

Final Paper

Rural Road Maintenance and Poverty Reduction in Bangladesh

Theme: Innovation in infrastructure construction and maintenance

Sub-theme: Road asset management

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Abstract

Bangladesh has been striving for countrywide road network development since its independence in 1971. In last four decades huge road network developed all over the country to provide connectivity from capital to the remote villages. The total road length of the countrywide road network is 271992 Km where 250401 Km road length belongs to rural roads. Out of 250401 Km road length 71582Km is bituminous carpeting including bridge culverts worth about 7.5 billion USD. Local Government Engineering Department (LGED) is the only departments in Bangladesh for rural infrastructure development. The rural roads 250401 Km belongs to LGED and responsible for its construction and maintenance. Every year Bangladesh Government uses a substantial portion of its financial budget for rural infrastructure development. With this budget LGED implements many rural infrastructure development projects and maintaining rural roads to provide the all weather accessibility to the basic services. To maintain this huge road asset LGED performs mainly two types of maintenance work one is on pavement and another is off pavement. Moreover, sometimes emergency maintenance is done due to disaster. Destitute women are engaged for off pavement maintenance work. This paper highlights how the maintenance works are performing by LGED and sustaining the roads serviceability. Furthermore the poor village women are changing their life style and coming out from the poverty line through road maintenance program. There is a fund scarcity according to the demand of maintenance work of rural roads. This paper also analyzed the problems of the rural road sustainability and suggestions are made to overcome these problems. Lastly a conclusion is made for the sustainable rural roads and certainly a part of the community under poverty reduction strategy in Bangladesh.

1. Introduction

Local Government Engineering Department (LGED) Receives financial budget from the Government of Bangladesh to maintain their rural roads every year. With this budget LGED takes initiative to start the maintenance program during the starting of the financial year. The total budgets are allocated for on pavement and off pavement maintenance. A maintenance working manual is centrally prepared to implement the program effectively. This manual gives the guide line to employ the women maintenance crew/LCS member/Length Person for off pavement maintenance. It is revealed that the implementation of rural development programs have significant positive impact on socio-economic development and creation of direct and indirect working opportunities.

2. Background

As a developing country poverty reduction is the prime object to foster the ultra poor in the country. To achieve the MDG Bangladesh government has been published their 2009 country progress report where poverty reduction is one of the vital component and the poverty reduction target is fixed to decline from 56.6% to 29% in between the year of 1990 and 2015. There is a gender gap in the country, out of the 160million population of the country 49% is the women work force but most of them are unutilized and engaged with child rearing and household chores. In Bangladesh 75% population of the country live in the rural area. To foster the rural women and utilize this enormous work force and to make effective contribution to GDP Government has taken many initiatives. Off pavement maintenance thorough rural destitute women is one of them. Local government Engineering Department (LGED) is working with rural infrastructure development works hence this department is assigned to perform the work for destitute women.

2.1 Importance of Rural Road Maintenance

a) In Bangladesh Roads and road structures component represent major capital investments that must be protected in order to ensure adequate return on expenditure. Like other infrastructures, road infrastructures are also subjected to deterioration in time even with proper adherence to specified construction and material standards. It is progressive and is influenced by several factors including the climate and terrain, traffic volume and axle loading and original design and construction standards. Maintenance is an essential function that should be implemented as soon as each stage of construction has been completed and should continue throughout the entire life of the structure, until such time as reconstruction or rehabilitation becomes absolutely necessary. Maintenance provides an important and worthwhile contribution to the economic well being of the country and an effective road maintenance system is a valuable part of its economy.

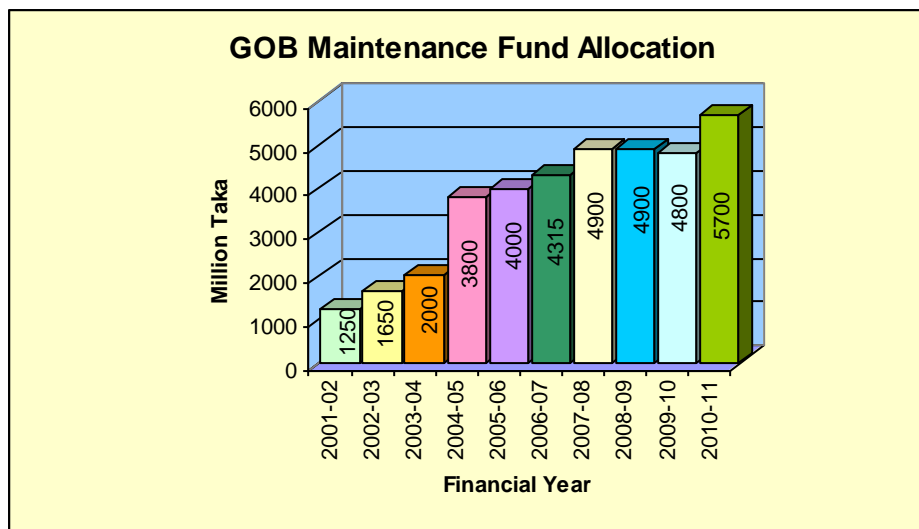
b) The Government of Bangladesh and the Development Partners have invested substantial resources in rural infrastructure development in the country; most of these are on road and road structure development. Top priority has been given for the development of the road transport network in the country for providing easier and cheaper transport services. During the last decade, a significant expansion of Upazila and Union rural road network in the country has been observed. With the construction and improvement of Upazila road and Union road, the question of repair and maintenance of these infrastructures has becoming increasingly important. Considering the necessity of

maintenance of these infrastructures, the Government of Bangladesh has started allocation of funds to Local Government Engineering Department (LGED) since 1992-93 from its revenue budget to address the rural road maintenance throughout the country.

c) The National Strategy for Accelerated Poverty Reduction 2004 highlights that the role of rural infrastructure is significant in Bangladesh and infrastructure development contributes both directly and indirectly to poverty reduction. There are many components of rural infrastructure of which three important elements are identified as - roads, markets and electrification. Several problems impose a tremendous burden on road maintenance and reduce the quality of services. It has also highlighted that rather than expanding the network, the Government would improve the quality of rural roads e.g. emphasize quality construction using labour-based technologies, maintain, widen and upgrade the existing network and undertake selective expansion to fill critical gaps to ensure rural-urban linkages.

2.2 Maintenance Budget

Government of Bangladesh allocates money to repair the rural roads and the budget is increasing due to the countrywide road coverage improvement. Here is the revenue budget for rural road maintenance for last 10 years.



Graph-1 : 10 years GOB Maintenance Fund

It is revealed that remarkable budget for rural road maintenance work which creates remarkable job opportunity for skilled and unskilled labor in the rural area. From this maintenance allocation every year more than 10% funds are used to off pavement maintenance work of the rural roads by LGED.

2.3 Road Network in Bangladesh

The road network of Bangladesh has been reclassified and the responsibilities of construction, development and maintenance of these roads have been entrusted to Roads

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and Highways Department (RHD) and Local Government Engineering Department (LGED) respectively. The Planning Commission of Bangladesh during April 2003 approved this classification and fixed up the definition, ownership and responsibilities of the total road network of the country. According to the classification LGED will be responsible for construction, development and maintenance of three classes of roads, which has been named as Upazila Road, Union Road and Village Road in collaboration with Local Government Institution (LGI). Road type with definition and the ownership and responsibility are furnished in Table below;

Sl. No.	Type	Definition	Length In Km	Ownership and Responsibility
1.	National Highway	Highways connecting National capital with Divisional HQs or sea ports or land ports or Asian Highway	3723	RHD
2.	Regional Highway	Highways connecting District HQs or main river or land ports or with each other not connected by national Highways.	4832	RHD
3.	Zila Road	Roads connecting District HQ/s with Upazila HQ/s or connecting one Upazila HQ to another Upazila HQ by a single main connection with National/Regional Highway, through shortest distance/ route.	13016	RHD
4.	Upazila Road (UZR)	Roads connecting Upazila HQ/s with Growth Center/s or one Growth Center with another Growth Center by a single main connection or connecting Growth Center to Higher Road System,* through shortest distance/route. (Former Feeder Road Type-B)	36329	LGED/LGI**
5.	Union Road (UNR)	Roads connecting union HQ/s with Upazila HQs, Growth Centers or local markets or with each other. (Former Rural Road Class-1 (R1)	42014	LGED/LGI
6.	Village Road (VR)	a) Roads connecting Villages with Union HQs, local markets, farms and ghats or with each other. (Former Rural Road Class-2 (R2) b) Roads within a Village. (Former Rural Road Class-3 (R3)	: 94545 : 77513	LGED/LGI

Table-1: Road Types in Bangladesh

* Higher Road System- National Highway, Regional Highway, and Zila Roads;

** LGI- Local Government Institutions.

3. Rural Road Network and Surface Condition

The rural road network is the huge coverage of the countrywide road network and the surface condition is the main factor for maintenance options. The following table is

giving the information of the present road surface condition of the rural roads in Bangladesh.

Sl. No.	Rural Road Category	Total Length in Km	BC & RCC in Km	HBB in Km	Earthen in Km
1	Upazila Road (UZR)	36329	25386	2551	8392
2	Union Road (UNR)	42014	15169	4016	22829
3	-Village Road-A -Village Road-B	94545 77513	15136	9324	147598
	Total	250401	55691	15891	178819

Table-2: Road Surface Conditions

It is revealed that 71582 km rural roads are paved which covers 28.5% length of total rural road length and presently LGED is responsible for reconstruction and maintenance of UZR and UNR.

3.1 Rural Road Asset in Bangladesh

Presently there are three components belong to LGED these are a) Rural Infrastructure which includes Upazila, Union and Village Roads, Bridges, culverts, Growth Centre Markets, Rural markets, Union Complex Buildings etc. b) Water Control Structures and c) Urban Infrastructure Like Bus Terminal, Road, Drain, etc. The total value of the assets stands 8.17 billion USD.

Component	Asset Value in Million Taka
Rural Infrastructure	540543
Water Control Structure	15750
Urban Infrastructure	15700
Total: 571993	

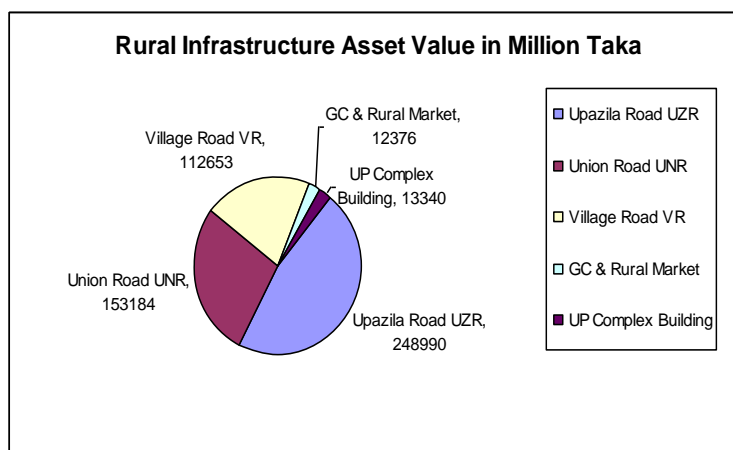


Table-3: Total Asset Value

Piechart-1: Comparison of Asset Value

According to surface condition the value of the paved rural roads and structure are Tk. 540543 Million or 7.722 Billion USD which covers the 94.50% of total asset value under LGED. In addition this asset value is calculated only considering the paved rural roads and structure.

4. Categories of Road Maintenance

The most commonly accepted maintenance categories are:

- **Routine Maintenance**
- **Periodic Maintenance**
- **Rehabilitation**

Under special circumstances one more category can be included, namely

- **Emergency Maintenance**

However maintenance also involves activities like inspections of the road conditions and the conditions of associated assets, like culverts and bridges. It also involves preparing long-term, five-year and annual maintenance plans. In some special condition like flood disaster etc. required Emergency Maintenance.

The main objective of the maintenance is to keep the road net work sustainable in all respect. The periodic maintenance work is done after a certain period like overlay, patch repairing, resealing, bituminous carpeting etc. Routine maintenance activities refer to the day-by-day activities that are carried out on a regular, largely repetitive basis. In routine maintenance two types of works are done one is on pavement and another is off pavement. The on pavement routine maintenance is normally done by the Mobile Maintenance Team (MMT) and the off pavement maintenance is done by the Labour Contracting Society (LCS) group in rural roads.

4.1 Mode of Off Pavement Maintenance

Off pavement maintenance means to perform the maintenance work at outside of the paved portion of the roads. The main work-components of off pavement maintenance are repairing of The shoulders and side slopes of the roads and that must be maintained to its proper grade so that rainwater can drain out easily from the road surface before it finds ways to penetrate into underlying layers of road pavement and ensure surface water drainage facility development for roads and bridges/culverts during monsoon and road side tree care taking and little repairing for carriageways.

The off pavement maintenance works are human labor dependent so it could be done economically. It is very efficient for the sustainability of the roads and simple tools are used to execute the activities. After completion of the new paved roads the road must be taken under routine maintenance program. It is one of the versatile policies of LGED that all paved roads within Upazila and Union road class must be maintained (mainly Off Pavement Maintenance) by the rural destitute women groups i.e. Labour Contracting Society (LCS).

4.2 LCS Group Formation and Activities

Destitute women labourers living in the vicinity of the road should be made aware of the maintenance work through wide local publicity and applications invited. The age limit should be 18-40 years and they should be mentally and physically sound to take the responsibility. Landless, unemployed women having no earning member in the family will get priority in selection. A primary list is made of female labourer (20 persons more

or less) from the applicants and select required number of labourers on the basis of verbal interview from primary list of suitable candidates. The female labourers will be appointed purely on a temporary yearly contract basis for a period of maximum three years estimate for off-pavement routine maintenance should be prepared on the basis of 7 (seven) working day per week, normally, 365 days for a year and 366 days for lip-year. In preparing estimate the rate approved in LGED schedule of rate; one person for a length of 1 (one) Km shall have to be applied. In order to ensure proper supervision of off-pavement routine maintenance, maintenance supervisor will be engaged to supervise a group of 15-20 labourers.

4.2.1 Main Activities of LCS

The following activities are required to be done by the LCS workers engaged in Off-pavement routine maintenance:

- Maintain shoulders to its proper width as per design standard with respect to road type (UZR/UNR) including maintenance of 5% cross-fall with the help of wooden shoulder board to facilitate drainage and cut high shoulder to maintain 5% cross-fall at road shoulders to avoid water congestion at pavement edge or shoulder.
- Fill low/ depressed shoulders at proper grade and repair rain cuts, rat-hole on shoulders and slopes.
- Removal of weeds from abutment and wing walls and cleaning weep-holes, rain water pipes of the road structures (bridges/ culverts) and removal of debris at the in-let/ out-let/ inside of culverts and keep them clean for easy passage of water.
- Re-placing turf on the side slopes of road and care taking roadside tree plantations and cleaning jungles/ bushes.
- Stockpile suitable materials on shoulder for use in monsoon.

4.3 Last Six Years Budget for Off Pavement Maintenance in LGED

Every year a revenue budget is sanctioned for rural road maintenance and from this budget a significant amount is utilized for off-pavement maintenance to ensure the sustainability of rural roads and all weather movements. The last six year budget is furnished in a table below;

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Allocation in Million Taka	474.8	466.8	501.3	502.0	495.6	590.3
Schemes Number	4926	3629	3674	2602	2478	2698
Length (km)	25272	23110	23706	17793	16066	18000
Supervisors (Number)	1558	1168	1249	836	836	1200
LCS Persons	25935	21834	23177	14443	14973	18000

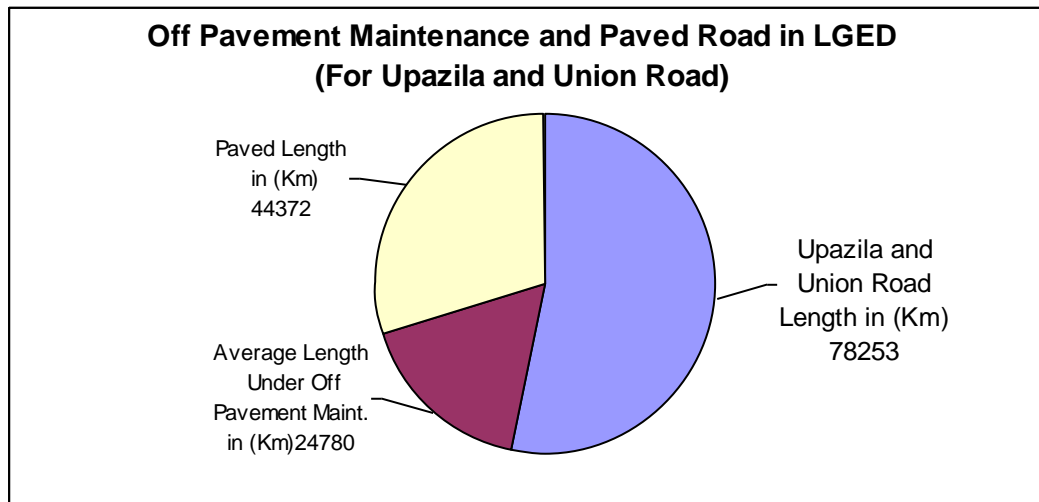
Table-4: Six Years Budget

In the table-4 it is evident that enormous work force has been created for the rural poor women and they are directly getting benefit from this program. The budget is more or

less same but the overall number of LCS persons are decreased due to lack of budget amount and increase of wage rates in recent years.

Furthermore in table-4 that in six years (2005-06 to 2010-2011) average 20000 km rural roads have been taken for off pavement maintenance and in every year average 19727 length persons have been employed and on average Taka 505.13 million have been utilized. Moreover every year average 1142 supervisors are employed from the rural poor community as well. Due to this program an enormous work force has been created to sustain the road stability.

In table-2 and table-4 it is evident that the off pavement maintenance length is less than the total paved length of Upazila and Union roads. In the pie chart-2 out of 78253km of total length 44372 Km roads are paved and required off pavement maintenance every year. According to present road database of LGED it is revealed that LGED is covered up to 55.84% of the paved roads for off pavement maintenance and due to fund constraints every year about 45% paved roads are out of off-pavement maintenance work.



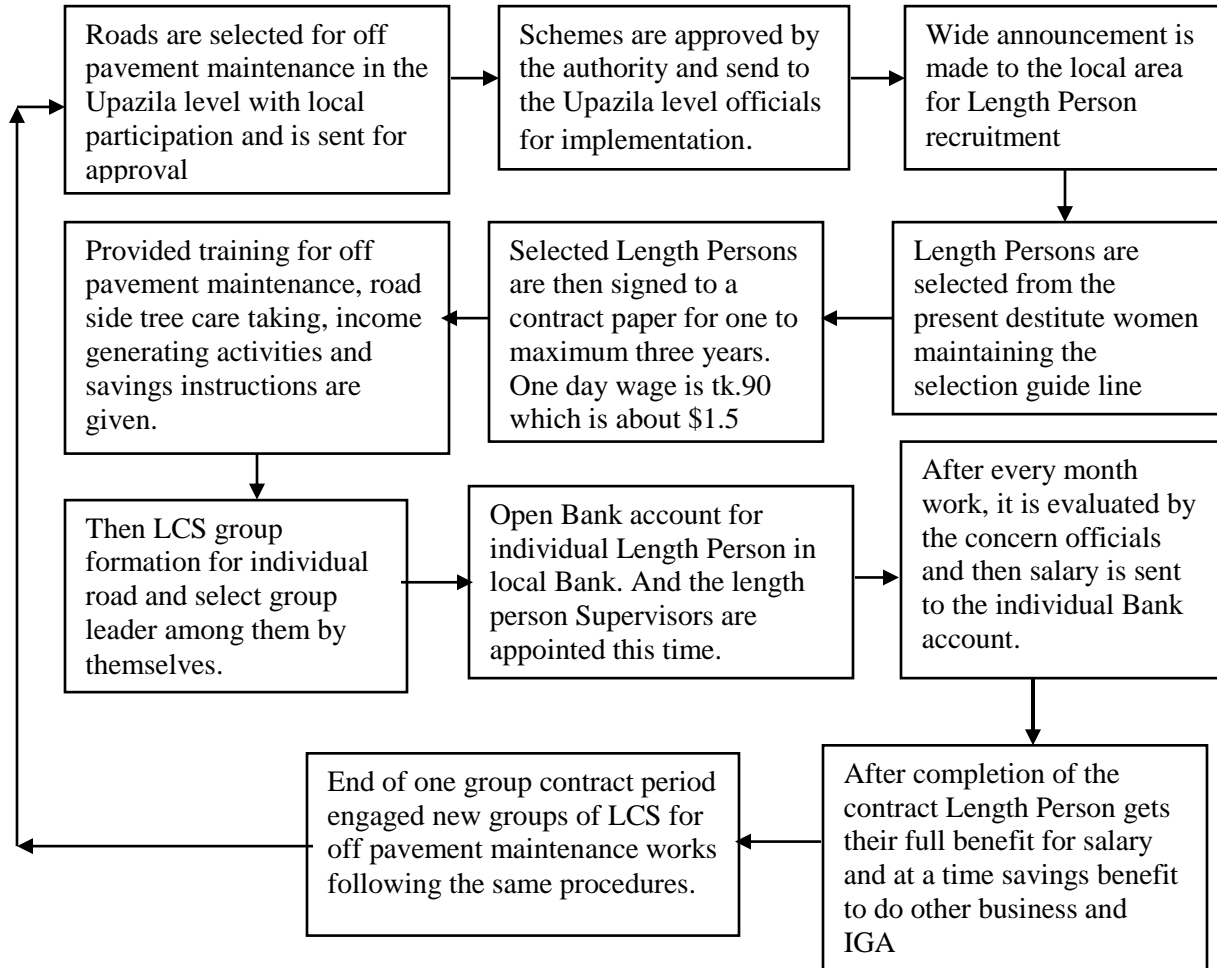
Pie Chart-2: Paved roads in LGED

5. Implementation of Off Pavement Maintenance

The purpose of routine maintenance is to repair small defects on the road surface as and when they appear, so that these small defects do not get chance to aggravate further. This works largely are to be done on a regular basis. To accomplish this type of repair works required number of Mobile Maintenance Team (MMT) has been formed at the district level. Off-pavement Maintenance on the shoulders and side-slopes are equally important as on-pavement maintenance and that has to be continued. For this purpose the existing LCS system is a preferred method of implementing off-pavement maintenance, which is already established in all districts. The shoulders and side slopes of the road are important elements and that must be maintained to its proper grade so that rainwater can drain out easily from the road surface before it finds ways to penetrate into underlying layers of road pavement. The whole process of implementation of Off Pavement Maintenance is a

series of works and could be explained by the following flow chart and engagement of road side ultra poor women to this program as well.

5.1 Flow chart of off pavement maintenance works implementation;



According to above flow chart it is a continuous process to boost up the rural ultra poor women till they come to a sustainable income level moreover due to routine off-pavement maintenance the rural road asset is getting sustainability and reduced its large scale maintenance costs.

5.2 Sustainability of Rural Roads and Poverty Reduction

Every year a remarkable work force is created for off pavement maintenance and engaged the local ultra poor women for as Labour Contracting Society i.e. LCS member to sustain the road surface condition. In the past most of the LCS member were unemployed and used to lead a very low standard life. Due to this program they have got the opportunity to increase their income level and life style. In implementation flow chart it is evident that the process is cyclic and after completion of one LCS group contract another new LCS member group is appointing to accomplish the off-pavement

maintenance works for next contract periods. Hence, there is maintaining equity for work distribution and creating opportunity for the rural ultra poor women to come to an income network in regular basis.

In six years from 2005-06 to 2010-11 for off-pavement maintenance total 118362 number poor destitute women have been employed under LGED. In last decade total maintenance budget was 37315 Million Taka or 533 Million USD and at least its 10% is utilized for off pavement maintenance works in Upazila and Union Roads in rural area of Bangladesh.

5.2.1 Present Poverty Status in the Country

Recently a report has been launched by World Bank and Bangladesh Bureau of Statistics that the poverty declined to 31 percent on national plane as of 2010 from 40 percent in 2005, according to an official survey report, on account of improvement in nutritional status and incomes and availability of services people receive. The 'household income and expenditure survey (HIES) 2010' states that rural poverty has declined to 35.2 percent in 2010 from 43.8 percent in 2005 while urban poverty fallen to 21.3 percent from 28.5 percent in the same period.

It is evident that the poverty status of the rural poor improves due to different poverty reduction activities have been taken by the government.

6. Effectiveness of the Program

The Off Pavement Maintenance Program achieves two goals and simultaneous social benefits these are:

1. Sustainable rural roads
2. Reduces poverty of the rural destitute women

And social benefits through this program:

- a. The LCS member changes their lifestyle.
- b. The LCS members are coming out from poverty line.
- c. Employment opportunity is created in the rural areas
- d. Rural economy developed
- e. All weather connectivity ensured
- f. The destitute women are aware to send their children to school.
- g. The destitute women are now getting self dependency and social respect.

Many examples have already been created countrywide that the destitute women are now established in all the way of their life through this program. They are now the owners of small industries, grocery shops, ladies tailor shops, poultry farms, three wheelers etc.

Some photographs of the program have been given here to show that how this program sustaining the rural roads through off-pavement maintenance and boosting up the rural ultra poor women.

Photographs of Off Pavement Maintenance



i. Before Off Maintenance



ii. After Off Maintenance



iii. LCS Member Repairing Shoulders



vi. LCS Member Repairing Shoulders



v. Repairing Road Side Slope



vi. Stockpiling Soil for Monsoon

8. Suggestions to Improve the Program

In last fifteen years the LCS activities are demonstrated by the many experts and implemented very successfully as a result most of the rural roads have connectivity to the national road networks. The off-pavement maintenance is a routine work as a result every year there is a huge scope of ultra poor employment but still there is some weakness of the program and the following suggestions are made to improve the off-pavement maintenance works and LCS members.

- a. The budget of the off-pavement maintenance should be increased significantly.

- b. The daily wages of the LCS member should be increased than existing wage rates.
- c. After completion of the contract, LCS member should be under proper guidance and monitoring of the government and support should be given to them after evaluation of their present condition.
- d. Sufficient training should be given to the LCS member for Income Generating Activities (IGA) and Gender gap.
- e. To engage more women in on pavement maintenance LCS Member could be trained for small on pavement maintenance work.

9. Conclusion

In last four decades significant change in rural road infrastructure is observed in Bangladesh. A huge rural road asset of more than seven billion USD has been created and now it is a great national asset of Bangladesh. Rural road maintenance program is effective for road network sustainability. The off-pavement maintenance is an outstanding program for the poverty reduction for the ultra poor rural destitute women of Bangladesh and sustainability of the rural roads as well. This exemplary program has given the opportunity to maintain the rural road asset of Bangladesh and created huge employment in rural area for destitute woman. Last one and half decades many examples have been created that the destitute women are now self dependent and recognized by the society. LGED is the distinctive department who is successfully implementing this activity. It is revealed that poverty reduction is not possible within a very short period but this approach could contribute to a certain portion of the rural population effectively.

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