

**Expert Group Meeting on Enhancing Rural Transport Connectivity
to Regional and International Transport Networks**

9 - 10 July 2019, Bangkok

**Maintenance and Safety
Enhancements of
Rural Road Networks**

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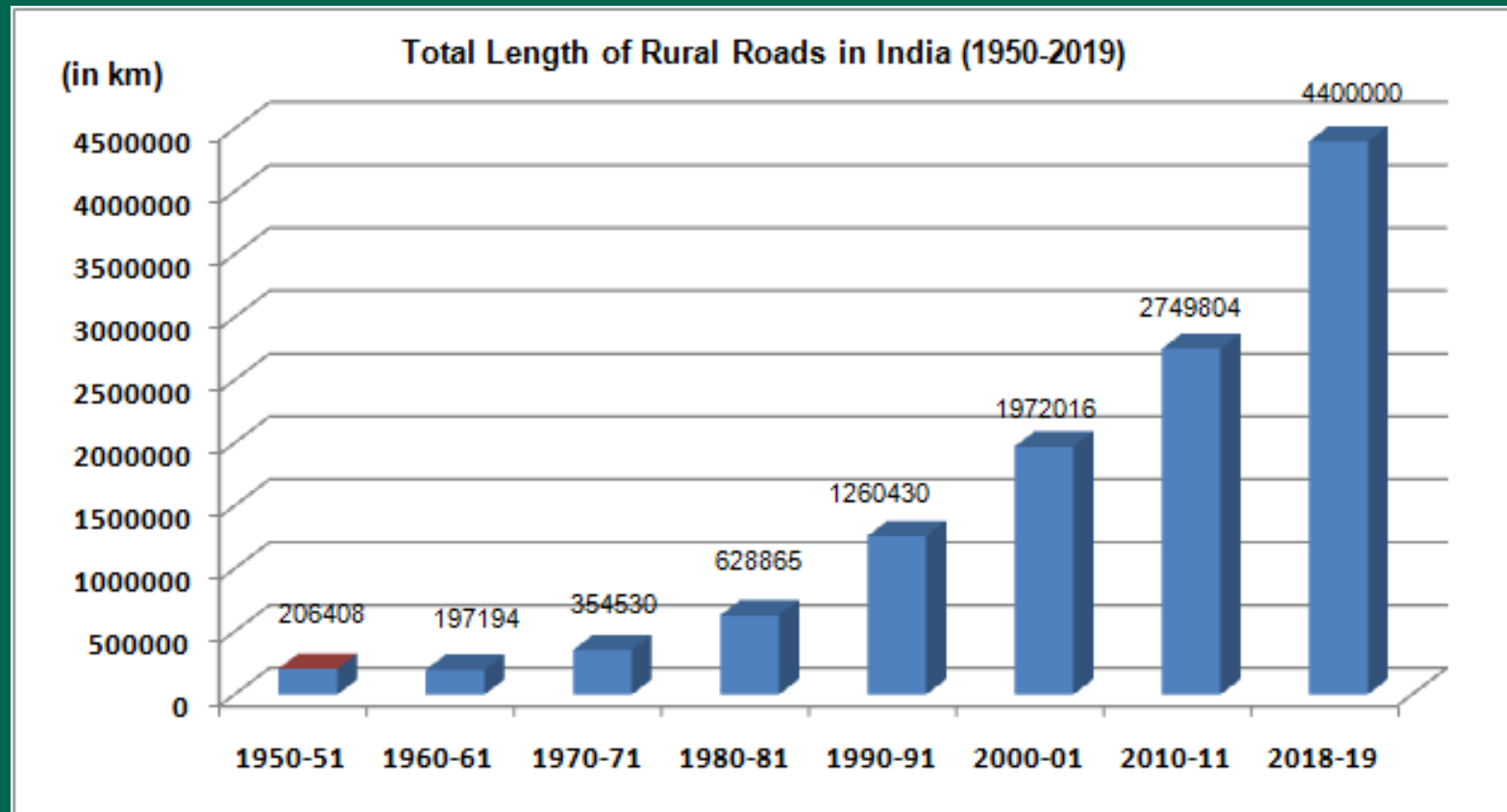
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Rural Roads and Rural Economy

- India has 597,464 villages (2018) of varying population size dotted across its land mass of diverse topography ranging from mountains, valleys, deserts, wet lands, etc. and climate zones.
- Efficient access to these villages is important for socio-economic development of their population (about 70 percent of country's population).
- Rural roads are an integral part of the road network comprising national and state highways, district and rural roads.
- A good part of traffic from national highways originates from rural and district roads, thus establishing the organic relationships of different hierarchies of roads (AITD Study).

India's Growth Story on Rural Connectivity

- Presently, over 90 percent of the villages have been provided with all-weather road access. The increase in rural roads length over the years is depicted below.



Rural Connectivity Scenario in India

(December 2000)

- Having achieved high levels of village connectivity, the country adopted policy of connectivity to habitations. These are small clusters located away from the main village.
- Of 825,000 habitations, 345,000 remained to be connected
- Huge inter-state and inter-district variations
- Rural development suffering in low connectivity states
- This led to launch of PMGSY in late 2000 Pradhan Mantri Gram Sadak Yojana – a Prime Minister’s Rural Roads Program
- Objectives:
 - Reduce regional imbalances, inequality
 - Alleviate rural poverty
 - Ensure sustained access
 - Create employment opportunities
 - Integrated Rural Development

PMGSY: Key Features

- **Construction cost by Federal (Central) Government, maintenance by states**
- **Five-year routine maintenance by same contractor who undertakes construction/upgradation work**
- **Preparation of District Level Master Plans in due consultation with elected representatives**
- **Dedicated fund: Half of additional excise duty on HSD**
- **Stress on local material, local contractor, local labour, local employment and thus local economy**
- **Frugal but proven technologies, resource efficiency**
- **Well engineered, well delivered programme**

Strategies for Network Connectivity and Development

- Rural transport: Part of transport chain with one end in farm and the other in market. Also the transport chain from main highway network to local market
- Development of rural roads not be viewed in isolation. They must integrate with state highways and national highways through district roads as also agri-supply chains
- With digital initiatives being taken by countries of the ESCAP region, need for space planning for co-deployment of optical fibre cable even along rural roads to enable digital connectivity to rural masses and even cross border linkages (India committed to Bharat Net)
- Integrate 'development' objective with 'employment' objective:
 - Plantation of trees, preferably fruit bearing, along rural roads (income besides protection of slopes)
 - Mobilizing local communities, women Self Help Groups for routine maintenance (carriageway, off-carriageway). Revive old system of voluntary labour as beneficiaries
- Development Agenda must be mirrored in the SDGs

Current Scenario on Connectivity

(June 2019)

- Several states towards achieving universal connectivity for habitations of lower size population not covered under PMGSY
- Around 700,000 habitations stand connected
- Essential that access remains available on sustained basis and users are not exposed to risk of accidents on these roads also
- Areas requiring continued attention:
 - Maintenance of rural road assets
 - Safety of road users including vulnerable road users
 - Integration with state, national and international

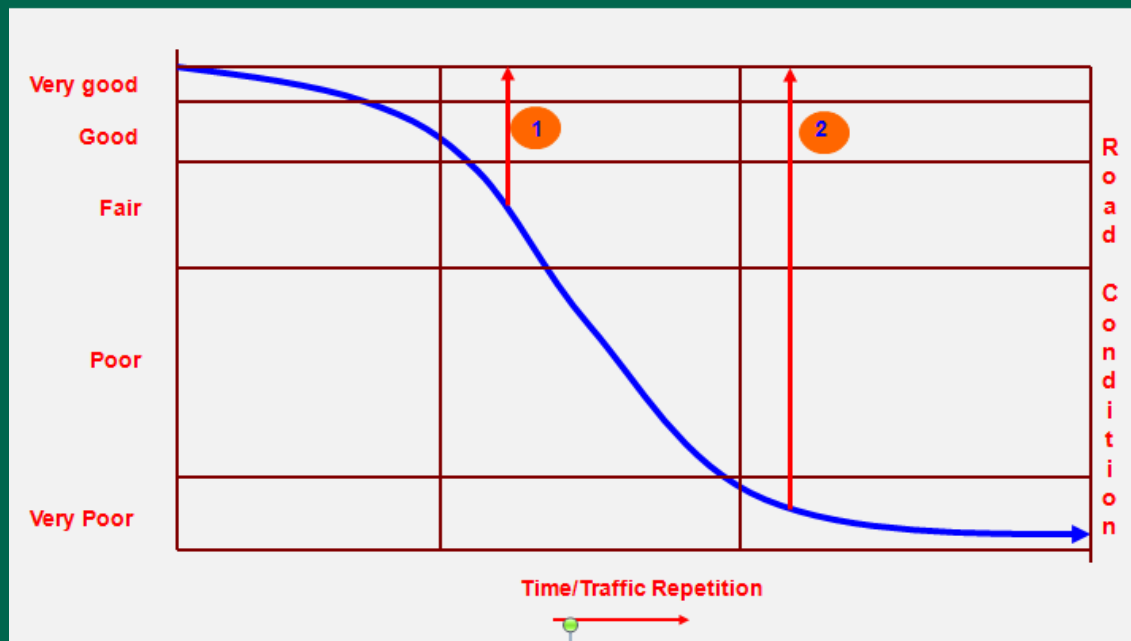
Purpose of Road Maintenance

<p>Safeguard government investment in provision and development of roads and bridges by reducing rate of deterioration</p>	<p>Of direct interest and value to government</p>
<p>Sustain assets created</p>	
<p>Keep the road serviceable throughout its design life and contribute to reliable and safe transport services</p>	<p>Of direct interest and value to road users, farmers and inhabitants of the area served by the road</p>
<p>Lower cost of vehicle operation, enhance energy efficiency and safety</p>	
<p>Sustain social and economic benefits of improved road network</p>	

Replacement Value of Rural Road Assets

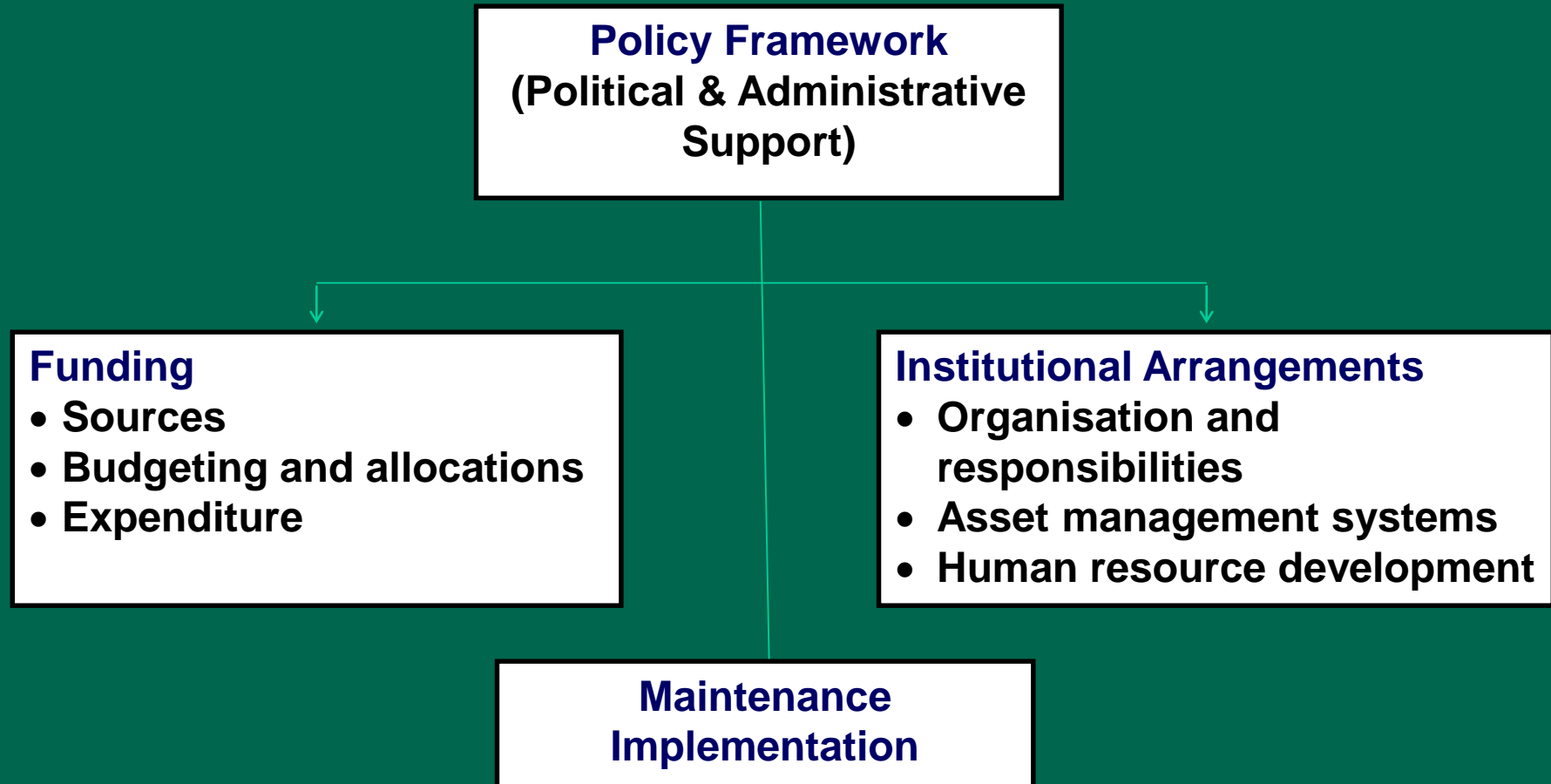
- The current replacement value of the rural roads assets exceeds US\$100 billion. Neglect in maintenance (say, 5 percent of RV) amounts to loss of US\$ 5 billion.

Road Deterioration Curve



Source: World Bank Studies in mid 1980's: Road Deterioration in Developing Countries

Asset Preservation Strategy Elements in Maintenance



- Maintenance on Radar of Government
- Moving towards Asset Management Principles

Key Elements – Road Maintenance Implementation on Ground

Management & Planning

- Maintenance units
- Inventory and surveys
- Inspections
- Planning and prioritisation
- Works and supervision

Delivery on Ground

- Contract procedures
- Contract documentation
- Contracting arrangements

Technology

- Resource efficiency
- Knowledge development
- Appropriate equipment

Control

- Monitoring
- Review and evaluation
- Technical and Financial Auditing

Funds for Maintenance

- **Establishment of dedicated funds**
 - **Central Road Fund at the federal level**
 - **State Road Funds at the state level**
- **Resource mobilization**
 - **Cess on Agriculture Produce**
 - **Share from Transport Revenues**
 - **Income from fruit tree plantations on rural roads**
 - **Cess on use of right way for laying fibre optics**
 - **Contribution by village level self-help groups**

Maintenance Levels: Serviceability Indicators

S. No.	Serviceability Indicator	Level 1	Level 2	Level 3
1.	Roughness by bump integrator (Max. Permissible)	2000 mm/km	3000 mm/km	4000 mm/km
2.	Potholes/km (Max. Numbers)	Nil	2-3	4-8
3.	Cracking and patch repairs (Max. Permissible)	5 per cent	10 per cent	10-15 per cent
4.	Rutting (20mm) (Max. Permissible)	1.0 per cent	1.5 per cent	2.5 per cent
5.	Skid resistance (Skid number by ASTM-274) Minimum Desirable	50 SN	40 SN	35 SN
6.	Defective bridge deck area and bump at approach (Max. Permissible)	Nil	10 per cent	15 per cent
7.	User Information	All road signs, km stones and road marking in good condition	Only major road signs, km stones, some road markings in good condition	Signs only for major destinations and km stones in fair condition

Strengthening Operational Capacity

- **Planning capacity to assess the condition of the road network and plan, design and prioritize maintenance activities. Formulating annual maintenance plans block/district level**
- **Ability to manage the contracting process and supervise and monitor the work done by contractors**
- **Technical expertise to evaluate the effectiveness of current standards and practices**
- **Provision for monitoring and evaluation**
- **Technical and financial reporting and auditing**

Cadre of Local Maintenance Contractors

- **Conversant with Techniques of Maintenance and Accounting Methods**
- **Mobile Maintenance Unit**
- **Good in**
 - **Planning and programming of maintenance activities**
 - **Supervision of labour**
 - **Management of tools & equipment**
- **Performance based maintenance contracts**
- **Community Contracting, Self Help Groups**
- **Job potential: Two million workers (600 million man-days annually) for routine maintenance alone, good scope for gender inclusion**

Road Safety: Another Emerging Challenge

- The major factors leading to accidents on rural roads are:
 - Geometric deficiencies
 - Weak design and layout of intersections when they meet state and national highways
 - Inadequate, improper road signs, pavement markings, delineators, hazard markers, crash barriers
 - Inadequate stopping sight distance
 - Sudden / surprise acute curves, steep gradients

Condition of Roads and Bridges

- **Road Condition**

- Uneven, slippery surface
- Potholes
- Edge break, sunken shoulder
- Rut formation



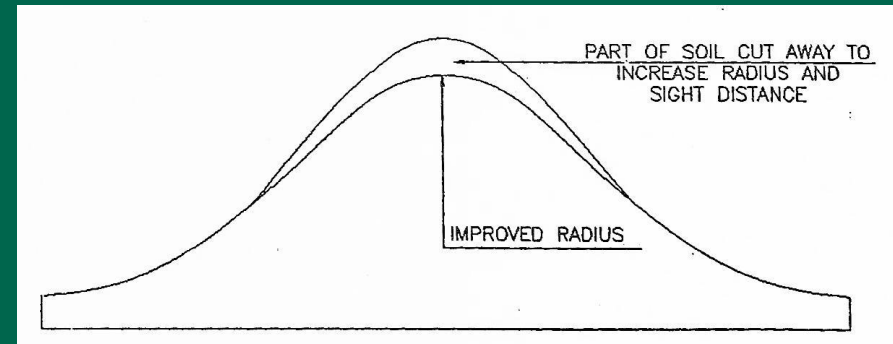
- **Bridge Condition**

- Gap in expansion joints
- Worn out bearings
- Broken parapets, railings
- Highly distressed, but not noticed
(Virtual Absence of Inspection System)

Message: Maintenance enhances safety

Safety Enhancements on Rural Roads

- Well designed and adequate visibility at T and Y – Intersections, cross junctions
- Proper geometric design standards
- In case of site constraints:
 - Proper cautionary signs
 - Traffic calming measures
- Proper and adequate road signs, pavement markings and other traffic control devices
- Passing places on narrow roads
- Road Infrastructure Safety Facilities (ESCAP Initiative)



Safety Enhancements on Rural Roads

(contd...)

- More shoulder width on valley side in hills
- Protection structures
 - Boulder nets
 - Snow fence, snow sheds
 - Gabion mattresses
- Special treatment at:
 - Blind curves
 - Hairpin bends
 - Deep gorges
- Passing places on narrow roads
- Community Awareness Campaigns

Road User Satisfaction Index (RUSI)

(Illustrative Example)

Maximum Score: 100

S. No.	Parameter	User satisfaction level	Relative score	Weightage for the parameter	Weighted score
1.	Travel comfort	Good	100	0.40	40.00
2.	Condition of shoulders	Poor	30	0.20	6.00
3.	Cleanliness of drains	Poor	30	0.20	6.00
4.	Road signs and safety	Fair	60	0.20	12.00
Total Score				1.00	64.00

Relative score: Good - 100, Fair - 60, Poor - 30 Weighted score: Good 80+, Fair 60-80, Poor 60-

Institutional Strengthening and Capacity Building

- **Continue capacity building and skill development initiatives of all actors in delivery chain such as road departments, consultants, contractors, workers and equipment operators and at all levels.**
- **Excellent support from World Bank and Asian Development Bank.**

To Sum Up: Key Messages

- **Plan and deliver rural roads projects: Universal connectivity, shared prosperity**
- **Integrate rural roads with state, national and international road networks as also with markets, cold storages, warehouses and logistic hubs**
- **Set up dedicated road funds**
- **Ensure maintenance and safety enhancements: Sustained safe access**
- **Space planning for fibre optics: Digital initiatives**
- **Green growth: Tree plantation, climate resilient and green technologies**
- **Capacity building of actors in delivery chain**
- **Rural economy: Local materials, local labour and contractors**

Thank you

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