# VETIVER SYSTEM
# FOR
# BRIDGE APPROACH STABILISATION

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# Vetiver System

- **The Vetiver System (VS) is a new Bioengineering technology based on the use of vetiver grass ( *Chysopogon zizanioides* L.) in various applications**
- **VS has been developed in the last 20 years through extensive research, development and applications worldwide.**
- **VS has been used successfully for flood erosion control and riverbank stabilisation in Australia, Asia Africa and Latin America.**
- **The main advantages of VS are that it is effective, practical and a low cost method of flood erosion control and riverbank stabilisation .**

# Special Characteristics of Vetiver Grass

**The following characteristics make vetiver grass highly effective for flood erosion control and riverbank stabilisation:**

- **A deep, penetrating and extensive root system that binds the soil, and reinforces the soil structure which requires extraordinary force to dislodge.**
- **Erect and stiff stems forming a dense hedge which is very effective in retarding water flow and reducing the erosive power of the strong current.**
- **The top portion of the vetiver plant is flexible and bends over under strong flow. The bent tops act as an energy dissipater**
- **Vetiver is tolerant to drought, saline, sodic and acidic soil conditions.**
- **Vetiver survives under prolonged and complete submergence and it resumes growth after emerging from the water. Under partial submergence conditions, vetiver can remain indefinitely, as it was originally a wetland species.**

# Deep and Penetrating roots

## One year old plant with 3.3m deep root system in Thailand

# Submergence Tolerance

## Growing vigorously in water

# Principles of the Vetiver System for River Bank Stabilisation

**In flood erosion control and riverbank stabilisation the VS uses the deep and high tensile root system to reinforce the bank slopes and its dense and stiff stems to spread and Reduce current flow velocity .**

- **To stabilise the bank steep gradients, horizontal rows planted on approximate contour lines**
- **To reduce flow velocity of the strong current thus preventing scouring from the strong flow; planting of cross rows is needed.**
- **For maximum effect, the cross rows are orientated at right angle to the flow direction.**

- **The spacing of both horizontal and cross rows varies with slope gradient and length, soil type, flow velocity and depth .**

# AUSTRALIAN APPLICATIONS

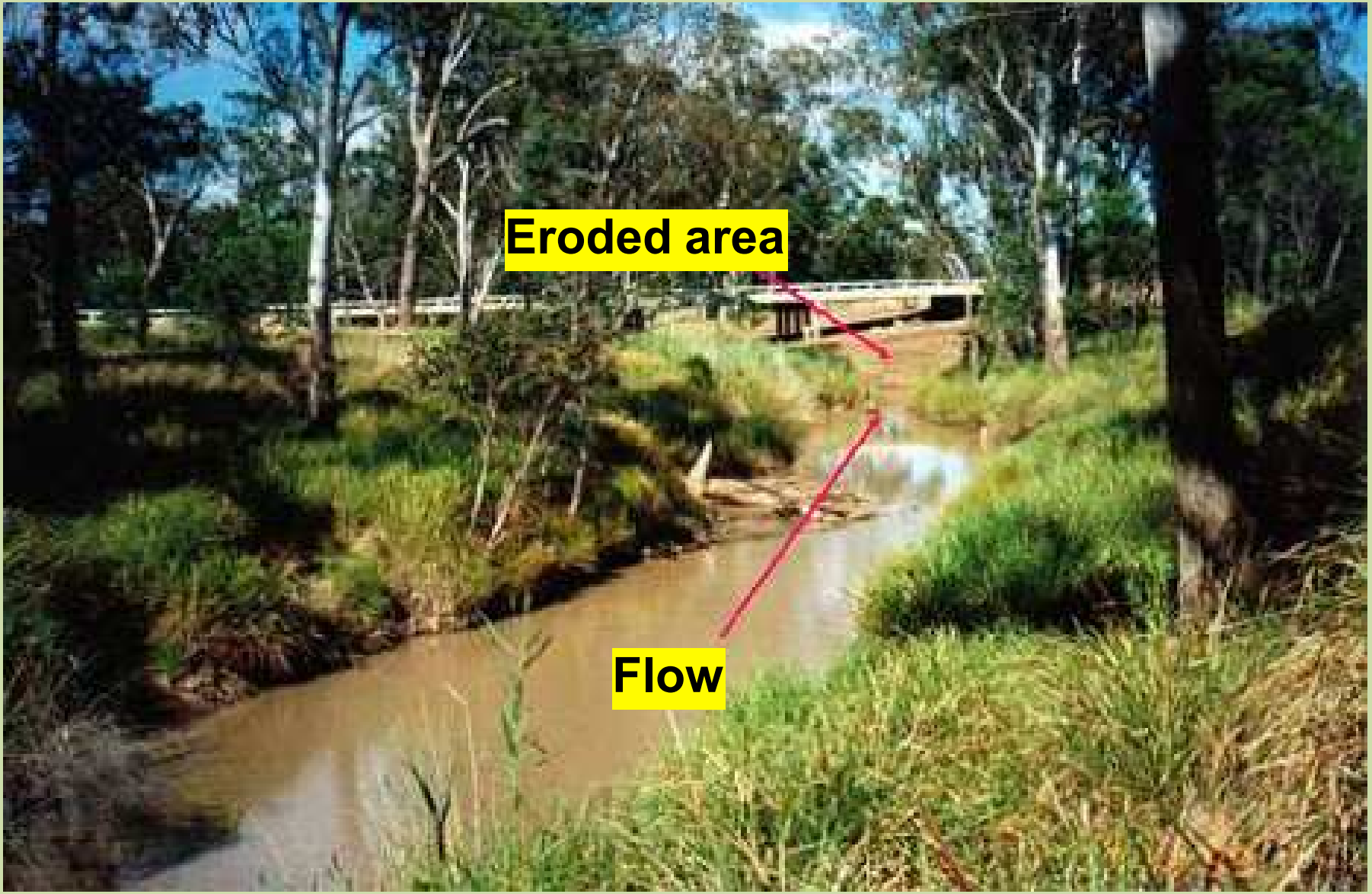
**The followings are projected carried out in tropical and subtropical Australia**


COLUMBOOLA CREEK
Stabilisation of creek bank
using Vetiver Grass
Main Roads

# Approach was washed out after road realignment

# Severe erosion on the approach of the Coolumboola Creek bridge near Miles, Queensland. .

# Erosion was caused by the change in flow direction



# Vetiver was planted in contour rows to stabilise the batter and cross rows to reduce flow velocity

# One month after planting

# Six month after planting

# 18 months after planting (vetiver was frosted in winter but will resume growth in spring)

# 18 months after planting, note the bare area between rows

**There were several big flows during the first summer and no damage occured. This approach is now well protected by the mature vetiver.**

# Five years after planting (Summer)

# NEW GATTON BYPASS

## SANDY CREEK BRIDGE APPROACH

## (Under Old Bridge)

# Flash flood undercut approach

# Planting on 3 Dec 2002

# One month after planting

# Seven weeks after planting, more than 30 cm growth

# Three months after planting

# One year after planting and through several flash floods

# NEW GATTON BYPASS

## SANDY CREEK BRIDGE ABUTMENT

## (Under New Bridge)

# Undercut shotcrete and unprotected batter

# New approach under new bridge built parallel to the old bridge

# Planting on 24 November 2003


25 - 11 2003

# Four months after planting

# Four months after planting

# One year after planting

***Bridge Abutment Coomera Creek,***

***Brisbane – Robina Rail line***

# Coomera Creek, Queensland Rail, Brisbane – Robina line


Mangrove seedlings

# Bridge abutment of a tidal creek

# Bridge Approach

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**Doria bridge, Assam, India (2008)**

**Doria Bridge approach , before and after vetiver planting , note grid pattern**

## Doria Bridge approach , six months after planting, note grid pattern

**(2010)**

**Doria Bridge approach, two years after planting**

**Doria Bridge approach, two years after planting**

**(2010)**


Doria Bridge approach, three years after planting (2011 )
Most of the approach was covered by native vegetation, Vetiver remained on the area where native species could not grow.