming technology, and increase in crop production and yield) at the pilot sites were set to be “increase in irrigated area and the number of beneficiary farmers (the number of IWUA members who use the irrigation water)”, “technologies introduced such as SHEP approach, LISA approach, and irrigation water-saving technology”, and “improvement in the production, the cultivated area, and the yield of main crops, and diversification of crops”¹⁰.

Concerning “irrigated area and number of beneficiary farmers” (indicator 1), of the 12 sites for which information was obtained¹¹, six sites were not irrigated, and for the other six sites that were irrigated, the simple average of the actual irrigated area relative to the

¹⁰ No indicators were set at the time of the ex-ante evaluation. In the ex-post evaluation, indicators were set based on the final report at the completion of the project.

¹¹ Except for Elgeyo-Marakwet County, where it was not possible to conduct a site survey due to security reasons.

plan was 51%, which can be said to be partially achieved. In the six irrigated farming sites, the smallholder irrigation facilities developed under the project are in operation and continue to be used. Besides, each IWUA continues to function as an association (e.g., electing committee members, holding general meetings, collecting water fees and recording accounts and others), cleaning and repairing irrigation facilities, and taking advantage of the learning from the project's capacity building concerning operation and maintenance. The reason why the target has not been met is mainly due to the incomplete development of irrigation facilities; however, other site-specific conditions are listed below.

Table 3: Reason for the failure to meet target irrigated area and the number of beneficiary farmers at each site

Pilot site	Reason
Mdachi (Kilifi County)	Farmers irrigated land after the development of the intake weir and main canal. However, at the time of the ex-post evaluation, they only used rain-fed agriculture because of crop damage from the September 2019 floods, high salinity, and poor design of the secondary and tertiary canals (not covered by the project), making water distribution inefficient. The county government has considered repairing the intake weir as a flood control measure and has secured a budget (not yet implemented).
Olopito (Narok County)	There has never been any irrigated agriculture with the irrigation facilities of the project, as no remaining work has been done since the end of the project period. IWUA has approached donors, including the county government, but there are no plans for improvements.
Gatitu/Muthaiga (Laikipia County)	There has been no irrigated agriculture since the completion of the project as no water rights have been granted by the Water Resource Management Authority (hereinafter called "WRMA"). Besides, there is a problem that residents downstream destroyed the water intake weir constructed by the project due to water disputes. The county government is negotiating with WRMA on the restoration of the destroyed weir.
Kiamariga/Raya (Laikipia County)	
Murachaki (Embu County)	After the completion of the project, the canal was partially improved (not subject to the project); however, the users were limited to 27 farmers along the main canal, and they did use water for non-irrigation purpose. IWUA is considering the improvement of the canal with the support by donors and by union members' reserves.

Tumutumu (Meru County)	The remaining works have been carried out by the county government, yet the irrigation area has not reached the plan because the branch lines have not been completed.
Mangudho (Kilifi County)	Pipeline and reservoir were damaged, and irrigation facilities are not in use. The county government has applied for a budget in the 2019/20 budget.
Shulakino (Narok County)	Irrigation facilities have not been used due to the December 2018 floods that damaged some of the water intake weir and pipelines and changed the river channel. Possible rehabilitation is being discussed with World Bank.

Source: Interviews with the county governments, IWUAs, and farmers

Concerning the use of “technologies introduced” (Indicator 2), according to interviews with farmers¹², they continue to prepare a cropping calendar and conduct market surveys.

Concerning the “production, the cultivated area, the yield of major crops and diversification of crops” (Indicator 3), data was not available because the county governments and IWUAs did not collect and accumulate data on smallholder irrigation¹³; however, pilot sites with functioning irrigation facilities (six out of 11 sites visited) showed significant improvements, according to interviews with farmers. According to the farmers, (1) water is distributed stably and efficiently, (2) cultivated area and production have increased because they are able to cultivate crops throughout the year, and (3) diversification of crops has been achieved.

Table 4: Achievement of Overall Goal

Overall Goal	Indicator	Actual
<u>Expected utilization of the proposed plan</u>	1. Status of approval of the model by the Government of Kenya	Partially achieved.
Improved SIDEMAN model is approved as a model for smallholder irrigation development		- The guideline developed under a mini-project (Implemented by JICA from 2000 to 2003, with the aim of promoting sustainable smallholder irrigation schemes. The project was formulated in response to various issues arising from the Study on Irrigation and Horticulture Development around the Foothills of Mt. Kenya conducted in 1997-98) in 2003 was approved in August 2003 and distributed and used nationally. - The 2003 Guideline was subsequently revised in 2010, 2016, and 2018; however, they have not been approved or distributed and are not being utilized because they are subject to public participation process for approval and distribution as

¹² Group interviews were conducted at each site with 105 members in total (including men and women) of IWUAs at 11 locations. In each IWUA, members belonging to various irrigation blocks, ranging from farmers whose farmland is close to irrigation facilities to those at the end of the canals, participated in group interviews.

¹³ According to the Ministry of Water & Sanitation and Irrigation, the number of smallholder irrigation schemes in the country is around 3,000; however, the exact figure is not known. The irrigation and drainage database of the Ministry of Water & Sanitation and Irrigation does not capture information on smallholder irrigation schemes, and there is no reliable data on IWUAs or production under the smallholder irrigation schemes.

and applied in Kenya.		required by the Constitution of Kenya. In revising this guideline, the experiences and issues of the project have been incorporated.																																																																	
	2. Status of the utilization of the model by the Government of Kenya	<p>Partially achieved</p> <ul style="list-style-type: none"> - The 2003 Guideline has been distributed throughout the country and is being well utilized. In particular, the development partners refer to the guideline when implementing their projects. - Besides, the guideline has significantly influenced policy, as reflected in the <i>National Irrigation Policy 2017</i> and the subsequent <i>Irrigation Act of 2019</i>, including funding methods, stakeholder participation, private sector involvement, and participatory development. - Since devolution in 2010, many counties may not be aware of the existence of the guidelines. - At the county government level in the pilot sites, the model used in this project has been applied in smallholder irrigation schemes when transferring technology to farmers (Meru County, Tharaka-Nithi County, and Kilifi County). 																																																																	
Impact 1 (Expected goals through the proposed plan) Increase in the number of smallholder irrigation schemes in semi-arid lands using the proposed plan in this project.	1. The number of smallholder irrigation schemes utilizing the proposed plan in this project.	<p>Not verified</p> <ul style="list-style-type: none"> - Verification is not possible because the model developed in this project has not been formally approved. - At the county level, where the pilot sites are located, interviews indicate that Kilifi County has used the experience of the project in 10 new irrigation schemes since the implementation of the project. 																																																																	
	2. Irrigated area using the proposed plan in this project.	<p>Not verified</p> <ul style="list-style-type: none"> - Ibid. - According to Kilifi County, it is estimated to be between 1,000 and 3,000 acres. 																																																																	
Impact 2 The effectiveness of the SIDEMAN model is verified (stable irrigation water supply, improved farming technology, increased crop production, increased yield, and crop diversification at the pilot sites).	1. Irrigated area and the number of beneficiary farmers (the number of Irrigation Water Users Associations (IWUA) members who use the irrigation water)	Partially achieved Irrigated area and number of beneficiary farmers																																																																	
		<table border="1"> <thead> <tr> <th rowspan="2">Site</th> <th colspan="2">Number of beneficiary farmers (IWUA members) (household)</th> <th colspan="3">Irrigated Area (ha)</th> </tr> <tr> <th>Plan at the time of ex-ante evaluation</th> <th>Actual at the time of ex-post evaluation</th> <th>Plan at the time of ex-ante evaluation</th> <th>Actual at the time of ex-post evaluation</th> <th>Ratio against the plan (%)</th> </tr> </thead> <tbody> <tr> <td>Kasokoni</td> <td>44</td> <td>47</td> <td>33</td> <td>25</td> <td>75%</td> </tr> <tr> <td>Mdachi</td> <td>62</td> <td>0</td> <td>30</td> <td>0</td> <td>0%</td> </tr> <tr> <td>Olopito</td> <td>82</td> <td>0</td> <td>77</td> <td>0</td> <td>0%</td> </tr> <tr> <td>Gatitu/ Muthaiga</td> <td>159</td> <td>0</td> <td>57</td> <td>0</td> <td>0%</td> </tr> <tr> <td>Kaben</td> <td>530</td> <td>N/A</td> <td>360</td> <td>N/A</td> <td>-</td> </tr> <tr> <td>Murachake</td> <td>430</td> <td>0</td> <td>172</td> <td>0</td> <td>0%</td> </tr> <tr> <td>Tumutumu</td> <td>450</td> <td>450</td> <td>90</td> <td>27</td> <td>30%</td> </tr> <tr> <td>Muongano</td> <td>418</td> <td>418</td> <td>167</td> <td>100</td> <td>60%</td> </tr> <tr> <td>Challa/ Tuhire</td> <td>700</td> <td>200</td> <td>300</td> <td>203</td> <td>68%</td> </tr> </tbody> </table>	Site	Number of beneficiary farmers (IWUA members) (household)		Irrigated Area (ha)			Plan at the time of ex-ante evaluation	Actual at the time of ex-post evaluation	Plan at the time of ex-ante evaluation	Actual at the time of ex-post evaluation	Ratio against the plan (%)	Kasokoni	44	47	33	25	75%	Mdachi	62	0	30	0	0%	Olopito	82	0	77	0	0%	Gatitu/ Muthaiga	159	0	57	0	0%	Kaben	530	N/A	360	N/A	-	Murachake	430	0	172	0	0%	Tumutumu	450	450	90	27	30%	Muongano	418	418	167	100	60%	Challa/ Tuhire	700	200	300	203	68%
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	Mangudho	40	0	16	0	0%
	Shulakino	172	57	40	20	50%
	Kiamariga/Raya	140	0	60	0	0%
	Kaumbura	500	200	200	49	25%
	Average of the ratio of actual irrigated area relative to plan					26%
	Average excluding sites with 0%					51%
	Note : Number of beneficiary farmers is the number of IWUA members who use the water for irrigation. The number of IUWA members is 30 households in Mdachi, 176 in Murachake, 630 in Challa/Tuhire, 7 in Manghdho, 200 in Shulakino, and 400 in Kaumbura. The figures above are the irrigation users among them.					
	2. Technologies introduced, such as the SHEP approach, the LISA approach, irrigation water-saving technology and others.	Partially achieved According to the interviews with farmers, they continue to develop a cropping calendar and conduct market research.				
	3. Cultivated area, production, the yield of main crops and diversification of crops	Partially achieved According to the interviews with the farmers, there has been an increase in the cultivated area and production, and diversification of crops (before the project, maize and cassava were the main products of rain-fed agriculture; however, after the project, okra, tomatoes, spinach, and kale have been grown).				

Source: Documentation provided by JICA, interviews with the county governments, IWUAs and farmers

Therefore, it can be said that the “Utilization of the proposed plan”, “Expected goals through utilization”, and “Verification of the effectiveness of the SIDEMAN model at the pilot sites” have all been partially achieved.



Harvesting sweet potatoes



Canal developed by
the project



Interviewing an IWUA members

3.2.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

Environmental Impact Assessment (hereinafter called “EIA”) at each pilot site was approved in July 2013, March 2014, and April-May 2015, although the timing varies by site. Following the EIA, the Environmental Management Monitoring Plan (hereinafter called “EMMP”) at each site was created. The main negative environmental impacts listed in the EMMPs common to each site were (1) ecological degradation and soil erosion of rivers and river banks during the construction period, and (2) soil erosion, retained water and salt pollution, pesticide contamination, sanitation, wildlife, and disputes over water use during the operation and management period. During the construction, as for the ecological degradation of the river and riverbank, measures such as slope protection by vegetative stabilization and designating storage for excavated materials for re-use of excavated material were planned. Concerning soil erosion, backfilling of excavated areas and revegetating of backfilled area were planned. Monitoring was conducted after distributing and explaining monitoring questionnaires, water quality analysis checklists and others, as monitoring tools to contractors and IWUAs. Generally, the contractors complied with what was stated in the EMMP. In terms of negative impacts during the operation, guidance has been given on the prevention of soil erosion and proper treatment of pesticides, and no negative impact on the natural environment has occurred according to SCIOs and IWUAs,

(2) Resettlement and land acquisition

In Muungano (Tharaka-Nithi County), IWUA purchased land for the construction of an intake weir. There were also IWUAs that acquired the property for site offices by purchase or donation. Other than that, no land acquisition or resettlement has occurred.

(3) Other impacts

The interviews with farmers in the pilot sites showed that the project had a significant impact on the six sites where irrigation schemes were operating. In all six locations, positive impacts were observed, including (1) increased agricultural revenue, farm income and savings from year-round production and production of high value-added crops; (2) improved food security and nutrition (especially for children); (3) improved quality of life (change from mud-walled houses to permanent houses and purchase of vehicles); (4) access to education (ability to pay school fees and send children to school or receive a better education in private schools); and (5) expansion of farmland and increased investment in agriculture. However, there were some sites where there was a sense of inequity among the water users because the water did not reach the end. In the five places with no irrigated agriculture, participants expressed disappointment that the expected results were not achieved and concern that the future of facility development was uncertain.

The draft guideline for the revised SIDEMAN model was developed upon completion of the project, and the capacity of IWUAs and farmers at the pilot sites was strengthened; however, smallholder irrigation scheme development was not yet completed at some sites. Goals to be achieved after the completion, such as the utilization of the proposed plan and verification of the effectiveness of the model at the pilot sites have been partially achieved. In light of the above, some effects of the project have been observed, and therefore, effectiveness and impact are fair.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

Table 5 shows the inputs by the project.

Table 5: Inputs

Inputs	Plan	Actual
(1) Experts	Eight persons	12 persons
(2) Trainees received	-	-
(3) Equipment	N/A	Construction materials, construction equipment and machines, equipment for training, vehicles, surveying equipment, GPS, and others.
(4) Construction cost	350 million yen	N/A
Japanese Side Total Project Cost	950 million yen	1,132 million yen
Kenyan Side Total Project Cost	1 . Allocation of staff 2 . Office space and furniture 3 . Counterpart fund	1 . Allocation of staff: 5 persons 2 . Office space 3 . Counterpart fund: nil

Source: Documentation provided by JICA, interviews with the Ministry of Water & Sanitation and Irrigation

* MM stands for man month.

3.3.1.1 Elements of Inputs

The number of experts increased; however, experts in their areas of expertise were sent out as planned.

Initially, the Ministry of Water & Sanitation and Irrigation officials (then District Irrigation Officers, hereinafter called “DIO”) were supposed to supervise the construction of the smallholder irrigation schemes in this project. However, the construction period changed due to the poor procurement of local consultants for the design, and the introduction of devolution system of government that occurred during the project period led to the opinion of the county irrigation departments (which supervise the SCIOs) that it was not possible to supervise the construction smoothly with the limited staff in the counties. For this reason, the Japanese side hired construction supervisory staff and assisted the SCIOs together with the Ministry of Water & Sanitation and Irrigation.

3.3.1.2 Project Cost

Project cost was 1,132 million yen (119% of the planned 950 million yen), which exceeded the plan. This is because, in the construction of smallholder irrigation schemes at the pilot sites, there was a significant difference in scope between the preliminary study

at the time of project formation and the detailed design during the project implementation.

3.3.1.3 Project Period

The actual project period was 47 months, compared to the planned 37 months (127% of the planned period), which exceeded the plan. The project period was longer than planned due to the lengthy procurement process for the construction of smallholder irrigation schemes, the delay in construction due to the change in scope as noted above, and the need for county government involvement in the project due to the impact of devolution.

Thus, both the project cost and project period exceeded the plan. The inputs were mostly as planned. Therefore, efficiency is fair.

3.4 Sustainability (Rating:②)

3.4.1 Policy and Political Commitment for the Sustainability of Project Effects

The sustainability of the effects of the project in terms of the policy and political commitment after the completion of the cooperation is assured.

The *Vision 2030* is still in valid at the time of the ex-post evaluation, and the *Third Medium-Term Plan (2018-2022)* of the *Vision 2030* aims to develop irrigation for food and nutrition security and to increase the area irrigated by large and small irrigation schemes to 207,200 hectares within the target period. The *National Irrigation Policy (2017)* also aims to increase the irrigated area by 40,000 hectares annually by promoting irrigation development for food security, job creation, and poverty reduction. Besides, President Kenyatta has identified the *Big 4 Agenda* as his priority economic policies in 2017, with food and nutrition security being one of them and irrigation being of high importance.

The visited county governments have listed irrigation development in its policy documents shown in Table 6.

Table 6: Policy documents for irrigation development at the county level

County	Policy document
Taita-Taveta	<i>County Integrated Development Plan</i> , (hereinafter called “CIDP”) (2018-2020)
Narok	<i>Annual Development Plan (2020/21)</i>
Meru	Irrigation policy is being formulated
Tharaka-Nithi	<i>Water Resource Policy (2019), Annual Development Plan (2019/20)</i>
Laikipia	Current CIDP
Embu	Policy and strategy for irrigation development are being formulated
Kilifi	There is no policy document specifying irrigation development at the time of the ex-post evaluation

Source: county governments

From the above, it can be said that the policy and political commitment necessary to sustain the project effects is mostly ensured.

3.4.2 Institutional / Organizational Aspect for the Sustainability of Project Effects

As for the organizational setting for utilization and dissemination of the revised SIDEMAN model, the *Irrigation Act (2019)* stipulates that the Ministry of Water & Sanitation and Irrigation is responsible for irrigation infrastructure development in the national government, while the development and maintenance of smallholder irrigation schemes will be undertaken by the county governments¹⁴.

In the Ministry of Water & Sanitation and Irrigation, irrigation schemes are handled by the four departments listed in the table below, and their responsibilities are clear.

Table 7: Organizational setting of the Ministry of Water & Sanitation and Irrigation

Department	Responsibilities
Department of Irrigation and Drainage	Infrastructure development
Department of Irrigation Water Management	Capacity enhancement of IWUAs, efficient use of water
Department of Land Reclamation	Regeneration of devastated land
Department of Water Storage	Construction of irrigation water storage

Source: The Ministry of Water & Sanitation and Irrigation

The number of staff in the above four departments is 30. The national government has frozen hiring and has not made up for the loss of personnel due to retirements and

¹⁴ Irrigation schemes of 40 hectares or less are carried out by the county governments, while schemes of 100-500 hectares are carried out by the counties and the National Irrigation Authority (hereinafter called “NIA”). Schemes of 500 hectares or more will be implemented by NIA.

transfers to the private sector.

The *Irrigation Act* (2019) stipulates that the county governments are responsible for developing smallholder irrigation schemes. The Act envisages the county governments to establish an Irrigation Development Units to (1) develop and implement irrigation strategies, (2) identify community-based smallholder irrigation scheme development projects, and (3) strengthen the capacity of IWUAs.

At the time of the ex-post evaluation, irrigation development units in the county governments we visited (seven counties) were not clear. Generally, one SCIO was assigned to each sub-county under the County Director in charge of irrigation; however, the number of staff was not sufficient for irrigation development in any of the counties. It is too burdensome for one person to be in charge of the entire sub-county, and there is no replacement for retirees. For example, Taita-Taveta County is planning to hire two new people.

Thus, there are some issues with the institutional aspect, such as a lack of personnel.

3.4.3 Technical Aspect for the Sustainability of Project Effects

The Ministry of Water & Sanitation and Irrigation continues to have officials involved from the previous SIDEMAN project and has the necessary skills to implement and promote the guidelines.

In the visited counties, the staff members who were targeted for capacity building at the time of the project implementation are still working. Although they have basic knowledge and skills, many of them are nearing retirement age and cannot be replenished or transfer their skills. Hence, both counties and the national government believe that training is necessary. At the time of the ex-post evaluation, the national government was providing training through the Food and Agriculture Organization of the United Nations (FAO).

Thus, there are some issues in the mechanisms for technology transfer and technology update.

3.4.4 Financial Aspect for the Sustainability of Project Effects

The table below shows the budgetary performance of the Department of Irrigation and Drainage (then the Ministry of Agriculture, Livestock, Fisheries and Irrigation) for FY 2018/19.

Table 8: FY2018/19 Budget for Department of Irrigation & Drainage
(Unit: million Ksh)

Recurrent Budget		Development Budget		Total	
Actual	Plan	Actual	Plan	Actual	Plan
1,252	1,659	6,197	6,835	7,449	8,495

Source: 2019 Budget Review & Outlook Paper

The actual budget of the Department of Irrigation & Drainage in FY 2018/19 was 7.4 billion shillings; however, 30 billion shillings were needed for the implementation of the *Big 4 Agenda* mentioned above (3.4.1). The budget of the irrigation sector for FY 2019/20 is expected to be 7.9 billion shillings; however, similarly, the required budget for FY 2019/20 for the implementation of the *Big 4 Agenda* is 31 billion shillings, which has not been adequately allocated.

According to the Ministry of Water & Sanitation and Irrigation, a portion of the budget, especially that of the Department of Irrigation Water Management, is earmarked for capacity development and will also be used to disseminate the guidelines.

According to the county governments visited for this ex-post evaluation, none of them have secured adequate budgets for irrigation activities.

The remaining works at the project pilot sites were under consideration at the time of the ex-post evaluation by Meru County (two sites) and Laikipia County (two sites) for application to the FY 2020/21 budget. Taita-Taveta County (two sites) negotiated with JICA's Kenya office for support for the remaining works. Besides, Kilifi County has included the cost of addressing inoperable facilities in its budgets for 2018/19 (approved and not yet implemented) and 2019/20.

Despite the efforts to address the remaining works, both the national and county governments are experiencing some challenges in the budget for irrigation development.

3.4.5 Status of Operation and Maintenance

Among the irrigation facilities developed in the project, the facilities are generally operated and maintained properly at the six sites that are functioning under the project. However, in Shulakino (Narok County), part of the water intake weir and pipelines were damaged due to flooding, as described in Table 3.

In light of the above, some problems have been observed in terms of the institutional/organizational, technical, and financial aspects. Therefore, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The aim of the project was to investigate and summarize the application of a model for smallholder irrigation development which involves farmer participation to secure stable agricultural water supply in semi-arid lands and to strengthen the resilience to frequent droughts. The relevance of the project is high because the objective of the project was consistent with the development plan and development needs of Kenya both at the time of ex-ante evaluation and project completion, and it is also consistent with Japan's ODA policy to Kenya at the time of ex-ante evaluation. At the completion of the project, a draft guideline for the model was developed, and the capacity of IWUA and farmers at the pilot sites was strengthened; however, the objective was partially achieved because some of the smallholder irrigation facilities have not been completed. Goals after the project completion, such as utilizing the proposed plan and confirmation of the effectiveness of the model were partially met. Therefore, the effectiveness/impact are fair. Efficiency is fair as both project costs and period exceeded the plan. Concerning the sustainability of the project effects, there are some challenges in the institutional/organizational, technical, and financial aspects, and therefore, the sustainability of the project effects is fair.

In light of the above, this project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

The Ministry of Water & Sanitation and Irrigation and the county governments are recommended to explore the possibility of implementing the remaining works of the pilot sites under NIA, as well as development partners and other funds for the implementation. If it is not possible to carry out the remaining works, it is recommended to provide a clear explanation to IWUAs. Also, at two sites in Laikipia County, water rights were not obtained from the WRMA, and water intake weirs were destroyed due to disputes over water. The Ministry of Water & Sanitation and Irrigation and Laikipia County are urged to negotiate with WRMA on the water rights and repair of the water intake weirs.

4.2.2 Recommendations to JICA

The JICA Kenya Office has been in discussions with the Ministry of Water & Sanitation and Irrigation on the future of the facilities at the pilot sites. JICA is recommended to identify the sites that can be quickly followed up by JICA for the implementation of remaining works or restoration works. In that case, JICA needs to involve not only the national government but also the county governments, who will be

responsible for supervising the implementation from the beginning.

4.3 Lessons Learned

In case infrastructure development is part of a project

1. In many pilot sites, irrigation facility development works were incomplete at the time of project completion. Many of the remaining works were also not implemented at the time of the ex-post evaluation. Therefore, some envisioned impacts have not been produced. There was a significant difference in scope between the preliminary study at the time of project formation and the detailed design during the implementation of the project, which led to an increase in project costs and construction delays, which in turn, prevented the pilot projects from being completed during implementation. If infrastructure development is included in a project, the determination of the project scope and appropriate feasibility study should be done at the time of project formation as much as possible, to avoid incomplete construction works.
2. Compared to the previous SIDEMAN project, the scale of this project is much larger. Therefore, local consultants were used at the design stage. Besides, the Ministry of Water & Sanitation and Irrigation (through DIOs) was to supervise the construction. However, in the end, the Japanese side allocated staff who supervises the construction by the request of the county governments with which DIOs were newly affiliated during the devolution, who thought such arrangement was desirable for the smooth implementation. The delay in the project implementation also affected the decision.

On the other hand, MOU for construction works, signed among (1) the Government of Kenya, JICA, the representative of the project implementation team, (2) the water users' association, and (3) the county governments did not clearly mention the responsibility for the remaining works after the project completion; however, the national government was to provide financial and other arrangements for the remaining works. If it was envisaged that the national government carries out the remaining works after the completion of the project, there was a need for greater involvement of the national government in the design and construction supervision phase to ensure the continuity of the remaining works and its responsibility. In that case, it is necessary to decide the feasible scale of the project (the number of sites), taking into account the implementation capacity of the counterpart country and duration of the project.

Also, aspects of strengthening the organizational structure and skills of the county governments should have been more emphasized during the devolution.