New Approaches to Sustainable Provision of Low-Volume Sealed Roads: General Introduction

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Objective of Presentation

To share experiences with practitioners from Mali, Senegal and Burkino Faso with proven, alternative pavement and surfacing technologies that may offer significant benefits in their countries.
Outline of Presentation

- General introduction
- Alternative surfacing technologies + case studies
- Alternative materials & pavement technologies + case studies
Background to workshop based on development of

The SADC Guideline on Low-Volume Sealed Roads
Introduction

The SADC Region

- 13 Countries
- 10 million sq. km
- 200 million pop
- Largely agrarian economy
- 80% pop in rural areas
- Rural (LVR) roads critical to economic well being of all countries
Introduction

Motivation for Guideline

- Traditional approaches to provision of LVSRs have stemmed from technology and research carried out over 40 years ago in very different environments:
  - not surprising that many of the imported approaches, designs and technologies are inappropriate for application in the region.

- Technology, research and knowledge about LVSRs have advanced significantly in the region:
  - not only question much of the accepted wisdom on LVSR provision but also show quite clearly the need to revise conventional approaches.

- Unfortunately, there has been little effective dissemination and uptake of the results of research carried out in the region:
  - triggered the need for this SADC Guideline on Low-Volume Sealed Roads.
Introduction

Aims of the Guideline

- Increased delivery of all-weather access through more appropriate approaches to planning, design, construction and maintenance of LVRs

Development of Guideline (initiated by SATCC; supported by DFID, NORAD, SIDA)

- High level of local participation in compilation of guideline
- SADC member state representation in each of the 19 technical, national and review workshops
- Much higher level of awareness and buy-in than in previous documents of this type.
Background

Benefits from the guideline

- Implementation of the results of research
- Application of locally derived (appropriate) technology
- Better appraisal techniques for road projects with low traffic
- Improved use of local resources
- Appropriate designs/construction techniques for local conditions
- Better opportunities for technology transfer
- Cost-effective provision of low-volume surfaced roads
Background

Definition of a Low-Volume Road

- Many kinds of low-volume roads serving different functions
  - may be primary, secondary or tertiary/access

- One characteristic in general:
  - they all carry relatively low volumes of traffic
  - typically less than 200 vpd
Introduction

Why low volume sealed roads?

Unpaved roads: Require continuous use of a non-renewable resource – gravel. This is inherently unsustainable and environmentally damaging. Is this sustainable? NO!

Unpaved roads: dusty, health hazard, pedestrian/vehicle safety; crop, natural habitat and vehicle damage. Is this sustainable? NO!

Approx. 175 million cu.m “consumed” annually in SADC region for gravelling purposes
Traditionally Gravel is used for rural access roads. However:

- They are low (initial) cost and relatively easy to construct

- However, they are expensive to maintain – typically US$1,600/year

- Each Km of gravel road typically looses more than 70 cubic metres of material EACH YEAR

- A range of constraints means that maintenance is rarely carried out, leading to impassability, or the need to repeatedly reconstruct.

..........SENSIBLE?? NO!!!
Introduction

Gravel Maintenance Challenge – Viable?
Introduction

Gravel Maintenance Challenge

(a) Gravel thickness with preventative maintenance (timely regravelling).

(b) Gravel thickness without preventative maintenance (no timely re-gravelling).
Introduction

Lack of gravel maintenance

The reality of lack of maintenance after only 3-4 years in service?
Introduction

The Message

- There is an ‘unhealthy’ and unsustainable reliance on gravel roads to solve the all-weather access problems of many countries.

- Window of opportunity for using gravel is slowly closing. Need for alternative, more sustainable solutions.

- A new approach is required, using a ‘menu’ of more durable, low cost, local-resource-based surfaces, using gravel only where appropriate.

- These techniques are ideal for use by SMEs.
Poverty is linked to Poor Access

- Rural Economic and Social development needs commercial, educational, health and infrastructure initiatives that rely on **GOOD PERMANENT ACCESS**.

- Unfortunately, **poor access** for millions in rural communities limits the effectiveness of these initiatives, because of:
  - unreliable travel or impassability, especially in the rains,
  - high unit transport costs for goods, services & people.

- **Investment is discouraged by poor access.**
Why Invest in Low-volume Sealed Roads?

Technical factors

- Provide more sustainable, cost-effective (LCC) solutions in terms of all weather passability
- Reduce depletion of scarce, natural resources;
- Reduce health problems;
- Reduce institutional capacity requirements;
- Reduce plant requirements;
- Reduce accident problems;
- Satisfy wishes of road users
Introduction

Gravel versus sealed roads: Life cycle analysis

Life-cycle analysis period

Option A - Base or without investment case (gravel road)

Option B - Project or with investment case (paved road)

Key: P = pavement / G = gravel / RG = regravel / RM = routine maintenance / ST = surface treatment / RV = Residual value / NPV = Net present value
Introduction

Why Invest in Low-volume Sealed Roads?

Economic factors

- Facilitate/increase trade
- Improve access to jobs, education, health care and other services;
- Enhance incomes and economic well being;
- Increase personal mobility and facilitate economic growth;
- Reduce poverty and contribute toward social development.
Not possible to upgrade all unsealed roads

However, many thousands of km of rural access roads carrying light traffic that could be justifiably upgraded using “low-cost” seals coupled with an appropriate “spot improvement” strategy

Guideline provides guidance on achieving this objective
Introduction

Gravel Road Network

<table>
<thead>
<tr>
<th>SADC Road Network</th>
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<tbody>
<tr>
<td>Paved (km)</td>
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<tr>
<td>126,681</td>
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<td>13.6%</td>
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- **Paved**: 126,681 km (13.6%)
- **Unpaved**: 805,526 km (86.4%)
- **Total**: 932,207 km (100.0%)

- **Rural Roads**: 95% unpaved, 5% paved
- **Main Roads**: 79% unpaved, 21% paved
Introduction

*Typical Means of Transport in Rural Areas*
Introduction

Lack of adequate access
Introduction

Lack of adequate access
Introduction

Lack of Reliable Access

Short sections of road in poor condition can benefit significantly from spot improvement works – attention to drainage.
Most rural (LVR) in poor condition - impact negatively on economy.
Introduction

Roads and Economic Development

“You can always tell the state of a country’s economy by looking at the state of its roads.”
Introduction

Meeting New Challenges—the SADC LVSR Guideline

- Captures best regional and international practice
- Not prescriptive or country specific
- Departure from traditional practice w.r.t:
  - planning, appraisal and environment
  - geometric design and road safety
  - pavement design and materials
  - construction and drainage
  - maintenance and management
- Holistic approach satisfying seven dimensions of sustainability (political, social, institutional, technical, economic, financial, environmental)
Introduction

What’s new?

- Adoption of a holistic approach to rural road provision for the urban and rural poor (dimensions of sustainability)
- Application of appropriate planning tools (e.g. IRAP)
- A whole-life approach to investment appraisal
- Recognition of the environmental impacts of road provision
- The use of appraisal techniques that include social and non-motorised user benefits (e.g. RED)
- Application of geometric and structural designs based on local users, local knowledge and technology exchange
Introduction

What’s new?

- Recognition of the disproportionate impact of road accidents on the poor and the need for safe designs that protect vulnerable road users
- Application of locally-derived standards and specifications
- Application of construction methods that increase the use of local materials and human resources thus reducing costs and increasing employment opportunities (compaction, LBM)
- Promotion of funding sources and maintenance planning and management techniques that ensure sustainable access
Meeting the seven dimensions of sustainability
Introduction

Benefits of adopting new approaches

- Application of locally derived, appropriate technology
- Reduced life cycle costs of LVSR provision
- Facilitating socio-economic growth and development and poverty alleviation

The successful engineering of a low volume sealed road requires ingenuity, imagination and innovation. It entails “working with nature” and using locally available, non-standard materials and other resources in an optimal and environmentally sustainable manner.

It will rely on planning, design, construction and maintenance techniques that maximize the involvement of local communities and contractors.

When properly engineered to an appropriate standard, a LVSR will reduce transport costs and facilitate socio-economic growth and development and reduce poverty in the SADC region.
Introduction

Phases in Uptake of New Technology
There is nothing more difficult to take in hand, more perilous to conduct or more uncertain in its success, than to take the introduction of a new order of things, because the innovator makes enemies of all those who prospered under the old order, and only lukewarm support from those who would prosper under the new.  

Machiavelli, *The Prince* (1513)
Summary – the Future

- Need to seal many more roads to
  - Provide better accessibility
  - Reduce road user costs
  - Avoid excessive environmental damage
- Can’t afford to use existing standards
- Need to look at innovations
- More, carefully monitored trial sections
- Must not be scared to try new things – carefully and with managed risk!!
Are you ready to be the champions of change???
Thank you