

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 (*Chrysopogon 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 and Africa.
- 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



T 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 flow velocity.

- To stabilise the bank steep gradients, horizontal rows planted on approximate contour lines
- To reduce flow velocity of the strong current therefore 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



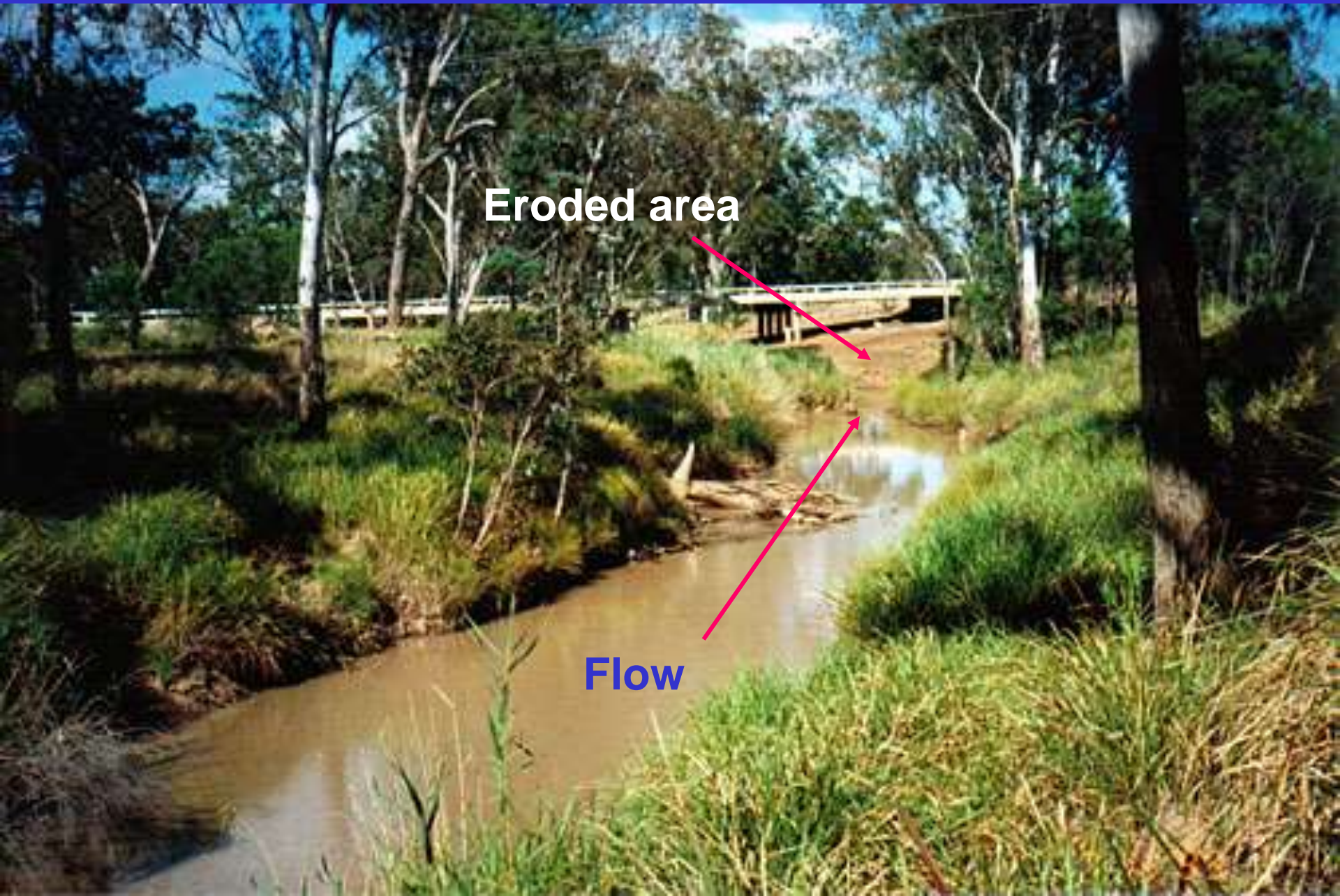
Approach was washed out after road realignment



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



Erosion was caused by the change in flow direction



Eroded area

Flow

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





Cross rows are most effective when planted right angle to flow direction



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 damages were noted.
This approach is now well protected by these mature vetiver.**



29 8'01

Five years after planting (Summer)





9 2 2004



9 2 2004

NEW GATTON BYPASS

**SANDY CREEK BRIDGE APPROACH
(Under Old Bridge)**

**Flash flood
undercut approach**



27 11 2002

Planting on 3 Dec 2002



One week after planting





10 12 2002

One month after planting



Seven weeks after planting, more than 30cm 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



2 1 2003

New approach under new bridge built parallel to the old bridge





6 11 2003

Planting on 24 November 2003





25 11 2003



25 11 2003

Four months after planting



Four months after planting



One year after planting





30 11 2004

Bridge Abutment Coomera Creek,

Brisbane – Robina Rail line

Coomera Creek, Queensland Rail, Brisbane – Robina line





**Mangrove
seedlings**

2-4-98

Bridge abutment of a tidal creek



Bridge Approach

ASSAM, INDIA

By

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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**



**Doria Bridge approach,
two years after planting
(2010)**





**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**



THANK YOU

