

Providing Sustainable Access through road works techniques suitable for Small & Medium Enterprises

by

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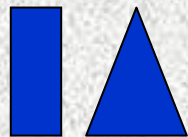
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The Message

- ❑ There is an 'unhealthy' and unsustainable reliance on gravel roads to solve the access problems of poor rural communities
- ❑ A new approach is required, using a 'menu' of more durable, low cost, local-resource-based surfaces, and even engineered natural surfaces. Using gravel only where appropriate.
- ❑ These techniques are ideal for use by SMEs.



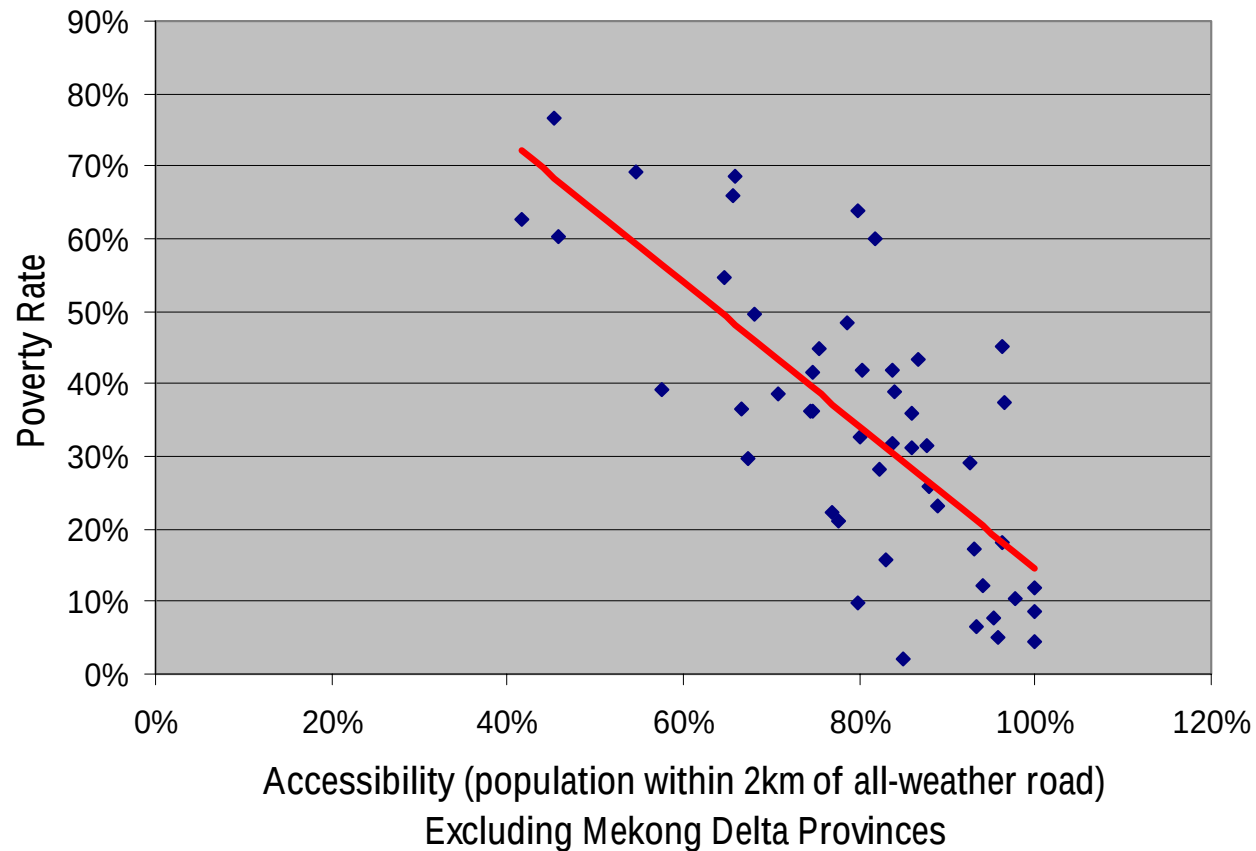
Presentation Contents

- ❑ **Poverty is linked to Poor Road Access**
- ❑ **The Limitations of traditional 'Gravel' use**
- ❑ **Alternative Surface Options**
- ❑ **Suitability for Small & Medium Enterprises**



Poverty is linked to Poor Access

Figure 1 - Poverty & Accessibility, Vietnam 2002



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.

Traditionally Gravel is used for rural access roads

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

However, they are expensive to maintain (In Cambodia, typically **US\$1,600/km/year**)

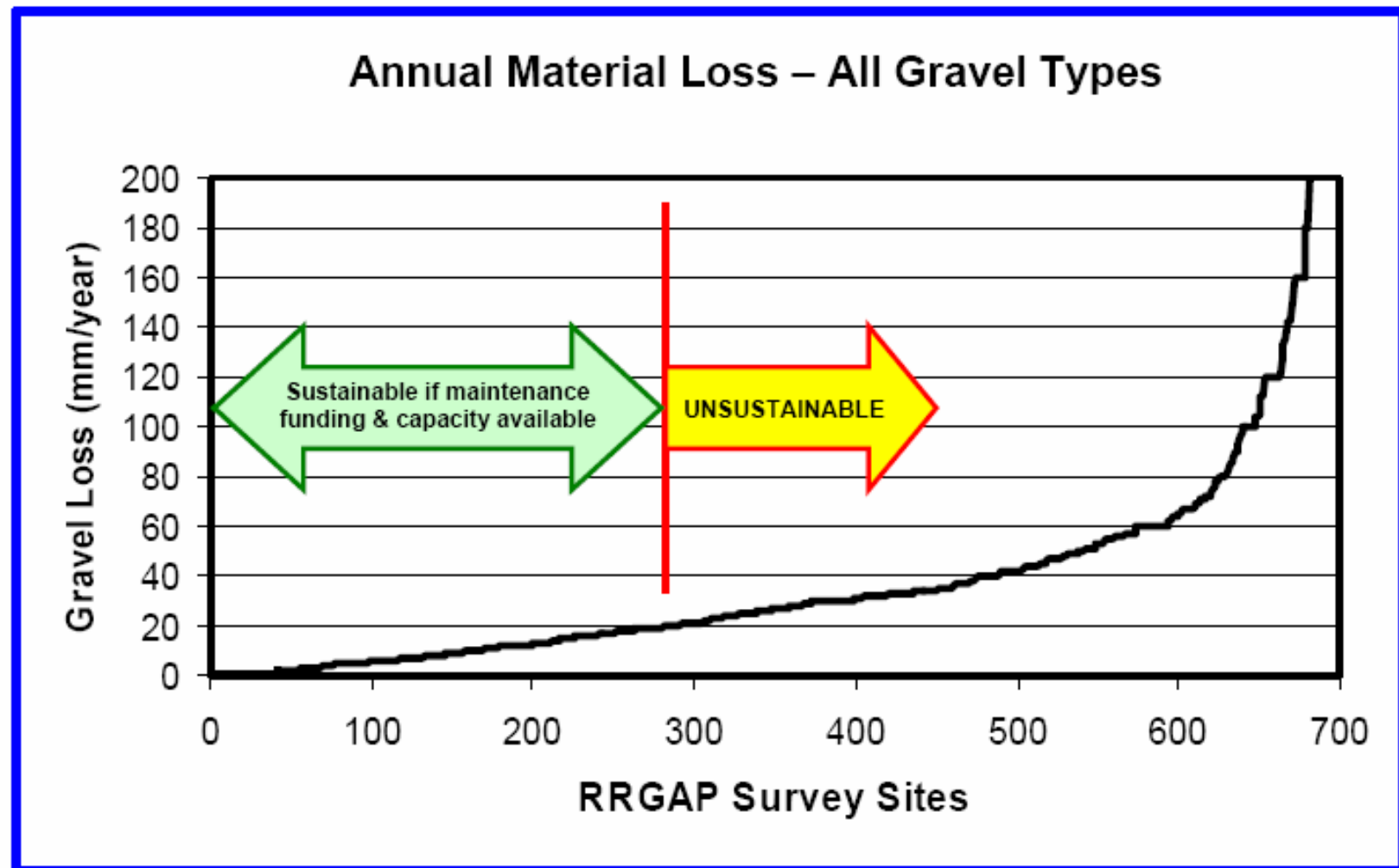
A Km of gravel road typically loses more than **70 cubic metres** of material **EACH YEAR** in South East Asia.

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

.....**SENSIBLE?**



RRGAP – Survey Gravel Loss on 700 Sites



Vietnam Rural Road Gravel Assessment Programme (RRGAP) 2004 – ANNUAL RATE OF GRAVEL LOSS FROM ALL SITES



Recent Intech-TRL research confirms that Gravel may **NOT** be appropriate, especially where -

- ❑ Gravel quality is poor (*Majority surveyed outside recognised specs*)
- ❑ Compaction & thickness cannot be assured
- ❑ Drainage is not provided (*>50% camber & drainage defective*)
- ❑ Haul distances are long (*suggest WLC for >10km*)
- ❑ Rainfall is very high (*>2m*), or dry season dust problems
- ❑ Traffic levels are high
- ❑ Longitudinal Gradients (*> 4% if rainfall >1,000mm/year*)
- ❑ Adequate maintenance cannot be provided (*75% not*)
- ❑ Sub-grade is weak or soaked (flood risk), or
- ❑ Gravel deposits are limited/environmentally sensitive

There are many PROVEN Alternative Surface Options using:

- Stone
- Bitumen
- Concrete
- Brick



They can have better Whole Life Cost and Local Resource Use attributes, & LESS MAINTENANCE.

MENU of Proven Rural Road Surface Options:

Number	Type of Surface/Roadbase/Subbase	Cambodia Phase 1	Cambodia Phase 2	Vietnam RRST 1	Vietnam RRST 2	Laos SEACAP 17
1	Engineered Natural Surface		◆			◆
2	Soil Stabilisation-Lime		◆	◆	◆	
	Soil Stabilisation-Cement			◆	◆	
	Soil Stabilisation-Emulsion			◆		
3	Natural Gravel / Laterite	◆	◆	◆	◆	◆
4	Water Bound Macadam			◆	◆	
5	Dry Bound Macadam			◆	◆	
6	Crushed Stone Macadam	◆	◆	◆	◆	
7	Hand Packed Stone	◆	◆			◆
8	Telford Paving					
9	Cobble Stones				◆	
10	Stone Setts or Pavé					
11	Dressed Stone	◆		◆		
12	Mortared Stone					◆
13	Stone Chippings		◆			
14	Slurry Bound Macadam					
15	Bitumen Emulsion Sand Seal	◆		◆	◆	◆
16	Bitumen Emulsion Chip Seal	◆	◆	◆	◆	◆
	Bitumen Multi-Chip Seal				◆	
17	Slurry Seal					
18	Ottaseal					◆
19	Penetration Macadam (Bitumen)			◆	◆	
20	Pre-Mix Macadam (Bitumen)					
21	Burnt Clay Brick			◆	◆	
22	Concrete Brick			◆	◆	◆
23	Un-reinforced Concrete		◆		◆	
24	Steel Reinforced Concrete		◆	◆	◆	
25	Bamboo Reinforced Concrete	◆		◆	◆	◆
26	Geo-cell Paving					◆
27	Natural Sand subbase			◆		
28	Quarry-Run Gravel subbase				◆	

Cambodia Phase 2 = SEACAP 19 & NRDP (proposed)

RRST-2 = Proposed

*Research in
3 countries
- Guidelines
being
prepared*

Some options of particular interest:

**Bamboo
Reinforced
Concrete**



**Cobble Stone
Paving**



**Clay bricks burnt
with Rice Husk**



The Use of Earth

Engineered Natural Surfaces (i.e. with maintained camber and drainage) have enormous potential for providing low cost basic access to many poor communities

However, we need to develop guidelines on suitable conditions for engineered earth roads based on:-

- **Soil type & strength**
- **Crossfall & drainage arrangements**
- **Rainfall characteristics**
- **Traffic (volumes and type)**
- **Maintenance arrangements**



Suitability for SMEs

- ❑ **Possibility to be based in the rural areas with low mobilization costs,**
- ❑ **Low capital and set-up requirements,**
- ❑ **Inter-sector flexibility; possibility to provide services to a range of sectors and clients,**
- ❑ **Good market entry point for small entrepreneurs,**
- ❑ **Possibility to use affordable simple equipment, either owned or hired,**
- ❑ **Possibility to use local labour skills such as carpentry and masonry,**

Suitability for SMEs (continued)

- ☐ **Less pressures for corrupt practices, as they are part of the local community,**
- ☐ **Less opportunities for HIV-Aids infections due to less imported labour into the community,**
- ☐ **More of the costs recycled into the local community in employment of local labour, local tools production, local transport, local materials and profits,**
- ☐ **Construction skills developed in the local community which can be utilized for maintenance and other activities,**
- ☐ **Low overhead costs.**

Constraints/Challenges that need to be tackled

- ❑ **Inadequate Government policy framework to support the SME sector for rural roads,**
- ❑ **Insufficient public awareness of the potential benefits of SME rural roadworks implementation,**
- ❑ **Lack of appropriate contract documentation, pre-qualification & bidding procedures, standards and specifications, financial and performance audit, dispute resolution for small scale works,**
- ❑ **Contract pre-qualification too demanding, for example 3 years experience of similar work,**
- ❑ **Contracting procedures and requirements usually (unnecessarily) demand heavy equipment holdings,**
- ❑ **Lack of access to capital or credit for equipment purchase or cashflow,**

Constraints/Challenges that need to be tackled

- ☐ **Lack of opportunities to hire equipment,**
- ☐ **Poor contractors' capacity in costing and planning works,**
- ☐ **Inadequate access to low cost training and guidelines on small scale roadworks,**
- ☐ **Contract technical solutions are usually restricted to gravel and macadam surfaces,**
- ☐ **Lack of sustainable local funding for small rural road works contracts and maintenance,**
- ☐ **Lack of market and sustainable workload for SMEs,**
- ☐ **Lack of representation of SMEs (e.g. association),**
- ☐ **Poor transparency in award and payment for work,**
- ☐ **Late and/or non-transparent payments for locally funded work.**

Conclusions

The Good News - Successes:

- ❑ Guidelines on use of Gravel now available
- ❑ 25 proven alternatives to gravel identified, many with better maintenance & WLC attributes, suitable for SMEs
- ❑ Guidelines on use of alternative surfaces for Rural Roads will be available later this year

The Challenges:

- ❑ Dissemination of the surfacing knowledge
- ❑ Demonstrating & Mainstreaming the knowledge in road authorities, academic and training programmes
- ❑ Creating an “enabling environment” for SMEs to implement appropriate surfacing options

Further details:-

Full details of the research findings, documentation and guidelines for downloading are being made available on the websites:-

SEACAP 2

www.cnctp.info

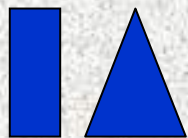
AND

Vietnam RT2 surfacing research website:

www.mt.gov.vn/ruraltransport/rrsr/

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