



**International
Conference on**

**New Technologies
and Innovations
in Rural Roads**

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Pragati Maidan, New Delhi, India

RURAL TRANSPORT PROJECTS IN VIETNAM

TECHNOLOGIES AND PRACTICES TO ENHANCE RESILIENCE
OF RURAL ROAD AND BRIDGES

Overview of WB rural transport projects in Vietnam

1996-2001

RURAL TRANSPORT PROJECT

- 18 provinces
- Rehabilitated 4403 km (4061 km district roads; 342 km commune roads);
- Constructed 9694m bridge
- Strengthening capacity at central and provincial level

2000-2006

SECOND RURAL TRANSPORT PROJECT (RTP2)

- 40 provinces
- Rehabilitated district and commune road;
- SEACAP projects

2006-2014

THIRD RURAL TRANSPORT PROJECT (RTP3)

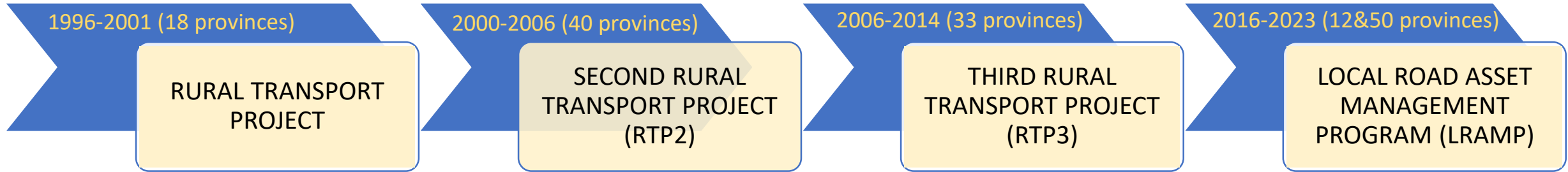
- 33 provinces
- Road rehabilitated 3283 km
- District road maintained 19902 km
- 36 bridges constructed
- 12/33 provinces used VPRoMMs

2016-2023

RESULTS-BASED LOCAL BRIDGES CONSTRUCTION AND ROAD ASSET MANAGEMENT (LRAMP P4R)

- Road Program of 14 provinces & Bridge Program of 50 provinces
- Rehabilitated 746 km local roads;
- Routine maintained at minimum level 46035 km roads; 37056 km maintained at BPC
- Built 1857 bridges

Overview of WB rural transport projects in Vietnam



Objectives

- Improve accessibility at gradually increasing levels
- Develop and strengthen local capacity from centralization to decentralization for project management
- Encourage the development of local contractors to small-scale constructors and then community-based local maintenance
- Strengthening capacity of local transport authorities to plan, implement and maintain rural roads, then improve spending efficiency in maintenance policy and budget allocation mechanisms
- Encourage better local road maintenance to commune roads and Incentivize prioritization of road maintenance activities approaching to climate resilient local road network.

Key Rural Transport Messages

Improved rural transport drives sustainable rural development and national growth.

Better rural transport is key for food security and zero hunger.

Poor rural transport condemns the poor to stay disconnected and poor.

Additional money and commitment is needed to build and maintain rural road networks.

Better rural transport calls for local solutions for local challenges.

UKAID-DFID 2018



Rural Transport Projects

Technologies and Practices to Enhance Resilience of Rural Road and Bridges



Key initial findings:

- i. Sustainability problem of unsealed gravel and aggregate pavement surface in very wet environment
- ii. Poor management and maintenance of local road networks: planning, implementation, management

Rural Road Surfacing Trials (RRST)

Construction



Monitoring



National Training Program on Road Maintenance

The model of Woman-leg rural road maintenance

Community-based road maintenance

More Sustainable and climate resilience of local roads and bridges

Computer-based local road management

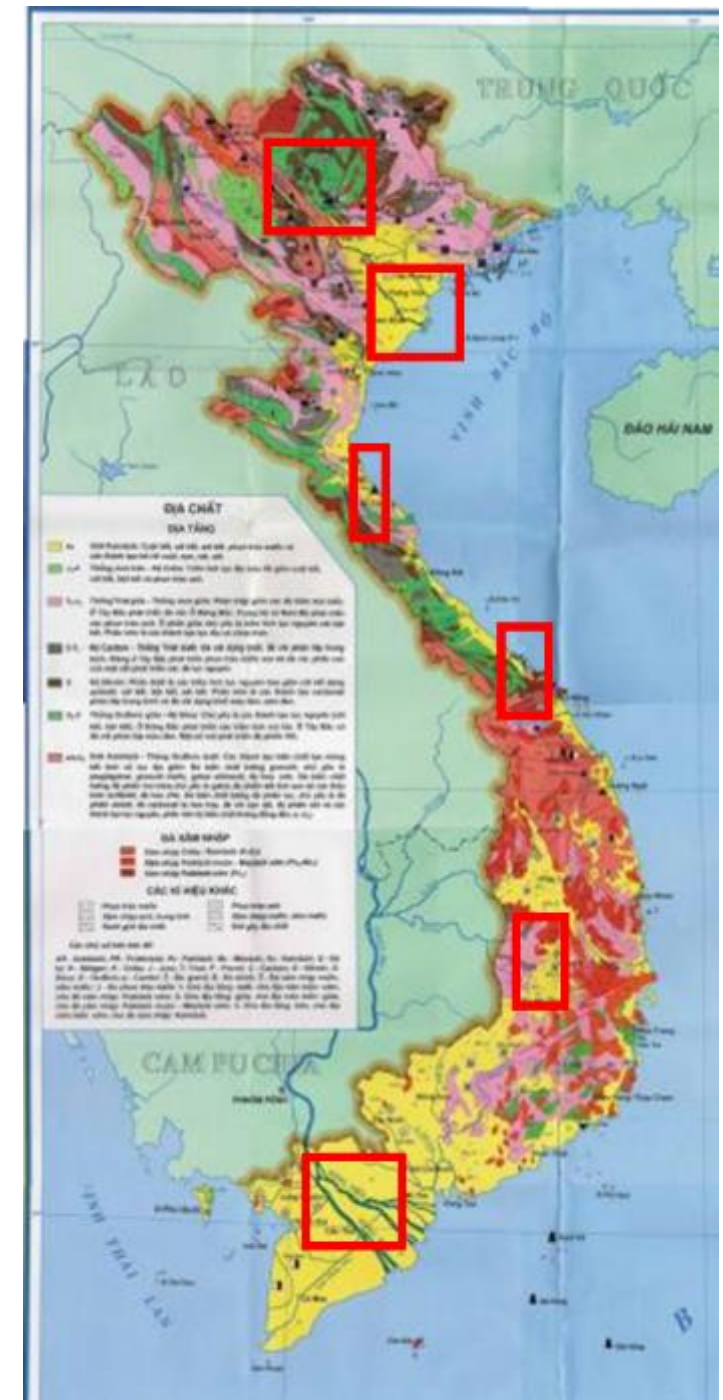
VPRMPS

VPRMPS/RONET-MTEP LRAMs

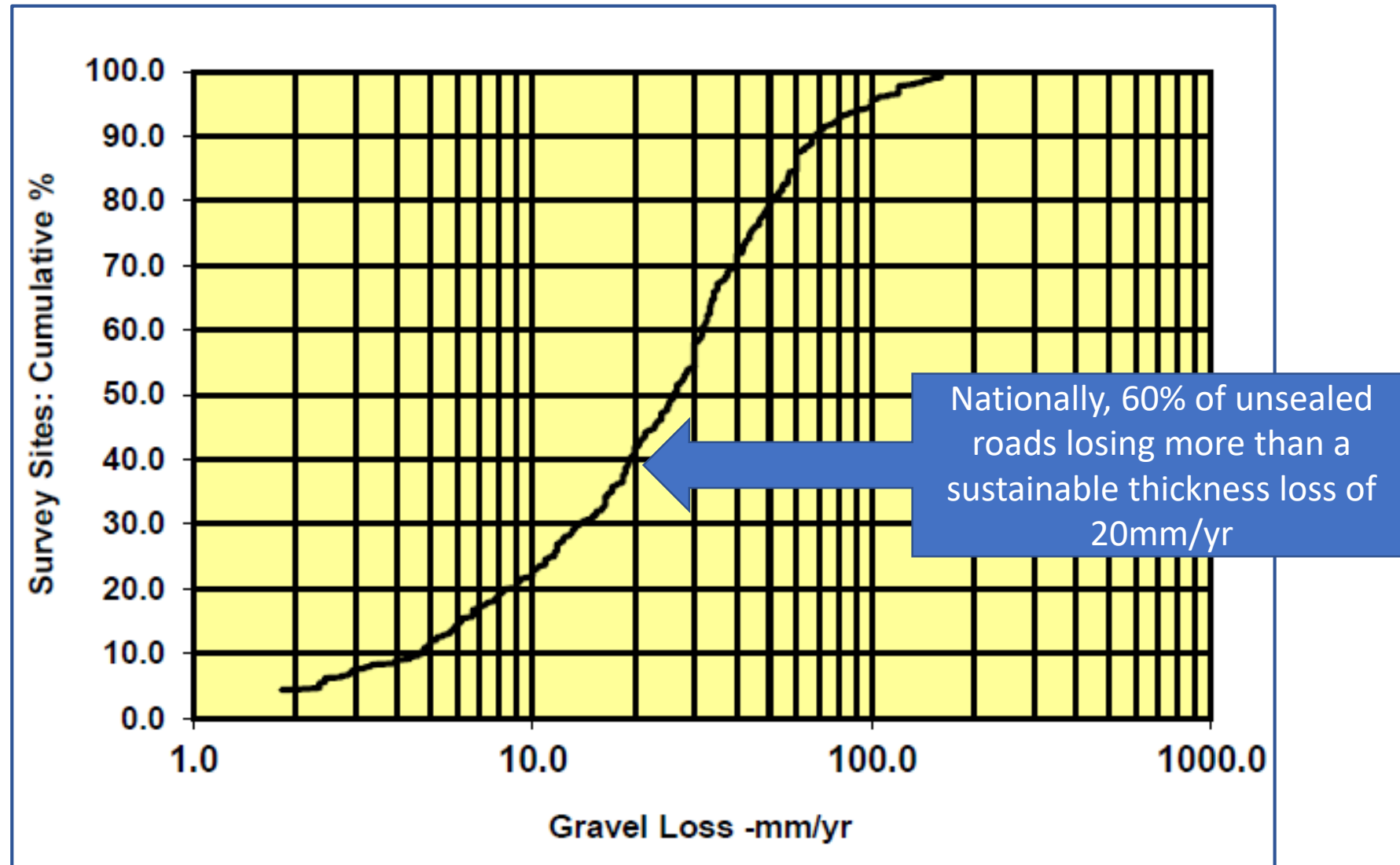
Rural Road Gravel Assessment Programme and the Rural Roads Surfacing Trials: Vietnam

Key Points

- ❑ Science-based research design
- ❑ 740 gravel erosion assessment locations
- ❑ Characterisation of pavement surfacing materials
- ❑ Identification of locally available solutions
- ❑ 156 km of trial pavement section constructed in representative terrains
- ❑ Implementation of monitoring procedures
- ❑ Statistical assessment relating geology, climate, terrain, traffic and performance.



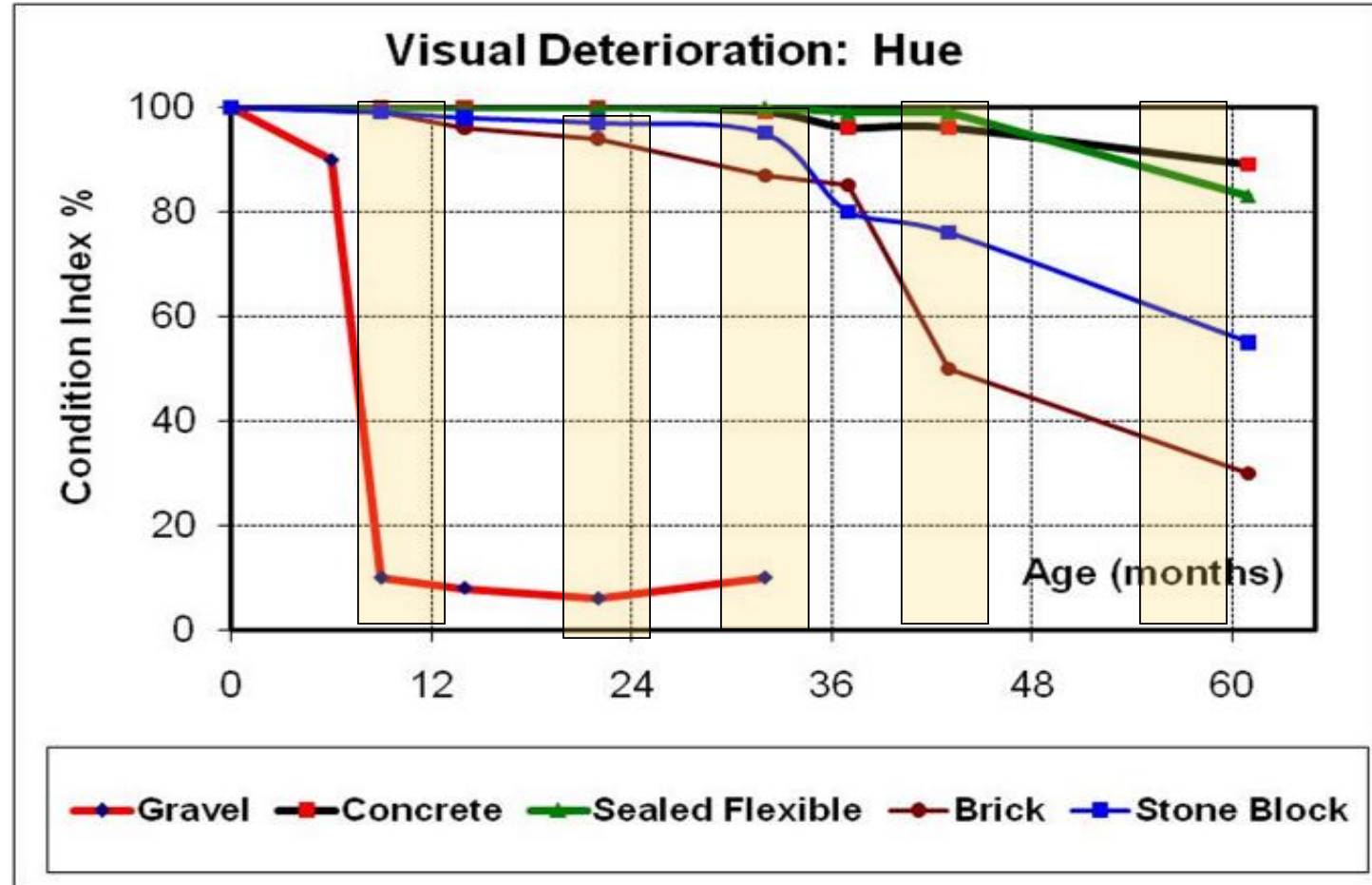
Overall Gravel Loss for 740 Locations at 95% Confidence Level



(Source: Cook & Petts, 2005. (UKAID-MoT))

Typical Research Outputs

Central Region
Thua Thien – Hue province
(After 5 years)

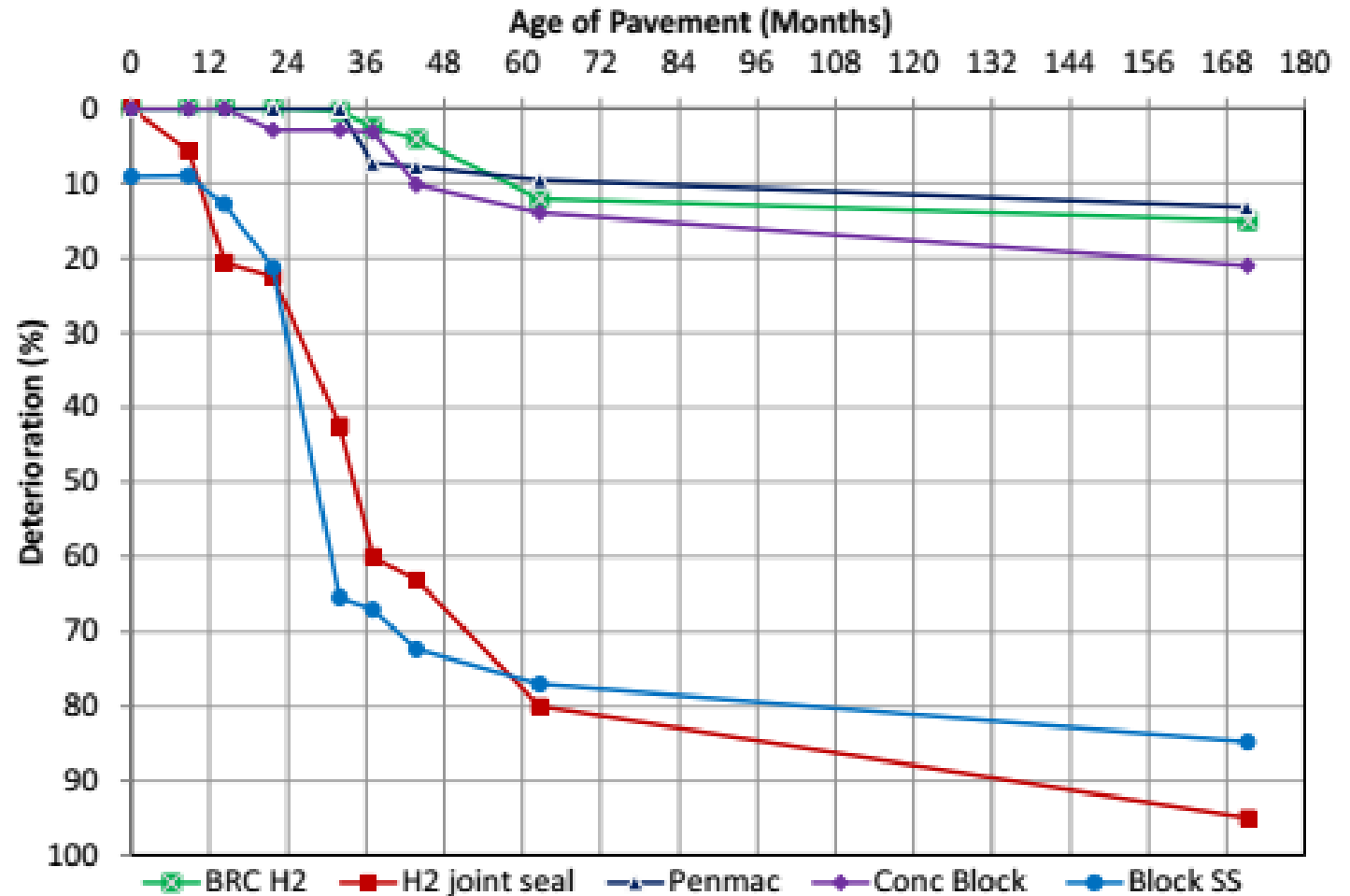


Intense Rain Period

(Source: World Bank 2014)

Typical Research Outputs

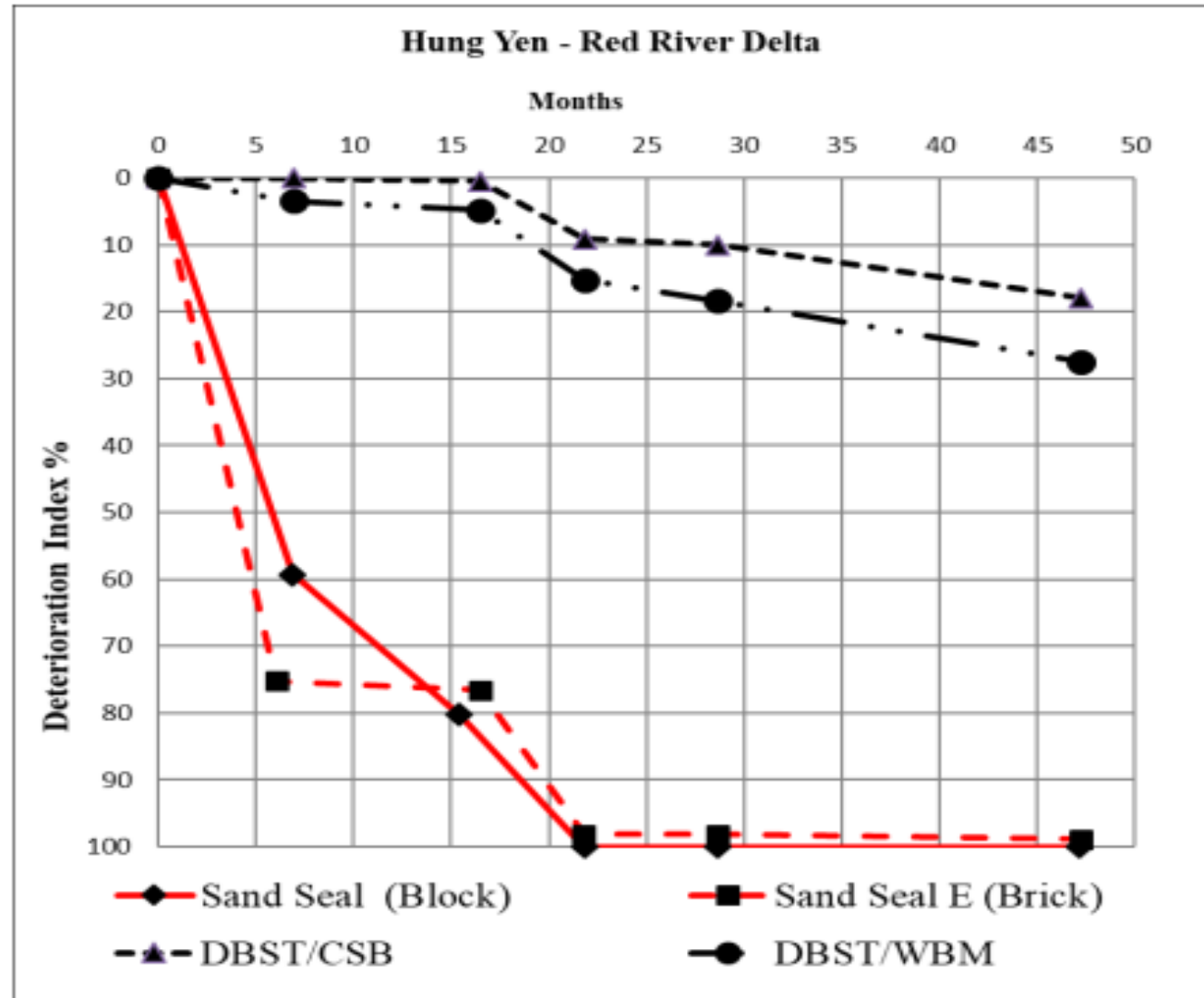
Central Region
Thua Thien – Hue province
(After 14.5 years)



Sealed road trial sections in Hue: bamboo reinforced concrete (BRC); concrete blocks (Conc block); penetration macadam (Penmac); inter-concrete slab construction joints (H2 joint seal); single sand seal over blocks (Block SS)
(Source: TRL-2020-Back Analysis LVR-Phase3 Final Report – AfCAP - RAF2069A)

Typical Research Outputs

Red River Delta Region

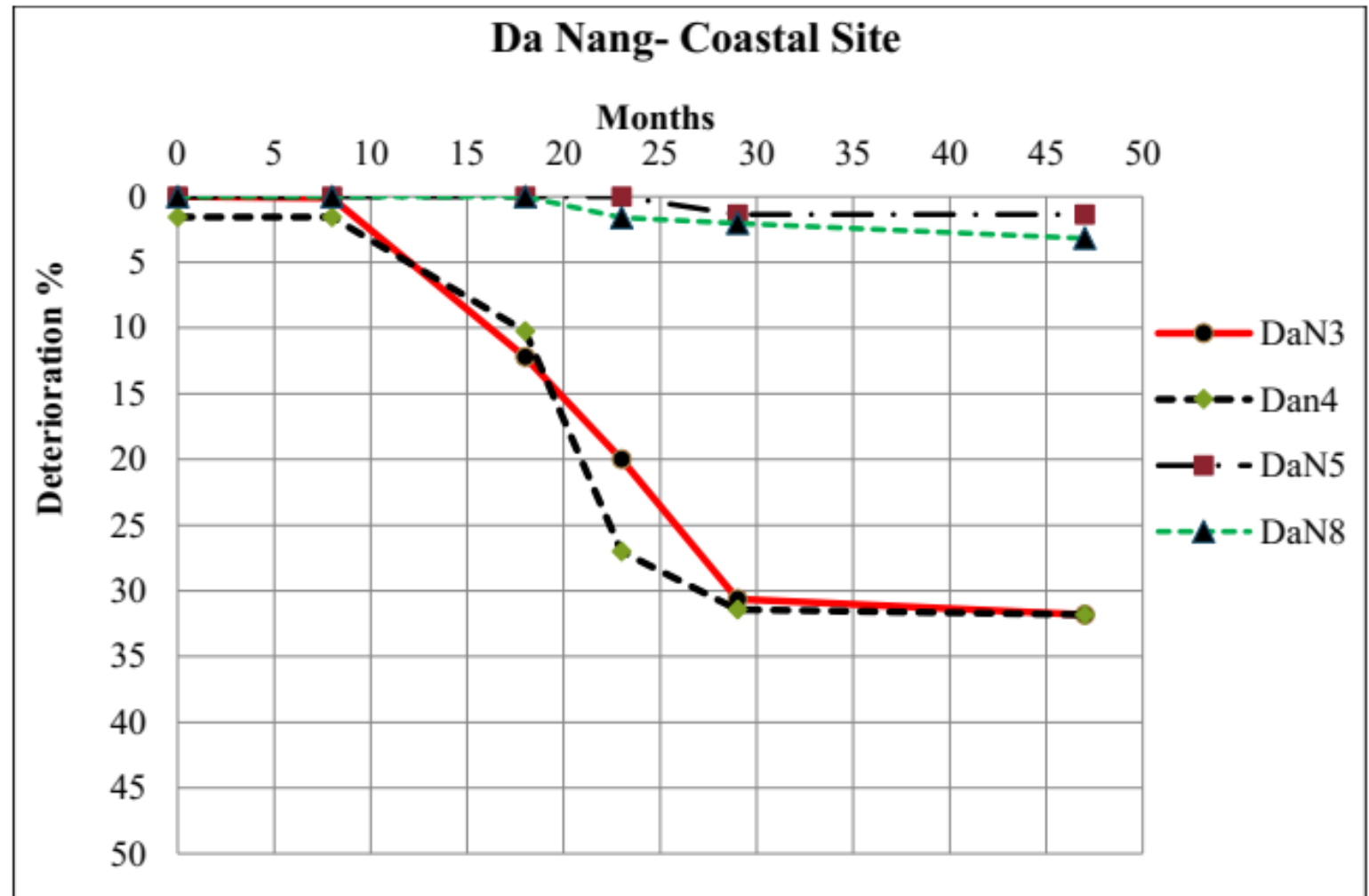


(Source: World Bank 2014)

Typical Research Outputs

Central Region
Da Nang

Section	Pavement Structure
DaN3	Sand emulsion seal on stone chip seal Cement-stabilised sand Cement-stabilised local soil
DaN4	Sand emulsion seal on stone chip seal Cement-stabilised sand Emulsion-stabilised local soil
DaN5	Penetration macadam Water-bound macadam
DaN8	Sand emulsion seal on stone chip seal Emulsion-stabilised sand Emulsion-stabilised local soil



(Source: World Bank 2014)

Summary Research Outputs

Pavement Design Solution Suggestions

Contrasting Terrain Group	Likely Options
Mekong & Red River deltas Flat floodable terrain. Clay, silt or sand deposits.	Non-reinforced concrete: Clay brick/concrete brick; Sealed cement modified sand.
Highlands Vietnam. Rolling to hilly terrain, variable quality hill gravel, limited hard rock.	Sealed lime modified gravel Sealed macadam Unsealed gravel wearing course
NE, NW Vietnam Hill terrain, locally steep with aggregate sources and variable hill gravel.	Sealed macadam Sealed modified gravel Non-reinforced concrete Stone setts/cobble stone.

Research Outcomes

- The impact of climate on pavement sustainability demonstrated.
- Combinations of terrain, construction materials and high, intense, rainfall defined as constraints on unsealed roads.
- Identified a range of pavement alternatives for use in differing road environments.

Lessons learnt

- Designs should be appropriate to the road environments and climate adaptation
- Local construction materials should be used where possible
- Maintenance requirements must be closely matched to local community arrangements and resources
- Construction techniques should be suitable for small contractors and encourage local employment.

Summary Outcomes

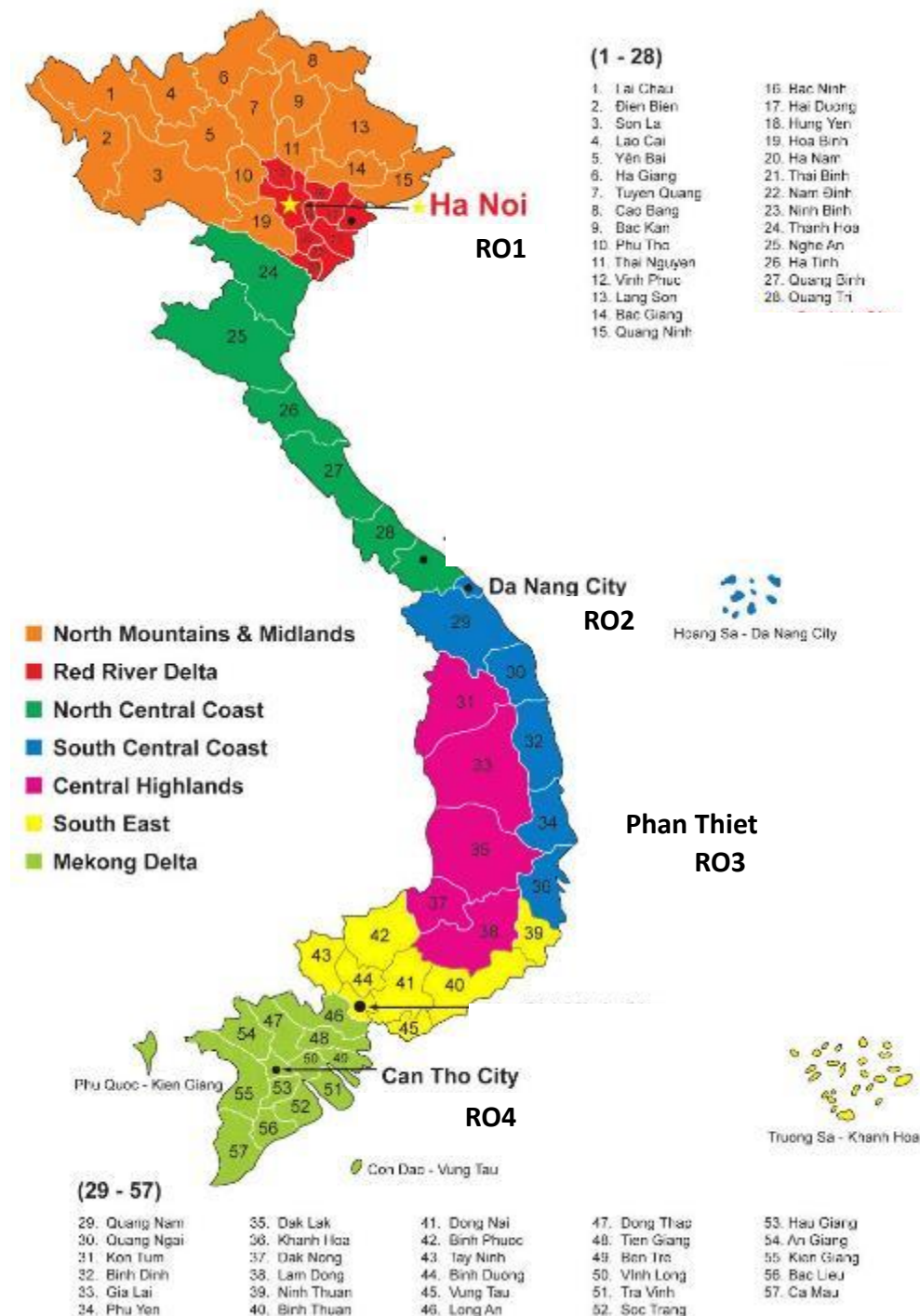
Dramatic shift from gravel wearing course to sealed options in subsequent World Bank supported rural road initiatives in Vietnam

Science-based processes supported this step change in rural road design policy through the application of a Levers of Change process.



Supporting Local Road Maintenance

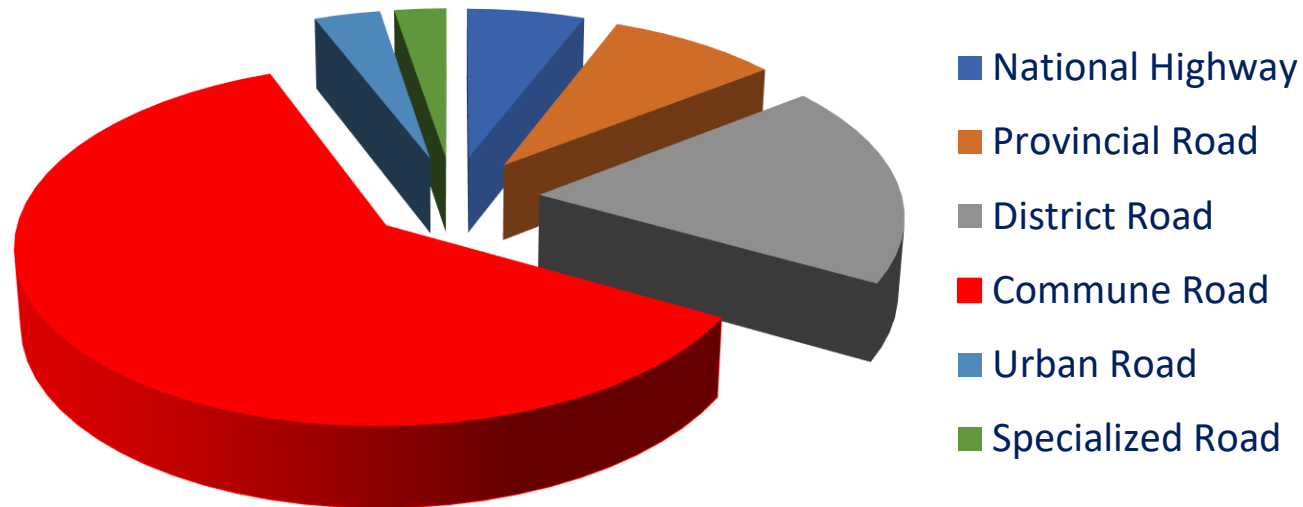
- Training activities included capacity strengthening of all 03 RTPs and LRAMP
- Road Maintenance Manual for commune transport staff (RTP2)
- Road Maintenance Manual for district and provincial transport staff (RTP3)
- National Training Program of road maintenance (SEACAP11) under RTP2: 04 regional offices – 53/64 provinces involving transport vocational schools and transport colleges under MoT
- Developed woman-based road maintenance (under RTP3) and community-based road maintenance (under LRAMP)
- Application of BPC for local road maintenance



Women-leg Model of Rural Road Maintenance and Community-Based Local Road Maintenance

Involvement of Women and other Community Members in Commune Routine Maintenance is Key Factor for Sustainable Commune Road Network

78% of total Vietnam Road Network (668.597 km length) is district and commune/fields roads (GTNT roads) \cong 521,500 km (56,500 km district roads and \cong 465,000 commune/fields roads)



Women-leg Model of Rural Road Maintenance and Community–Based Local Road Maintenance

Key challenges for local road maintenance and management

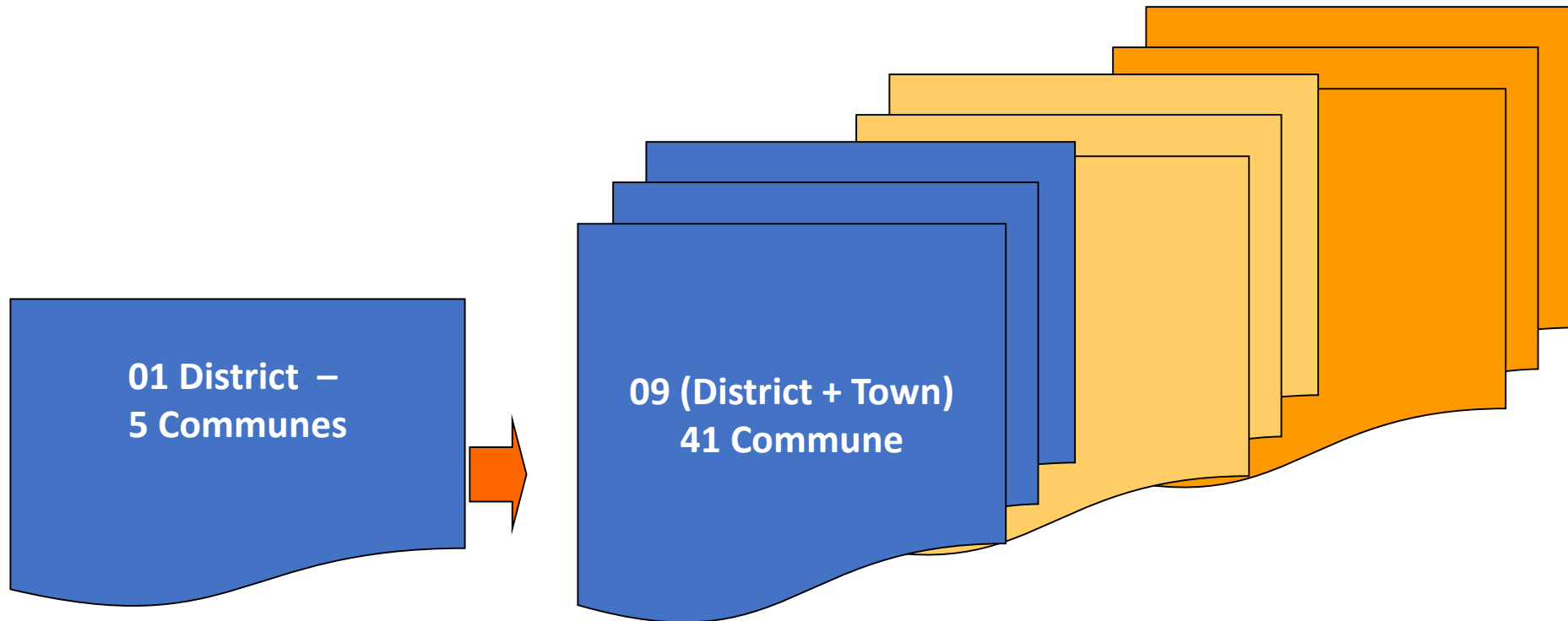
- i. Very high demand
- ii. Limited funding
- iii. Unstable funding
- iv. Lack of labor sources, especially high skilled labor force
- v. Lack of specific tools and equipment for road maintenance
- vi. Poor local road maintenance management mechanism (labor and funding), which can not support effectively the commune road maintenance activities

Women-leg Model of Rural Road Maintenance and Community-Based Local Road Maintenance



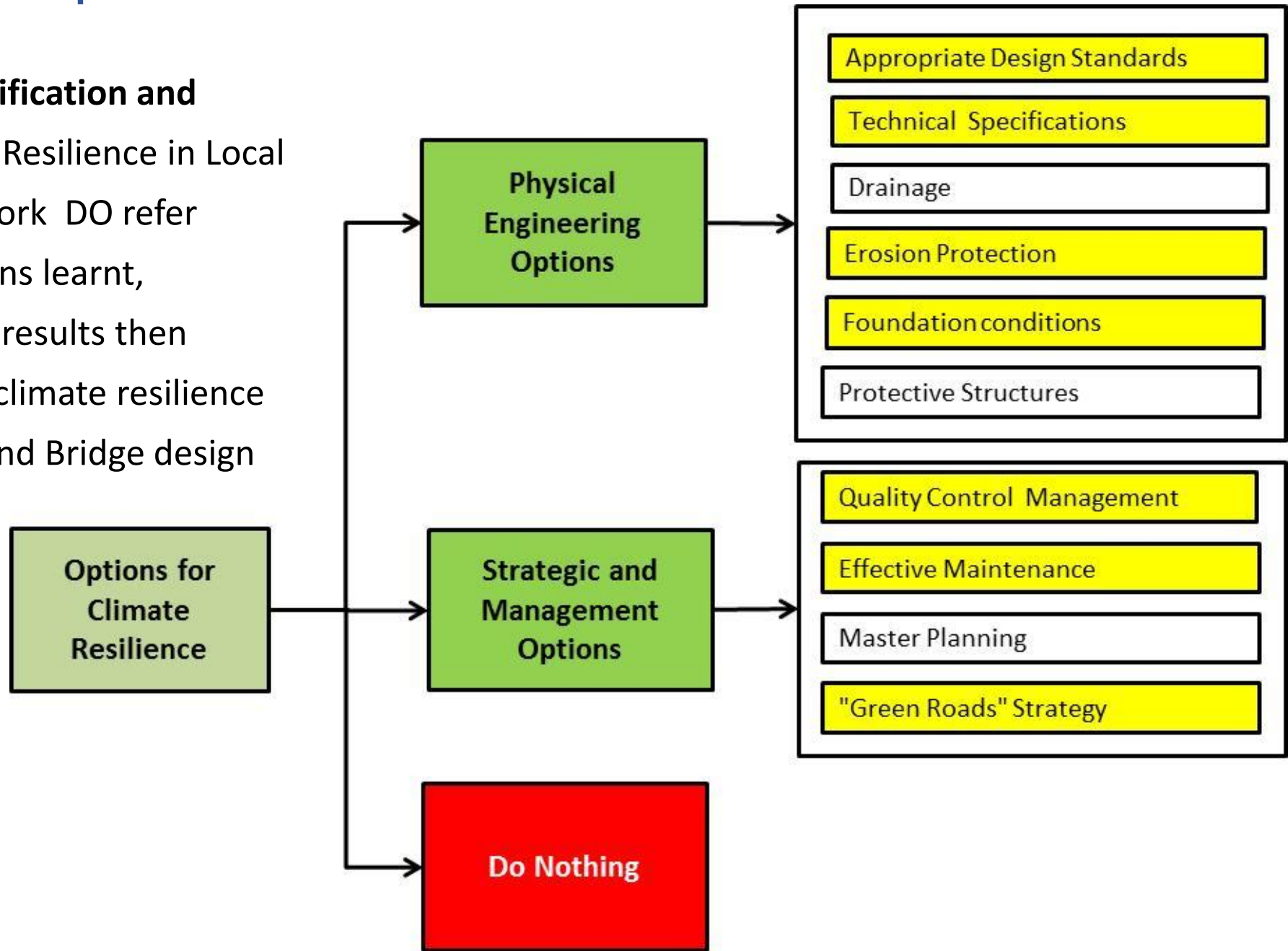
Women-leg Model of Rural Road Maintenance and Community–Based Local Road Maintenance

- ❖ The trial model under RTP3 was extended on a larger scale → management and monitoring ability of local Woman’s Union staffs (RTP3) then increasingly extended to Community-based maintenance (LRAMP)



More climate adaptation road under LRAMP

LRAMP **Technical Specification and Guidelines** on Climate Resilience in Local Road and Bridge Network DO refer experiences and lessons learnt, international research results then **COULD** deal well with climate resilience factors in Local Road and Bridge design



Technical Specifications and Guidelines

Series of materials and revised pavement construction specifications

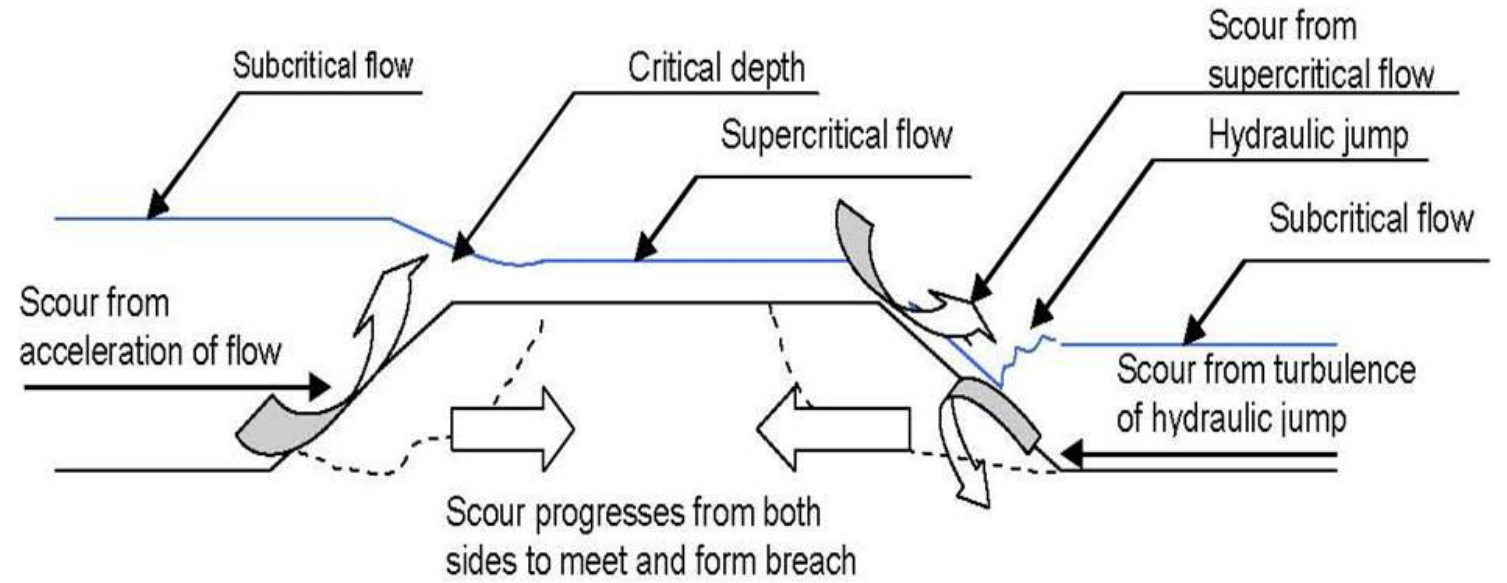


- Stone Chippings
- Drybound Macadam
- Hand Packed Stone
- Cobble Stone
- Mortared Stone
- Emulsion Seals
- Bituminous Otta Seal
- Penetration Macadam
- Armoured Natural Gravel
- Lime Stabilisation
- Cement Stabilisation
- Bitumen Emulsion Stabilisation
- Fired Clay Brick,
Unmortared/mortared joints
- Concrete Brick
- Non-reinforced concrete Pavement




Erosion Protection

- Review of local options and designs.
- Working links established with other programmes (national and regional).



Road protection in flooding area

A man in a red and blue plaid shirt and black boots stands on a paved road, looking towards the camera. The road is flanked by lush green vegetation and trees. In the background, a dirt road branches off to the left, leading towards a hilly landscape under a cloudy sky. A large white diamond shape is overlaid on the center of the image, containing text.

Better and more
climate resilience road
and bridge



Better and more climate
resilience road and bridge

Efforts to develop road network management system in Vietnam

VPROMP

Road Database/ Multi-aspects Analysis for Rural Road Maintenance Planning **(Completed)**



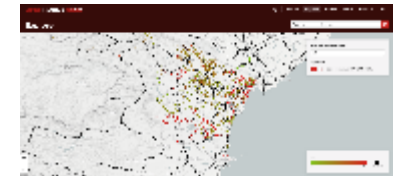
RONET

Economic Analysis Tool for Road works Planning **(Completed)**



LRAMs (P4R)

Road Database / Road works Planning (Local Road Network) **(incompleted) - ORMA**



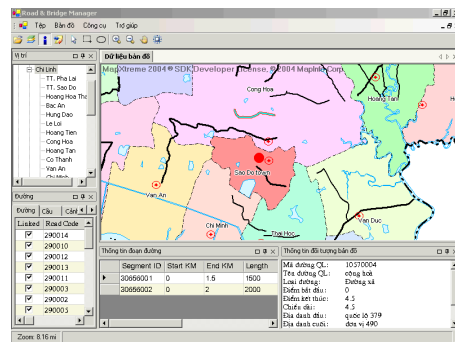
QLĐB

Road Inventory Database **(Completed)**



ROADNAM/ROSY

Road Database/ Road Works Planning **(Incomplete)**



BMSy

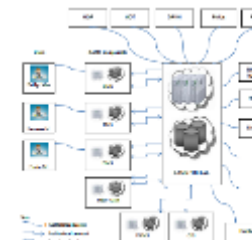
Bridges Database **(Completed)**

PMS

Pavement Database/ Pavement Maintenance Planning **(Completed)**

RAMs

Road Database/ Road Works Planning (National Highway Network)



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Thank for your attention