

Country Name	Capacity Development Project for Countermeasure Works for Landslide
Federal Democratic Republic of Ethiopia	

I. Project Outline

Background	The National Road No. 3, one of the main trunk roads, runs across Amhara Region, one of the largest granary of Ethiopia. It is also an important route for a crude oil transport from Sudan to Ethiopia. Among them, the section that passes the Abay Gorge is a steep gorge with an altitude difference of 1,500 m, and in the rainy season from June to September, a large-scale landslide covering 2 km in width repeatedly occurred, and the road function was threatened.												
Objectives of the Project	Through (1) establishing an operational mechanism in the Ethiopian Roads Authority (ERA), (2) implementing emergency landslide countermeasures in a project pilot site, (3) preparing and implementing mid-term and long-term landslide measure works in the pilot site, (4) training to ERM to enhance consultancy capacity and (5) conducting road disaster inspection, data collection for landslides, the project aimed at building ERA's capacity to mitigate landslide problems, thereby contributing to mitigating landslide problems along the national road.												
	<ol style="list-style-type: none"> Overall Goal: To mitigate landslide problems along the national road in Ethiopia. Project Purpose: To build the capacity of ERA to mitigate landslide problems 												
Activities of the project	<ol style="list-style-type: none"> Project site: Pilot project site in Abay Gorge Main activities: (1) establishing an operational mechanism of Ethiopian Roads Authority (ERA), (2) implementing emergency landslide countermeasures in the pilot site, (3) preparing and implementing mid-term and long-term landslide measure works in the pilot site, (4) training to ERM to enhance consultancy capacity and (5) conducting road disaster inspection and data collection for landslides Inputs (to carry out above activities) <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Japanese Side</td> <td style="width: 50%;">Ethiopian Side</td> </tr> <tr> <td>1) Experts: 20 persons</td> <td>1) Staff allocated: 55 persons</td> </tr> <tr> <td>2) Trainees received: 19 persons</td> <td>2) Facilities: Office and utility</td> </tr> <tr> <td>3) Equipment: Equipment for emergency landslide measures and monitoring.</td> <td>3) Local Operational Cost: cost for implementing countermeasure work in the pilot project site</td> </tr> <tr> <td>4) Local Operational Cost: Employment of local staff, maintenance of equipment, consumables, printing, and rental fee</td> <td></td> </tr> </table> 			Japanese Side	Ethiopian Side	1) Experts: 20 persons	1) Staff allocated: 55 persons	2) Trainees received: 19 persons	2) Facilities: Office and utility	3) Equipment: Equipment for emergency landslide measures and monitoring.	3) Local Operational Cost: cost for implementing countermeasure work in the pilot project site	4) Local Operational Cost: Employment of local staff, maintenance of equipment, consumables, printing, and rental fee	
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Project Period	June 2011-March 2016	Project Cost	(ex-ante) 760 million yen, (actual) 801 million yen										
Implementing Agency	Ethiopian Roads Authority (ERA)												
Cooperation Agency in Japan	Kokusai Kogyo Co., Ltd. and OYO International												

II. Result of the Evaluation

1 Relevance
<p><Consistency with the Development Policy of Ethiopia at the Time of Ex-Ante Evaluation and Project Completion></p> <p>The project was consistent with the development policy of Ethiopia. At the time of ex-ante evaluation, the "Plan for Accelerated and Sustainable Development End Poverty" (PASDEP) (2005/06-2009/10) prioritized the road sector for the socioeconomic development. At the time of project completion, the country's five-year "Growth and Transformation Plan" (GTP) (2010-2015) envisaged an accelerated growth in the agriculture and industrial sectors underpinned by massive projects of economic and infrastructural development including road network expansion.</p> <p>*Note: The above-mentioned documents were effective at the time of the surveys conducted at ex-ante evaluation and the terminal evaluation.</p> <p><Consistency with the Development Needs of Ethiopia at the Time of Ex-Ante Evaluation and Project Completion ></p> <p>The project was consistent with the development of Ethiopia for the landslide countermeasures. At the time of ex-ante evaluation, in the section that passes the Abay Gorge of the National Road No.3 a large-scale landslide repeatedly occurred in the rainy season, and the road function was threatened. At the time of project completion, land development of road networks extended to rural and mountainous areas demanded to take appropriate technical countermeasures to control landslides.</p> <p><Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation></p> <p>The project was consistent with Japan's ODA policy to Ethiopia. The "Country Assistance Program to Ethiopia" (2008) prioritized the socioeconomic infrastructure development.</p> <p><Evaluation Result></p> <p>In light of the above, the relevance of the project is high.</p>
2 Effectiveness/Impact
<p><Status of Achievement of the Project Purpose at the time of Project Completion></p> <p>The Project Purpose was achieved at the project completion, as both indicators namely, "Planning and implementation of landslide countermeasure for road is implemented 2 or more locations/year from 2011 to 2015" (indicator 1) and "The extent of ground subsistence is reduced in locations where countermeasure works have been implemented" (indicator 2) were attained, although no quantitative data was</p>

available for the latter.

<Continuation Status of Project Effects at the time of Ex-post Evaluation>

The effects of the project have partially continued after the project was completed. Planning and implementation of landslide countermeasure for road have been implemented in two or more locations every year since the project was completed up to now.

As to the ground conditions of locations where countermeasures works were implemented, some sections have been in better conditions while other sections have had subsidence and related deformations. To investigate the causes and mitigate the problem, ERA and Addis Ababa University (AAU) has planned to work together in the area and prepared a draft action plan. ERA Research Center has also prepared questionnaire to review the utilization of the results of project and review their plan.

During the project period, the scope of capacity development of ERA covered use of the landslide inventory database for planning, implementing, and maintaining landslide countermeasure works. However, after the project was completed, GIS landslide inventory database update and inspection based on GIS data has not been regularly conducted because of absence of GIS & remote sensing specialized expert in ERA. On the other hand, annual regular inspection work has continued for the pilot area (Abay Gorge) using previous findings and visual inspection. To solve the problem, ERA has planned to hire GIS Expert in the near future.

<Status of Achievement for Overall Goal at the time of Ex-post Evaluation>

The Overall Goal has not been verified due to the lack of data. In general, the frequency and extent of disruption have rather increased because of the following reasons: (1) ERA concentrates on controlling work (gabions, ditches and retaining wall) around landslide prone areas and emergency maintenance. Restrain works which bring better solution have not been conducted because of lack of detailed investigation, data/information and budget. (2) Increasing quarry sites and construction around the gorge disturb the ecology and make the area more susceptible to landslide. However, there is no organized data to quantify the extent of the problem.

<Other Impacts at the time of Ex-post Evaluation>

No negative impact on the natural environment by this project has been observed. During the project implementation, mitigation measures on problematic section, road realignment and construction of detour caused temporary and insignificant loss of farmland. Since the loss was temporary, the farmers have got back their land. No information on the compensation was obtained.

<Evaluation Result>

Therefore, the effectiveness/impact of the project is fair.

Achievement of Project Purpose and Overall Goal

Aim	Indicators	Results																					
(Project Purpose) To build the capacity of ERA to mitigate landslide problems	Indicator 1: Planning and implementation of landslide countermeasure for road is implemented 2 or more locations/year from 2011 to 2015.	<p>Status of the Achievement: achieved (continued) (Project Completion) Expect for 2011, the first year of the project, works of far more than 2 points and more than 2 work methods were implemented.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>No. of locations</th> </tr> </thead> <tbody> <tr> <td>2012</td> <td>2 points and Emergency works before/after rainy season</td> </tr> <tr> <td>2013</td> <td>6 points and Emergency works before/after rainy season</td> </tr> <tr> <td>2014</td> <td>8 points and Emergency works before/after rainy season</td> </tr> <tr> <td>2015 (up to July)</td> <td>4 points</td> </tr> </tbody> </table> <p>(Ex-post Evaluation)</p> <table border="1"> <thead> <tr> <th>Year</th> <th>No. of locations</th> </tr> </thead> <tbody> <tr> <td>2016</td> <td>12 points</td> </tr> <tr> <td>2017</td> <td>22 points</td> </tr> <tr> <td>2018</td> <td>12 points</td> </tr> <tr> <td>2019 up to April</td> <td>7 points</td> </tr> </tbody> </table>	Year	No. of locations	2012	2 points and Emergency works before/after rainy season	2013	6 points and Emergency works before/after rainy season	2014	8 points and Emergency works before/after rainy season	2015 (up to July)	4 points	Year	No. of locations	2016	12 points	2017	22 points	2018	12 points	2019 up to April	7 points	
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	Indicator 2: The extent of ground subsistence is reduced in locations where countermeasure works have been implemented	<p>Status of the Achievement: achieved (partially continued) (Project Completion) There was no quantitative data to prove decreased numbers of extent of ground subsidence. However, as a result of countermeasures taken, it is assumed and evaluated extent ground subsidence has been stabilized as compared before. (Ex-post evaluation) Among the seven locations, Stations 00, is currently in better condition, however, stations 10, 20 and 28 have subsidence and related deformations. Station 05, 7, 13, 14, 17, 26, 30, 31, 33, 34 and 35 have problems including landslide, slope failure, rock fall, debris flow. Station 27 and 27+(01-04) has problems such as gabion damage, ditch collapse, uplift on the road surface and others.</p>																					
(Overall Goal) To mitigate landslide problems along the national road in Ethiopia.	Indicator 1: Frequency of disruption of road traffic by landslide is decreased on 2016-2020 compared to that of before the project focusing on pilot project area	<p>Status of Achievement: not verified (Ex-post Evaluation)</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Restricted Hours</th> <th>No. of Occurrence (point)</th> </tr> </thead> <tbody> <tr> <td>2010</td> <td>6.5</td> <td>6</td> </tr> <tr> <td>2011</td> <td>6.5</td> <td>8</td> </tr> <tr> <td>2012</td> <td>12.5</td> <td>6</td> </tr> <tr> <td>2013</td> <td>0</td> <td>8</td> </tr> <tr> <td>2014</td> <td>13.5</td> <td>19</td> </tr> <tr> <td>2015-2018</td> <td>Data missing</td> <td>Data missing</td> </tr> </tbody> </table>	Year	Restricted Hours	No. of Occurrence (point)	2010	6.5	6	2011	6.5	8	2012	12.5	6	2013	0	8	2014	13.5	19	2015-2018	Data missing	Data missing
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Source : JICA documents, questionnaires and interviews with ERA

Both the project cost and project period slightly exceeded the plan (the ratio against the plan: 105%, 102%). The outputs were produced as planned. Therefore, the efficiency of the project is fair.

4 Sustainability

<Policy Aspect>

There has been no government policy which gives special emphasis to promote landslide countermeasures. However, the importance of developing road sector and maintaining the available road for economic development has been given due emphasis in both GTP II and RSDP V (both 2015-2020).

<Institutional Aspect>

The organizational structure for landslide countermeasures at ERA has been appropriate. Landslide and Slope Stability Team (LSST) which was established to be in charge of landslide countermeasures have been upgraded to Landslide and Geotechnical Research Team (LGST) accommodating geotechnical issues. LGST consults Regional Directorates of ERA to solve landslide and geotechnical problems and make research on the issues. Though the organizational structure has been appropriate, there has been shortage of staff at all levels at ERA. In case of LGST, the number of staff was five at the time of survey for this ex-post evaluation. ERA considered that four more staff members were needed.

<Technical Aspect>

In addition to the number of staff, the knowledge/skill of staff in LGST has not been enough to plan and implement landslide countermeasures. Except two staff, all other staff joined LGRT after the project was completed. ERA as a whole, twelve counterparts under the project have been still working in ERA, and two counterparts have been working on landslide, however, most ex-counterparts left ERA for better opportunities. There is no capable institution who is able to provide landslide countermeasure training adequately to the new staff. ERA exchanged Minutes of Undertaking (MoU) with Geological Survey of Ethiopia (GSE) on data collection, who were provided with the most of landslide monitoring instruments under the project and previous project. However, the most of those instruments have been unfunctional. GSE has also stopped collecting data from the functional instruments because the contract period finished. Therefore, most jobs have been done by ERA through visual inspection and secondary data reference.

In order to solve the technical problem, ERA has a plan to provide in house training for new staff, invite experts from universities for experience sharing and send staff abroad for short term trainings. Regarding the data collection, ERA signed MoU with GSE to continue the cooperation in data collection, analysis and other related areas. Though the manuals and guidelines developed under the project have not been updated, they have been utilized as reference for daily work, countermeasure work design and site assessment.

<Financial Aspect>

The budget allocated for landslide measures has not been enough to apply the long-term mitigation measures introduced by the project such as soil nailing and horizontal drilling. However, it has been enough for emergency work and controlling measures, according to ERA.

Budget of ERA

(Unit: Ethiopian birr)

	2016/17	2017/18	2018/19
Approved Budget (1+2) *	47,554,721,000	47,102,285,638	40,416,309,832
of which, budget for landslide countermeasures	85,000,000	109,000,000	197,000,000
Source			
General Budget (1)	46,394,721,000	45,849,819,000	38,916,307,000
Road Fund(2)	1,160,000,000	1,252,466,638	1,500,002,832

<Evaluation Result>

Therefore, the sustainability of the effects through the project is fair.

5 Summary of the Evaluation

The project achieved the Project Purpose at the project completion as the both indicators set to measure the effects of the project were attained. The effects of the project have partially continued. Planning and implementation of landslide countermeasure for road have been carried out since the project was completed up to now. As to the ground conditions of locations where countermeasures works were implemented, some sections are in better conditions while other sections have subsidence and related deformations. The Overall Goal was not achieved because the disruption rather increases due to natural and human factors. As to sustainability, some problems have been observed in the **policy**, institutional, technical and financial aspects such as high turnover and lack of training opportunities, and the insufficient budget for long-term mitigation measures. As to the efficiency, both the project cost and project period slightly exceeded the plan.

Considering all of the above points, this project is evaluated to be partially satisfactory.

III. Recommendations & Lessons Learned

Recommendations for Implementing Agency:

- ERA needs to coordinate its activities with all stakeholders in the area. It needs to coordinate its activities with GSE and Ethiopian Geospatial Information Agency (EGIA) to collect data and information necessary for mid and long-term planning. Also, it needs coordination with Ministry of Mines and Petroleum, which was Ministry of Mines and Energy during the project implementation, to properly manage the quarry sites and mitigate their effect on the road.
- Ministry of Transport and ERA need to coordinate their effort on long and medium term landslide countermeasure planning and resource mobilization to conduct restrain works instead of concentrating on control work and emergency maintenance.

Lessons Learned for JICA Considering serious capacity limitation in landslide countermeasure in the Ethiopia and complex nature of the problem, it would have been possible to improve the sustainability by planning long-term training in Japanese universities at the beginning of the project.



Retaining wall constructed by Ethiopian Roads Authority



Ditch constructed by Ethiopian Roads Authority