



# ROADSIDE PLANTING

# Outline



1. Introduction
2. Benefits of roadside planting
3. Road dust problems
4. Retaining dust with roadside vegetation
5. Planning road side plantations
6. Implementation phase
7. Maintenance
8. Examples of implementation
9. Combining roadside planting and road water harvesting

# 1. Introduction



- Fast expansion of the road network in SSA
- Negative environmental effects from roads: dust, pollution, erosion and others
- Erosion threatening road integrity
- Roadside planting as a solution

## 2. Benefits of road side planting (1)

1. **Reduced soil erosion: holds soils in place**
2. Remove dust and protect crops
3. Wind break
4. Flood control: s



## 2. Benefits of road side planting (1)



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## 2. Benefits of road side planting (1)

1.

2.

3.

4.







### 3. Road dust problems

Dust is affecting the health of people living along the road and crop productivity

Identified as main problem from unpaved roads (47% of people in survey)

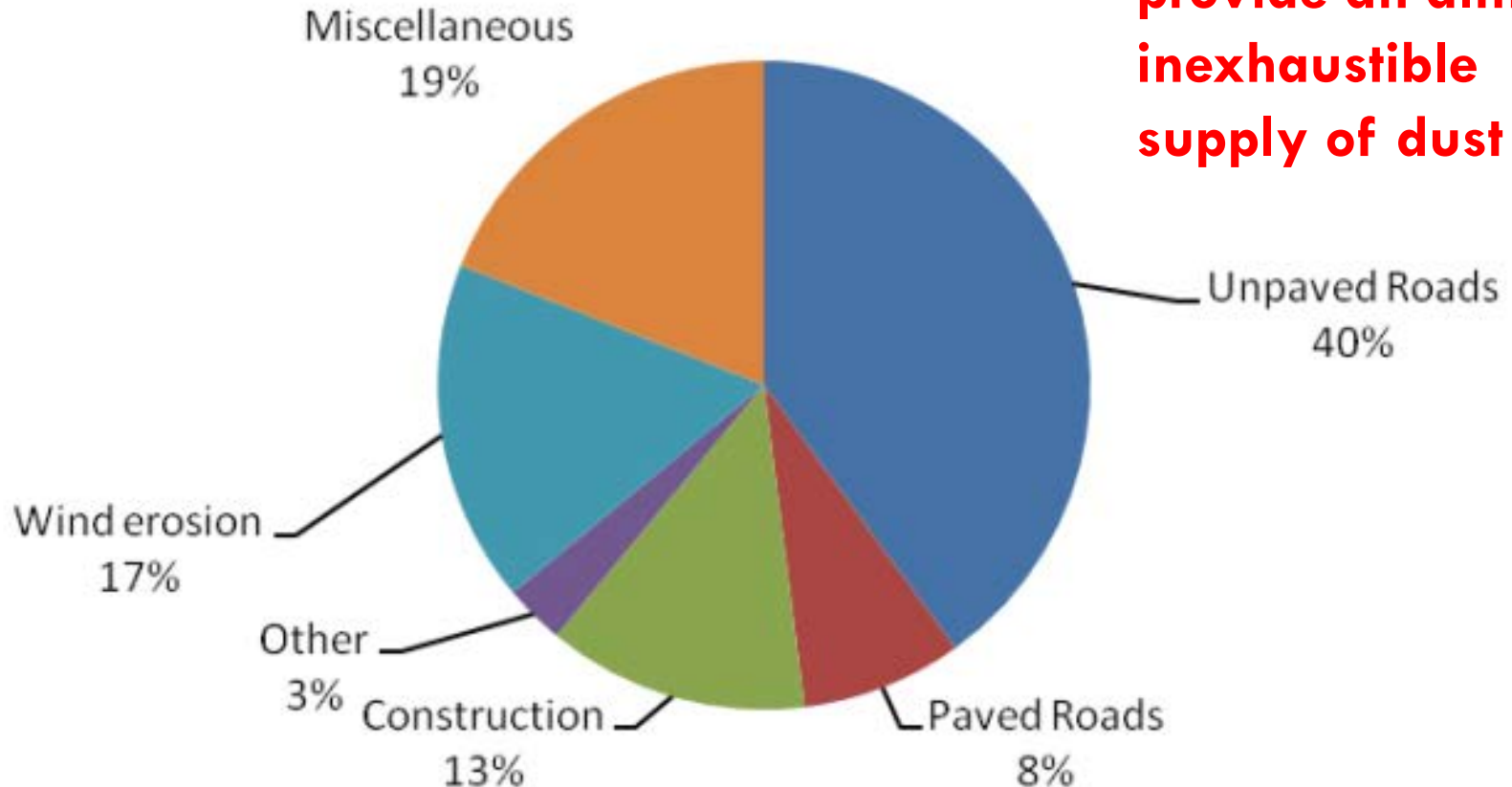




### 3. Road dust problems

Source – EPA US

#### Composition of Dust



**Unpaved roads provide an almost inexhaustible supply of dust**

### 3. Road dust problems - findings from research along feeder roads

- Close to 44% of the respondents (of 529) said that the **occurrence of dust has increased** after construction of the road.
- Close to 11% of the sample households have faced **decline in crop production** and/or income due to dust lifted up from roads
- The majority (55%) believe that road dust is causing 10 to 30% **reduction of their crop production.**
- 16% of respondents even account **the loss in crop** production due to road dust to 30 to 50% of their harvest.

### 3. Road dust problems - Effects of road dust in agricultural production

- Reduced photosynthesis leading to **loss of plant yield**
- Increased pest and disease incidence causing **yield losses and reduced quality** of produce
- Dust **hindering the pollination** of small seeded fruits by insects



### 3. Road dust problems- Effect of dust on people's health

- Road dust is composed by coarse particles that can **worsen heart or lung-related conditions** when inhaled through the nose and mouth
- Road dust causes skin irritations and diseases, eye irritations, shortness of breath, respiratory disorders and increased risk of lung and skin cancer (WHO, 1999)

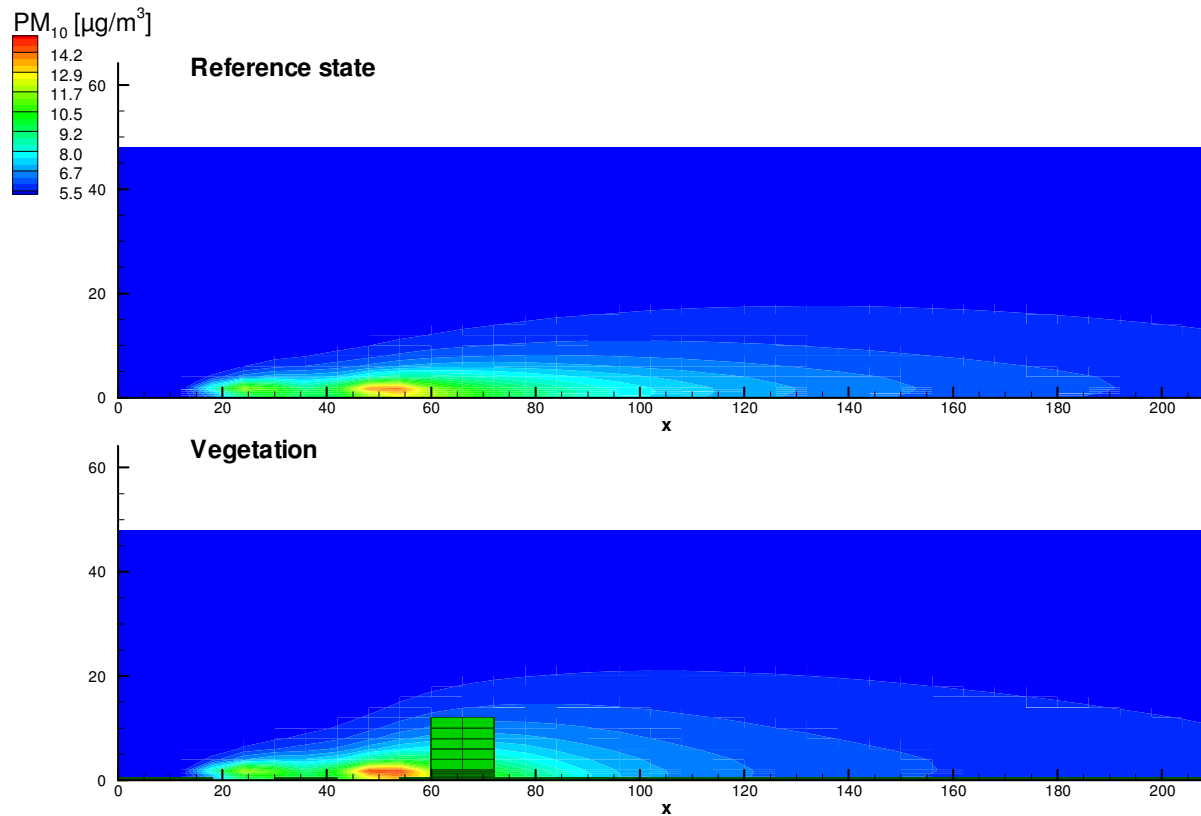
### 3. Road dust problems- Effect of dust on people's health

Leading Causes of Death (2008 update) (male, female, all ages)		
Cause	Death (m)	%
Ischemic heart	7.2	12.2
Cerebra-vascular	5.7	9.7
Respiratory infections	4.2	7.1
Diarrhoeal	2.2	3.7
HIV/AIDS	2.0	3.5
Tuberculosis	1.5	2.5
Trachea, bronchus and lung cancers	1.3	2.3
Road Traffic Accidents (RTA)	1.3	2.2
Premature birth	1.2	2.0

Global burden of disease WHO (Revised 2008)

Over 70% of the road network in SSA remain unpaved

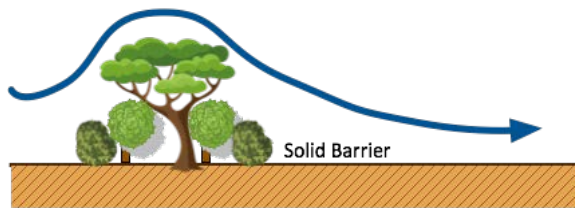
# 4. Retaining dust with roadside vegetation: Case study The Netherlands)



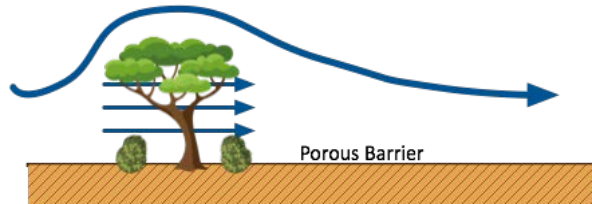


# 4. Retaining dust with roadside vegetation: Porosity

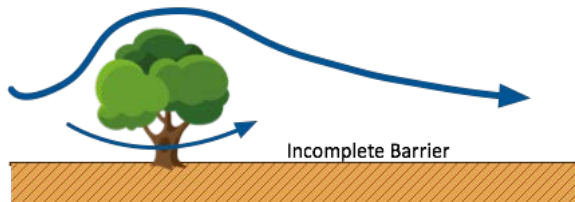
Roadside plantations must have some porosity to allow the wind pass through the plantation and increase the filtering effects. Optimal porosity: **35-50%.**



above: closed element (eg dense hedge)  
SMALL FILTERING EFFECTS



middle: porous element (eg half open hedge or row of trees with undergrowth.)  
GOOD FILTERING EFFECTS



below: incomplete element (eg line of trees without undergrowth)

## 4. Retaining dust with roadside vegetation: Porosity

To accomplish a good degree of porosity, roadside plantations should be approximately 5-20 meters wide consisting of tall trees with a bush layer underneath.



# 5. Planning road side plantations:

## Assessing biophysical factors

- Water resources available
- Soil physical and chemical properties
- Major stress factors with respect to survival of planted seedlings: drought, salinity, herbivores (domestic, wild animals), wind, fire, insect and diseases, human physical damage (theft)
- Local knowledge on improving planted seedlings survival and tree management
- Local people species selection criteria



# 5. Planning road side plantations:

## Stakeholder consultation

- Increase participation
- Disseminate information
- Understand the attitude of the community towards roadside planting
- Collect data and information on community characteristics and identify community concerns: issue of dust on feeder roads, erosion...
- Understand private and public ownership of land including ownership by road authorities

# Stakeholder consultation

## Why were these trees lopped?



# 5. Planning road side plantations:

## Criteria for selection of trees and shrubs

Tree species shall preferably be:

- Unpalatable or fenced
- **evergreen** or remain green over most of the year
- tolerant of seasonal **drought** and insect and pest harms
- deep rooted to **resist wind power** and don't damage road
- fast growing
- not invasive
- shall have one or more of social and economic values such as medicinal (antimalarial trees), food, fuel wood, feed, shade, etc

## 5. Planning road side plantations:

### Criteria for identifying planting sites

- Planting sites shall be at reasonable distance from farmlands as well as from the edge of the road
- Sites shall have good access to **water sources**
- Sites with established **animal paths** shall not be considered or be fenced
- Sites shall have access to **nursery**
- Sites shall **not be severely degraded**
- Take into account the effect of the shade on crops (direction of the sun) when deciding location



# 5. Planning road side plantations:

## Safety considerations

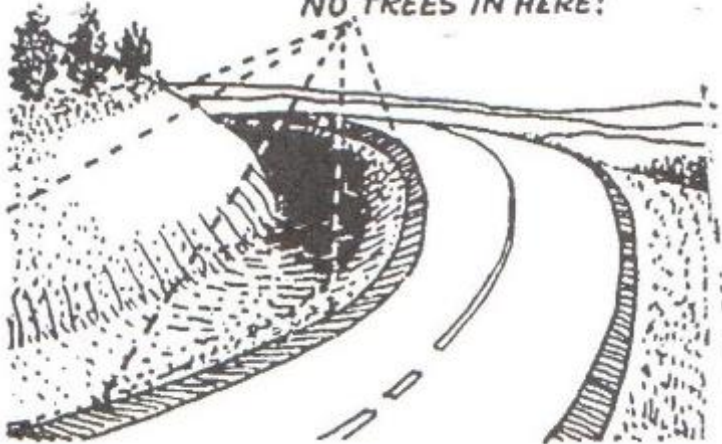
Speed zone	Road safety mitigation method	
40 km/h	The impact force is unlikely to exceed human tolerances, so <b>no specific mitigation</b> is needed.	
50 km/h	A <b>minimum lateral distance from road edge of 1 m</b> should be maintained	
60 km/h	• Intersections	at least 10 m beyond intersection on the approach and departure side
	• Driveways	at least 3 m between driveway and tree
	• Lane merge locations	3.6 m lateral distance from road edge
	• Curves	3.6 m lateral distance from road edge for gentle curves; barrier for moderate/tight curves
70 – 100 km/h	The impact force is highly likely to exceed human tolerances <b>Safety barriers are the most appropriate mitigation</b> (wire rope safety barrier, guard rail or other approved safety barrier that is suitable in high speed environments)	

# 5. Planning road side plantations: Road visibility

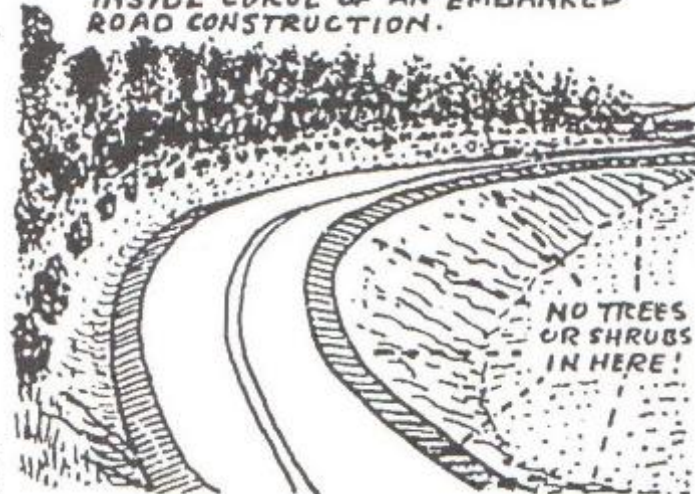
1. No trees or shrubs on the inside of cut-slopes around curves
2. No trees or shrubs on the inside curve of an embanked road construction

1. NO TREES OR SHRUBS ON THE  
INSIDE OF CUT-SLOPES AROUND  
CURVES.

NO TREES IN HERE!



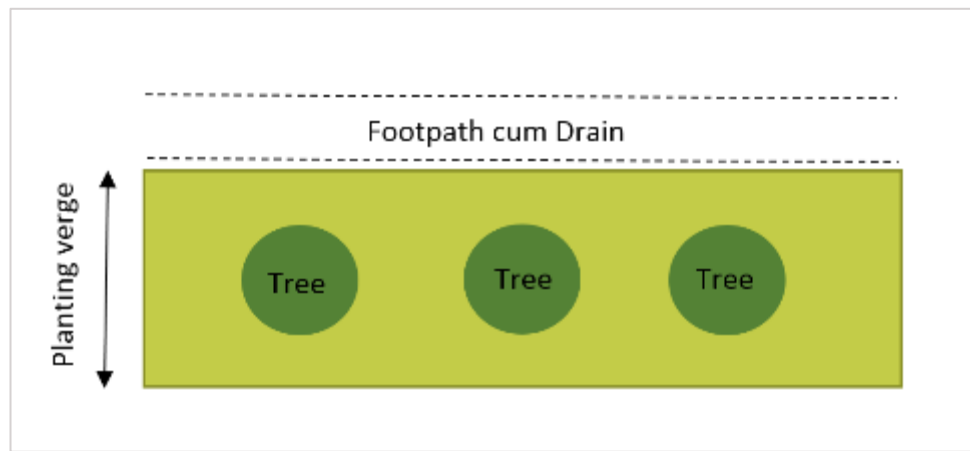
2. NO TREES OR SHRUBS ON THE  
INSIDE CURVE OF AN EMBANKED  
ROAD CONSTRUCTION.



# 6. Implementation phase

## Planting

Size of tree	Planting verge
Large sized trees (15-30 m high)	> 3 m
Medium sized trees (5-15 m high)	1.5m to 3.0m
Small sized trees (less than 10 m)	< 1.6 m



# 7. Maintenance



- The **most important element** in planting survival
- Developing mechanisms that enhance the **economical return** of tree plantation to ensure maintenance
- Prevent livestock physical contacts with the seedlings and **dry season watering** are vital



# 7. Maintenance

## Management interventions

Develop a viable management arrangement

Examples:

1. Pay tree keepers a small amount on money for the surviving seedlings after one year (India)
2. Bank providing loans to tree keepers for six to eight years (tree maturity period) after this, tree is sold with 50% of returns for the bank (Uganda)
3. People in nearby cities wanting to save money for the long term give trees in custody to rural tree keepers, when the tree is mature the benefits are shared (Indonesia)

## 8. Examples of implementation: Tigray, Ethiopia

- Roadside planting part of the watershed program
- Implemented in 10 woredas
- All seedlings fenced or planted in protected areas
- Mostly *Grevillea robusta* in all woredas and fruit trees in one woreda

# Some useful trees and shrubs for roadside planting

## Grevillea robusta

- Firewood, charcoal, timber (furniture), poles, fodder (leaves), bee forage, shade, ornamental, soil conservation, windbreak.
- Tree grows well with food crops if managed to reduce shade.



## 8. Examples of implementation: Amhara, Ethiopia

- Roadside planting part of the watershed program
- Implemented in 4 pilot woredas, plus 800 km
- All seedlings fenced
- Mostly *Grevillea robusta*, *Cordia Africana* and fruit trees in certain areas





# 8. Examples of implementation: Kitui County, Kenya

Pilot site in Kitui County, implemented by a local NGO

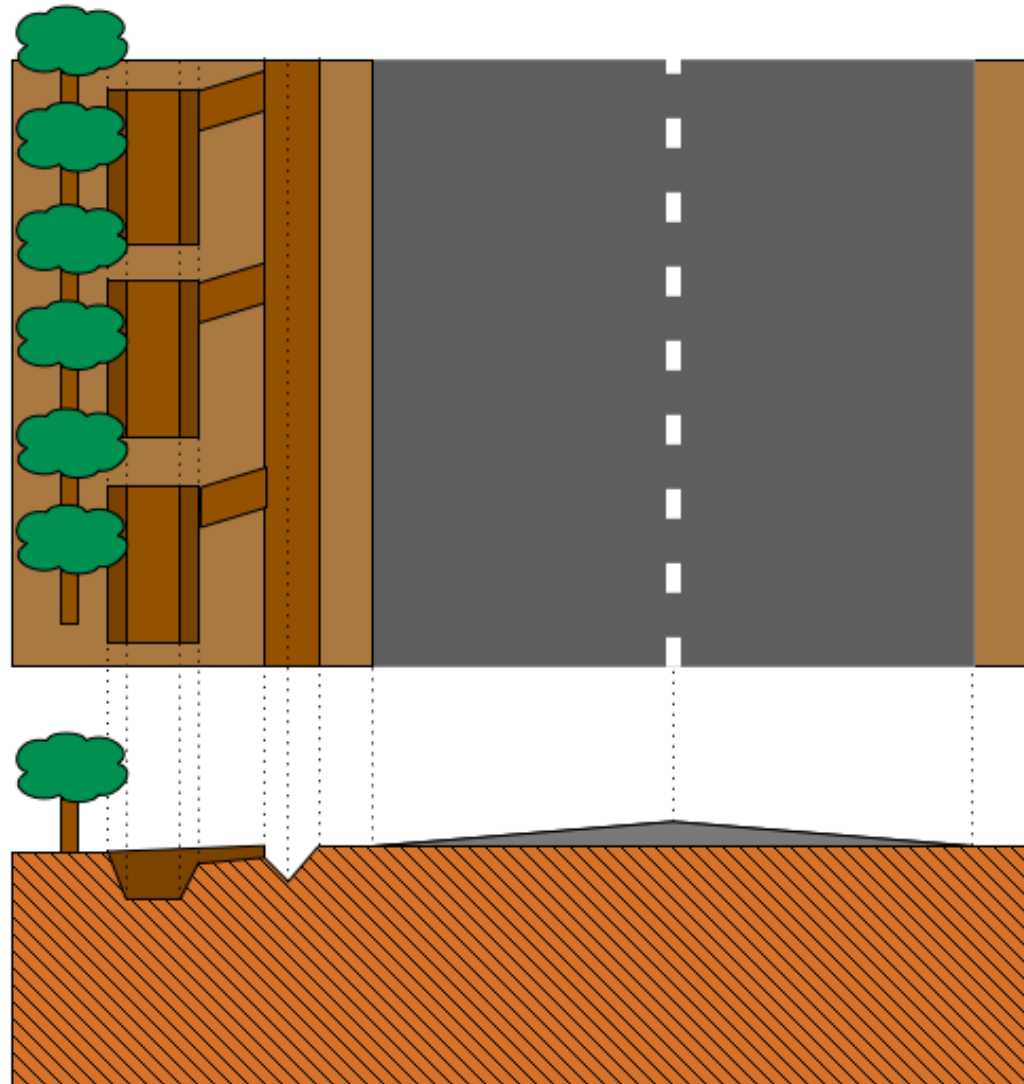
2,000 seedlings currently being planted with the involvement of farmers along the road

Species selected:

- *Berchemia discolor*
- *Azadirachta indica* (Neem)
- *Tamarindus indica*
- *Vitex paysonia* *Senna siamea*



## 9. Combining roadside planting and road water harvesting











**Water from road side pond used for a tree nursery**







# Opportunity: linking roadside planting with rural development programs

- Road side planting is a labour intensive activity
- Permanent and temporary employment generated for nursery, fencing, pitting/planting and maintenance activities.
- Provides additional source of income for poor households.



India: old, physically challenged, widows and women employed under Rural Employment Guarantee Act for roadside plantation → high success rate



**Thank you!!!**

