



Riverbank erosion stabilisation,
ecosystem service enhancement
and infrastructure protection.

Can you always get what you want?

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The Tweed River



Ecosystem services

Conference theme:

- Healthy rivers, healthy economies

Stream theme:

- Restoring rivers and their multiple values

Implication:

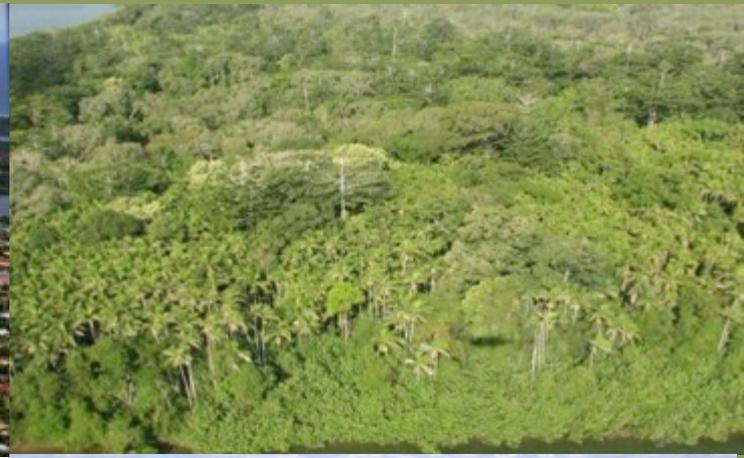
- Maintaining and enhancing ecosystem services

Which are:

- “The benefits of ecosystem function to the overall environment, including the products, services and information that humans receive from natural or modified ecosystems”

River Bank Ecosystem Services

- Supporting
- Regulating
- Provisioning
- Cultural



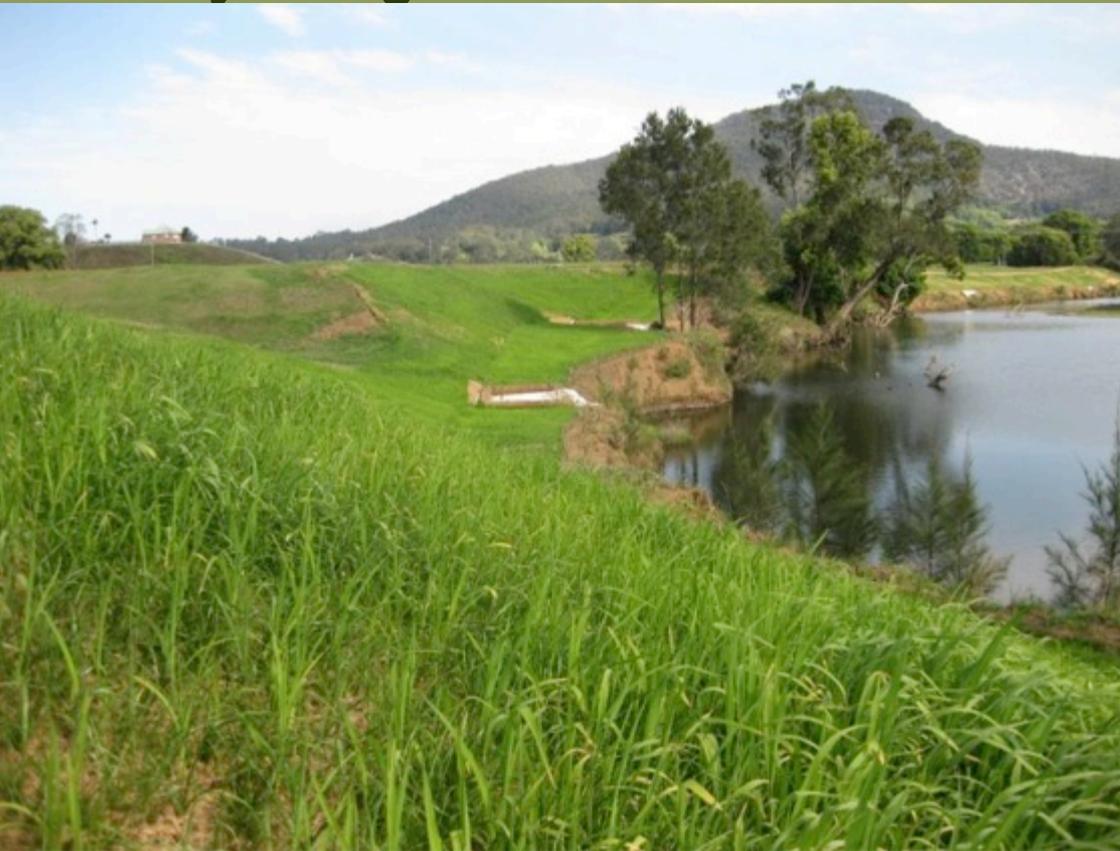
**Case study 1:
River bank stabilisation
for asset protection and
the enhancement of
ecosystem services.**



Earth works and site stabilisation



Primary revegetation





Follow the money

1. Local Government Code of Accounting Practice and Financial Reporting
2. Best practice management of water supply and sewerage guides
3. Dividend for taxation equivalent
4. Australian Drinking Water Quality Guidelines



Case study 2: The Tweed estuary erosion problem

**Tweed Valley
Way threatened
by river bank
erosion.**

**Asset needs
protection.**

**Can ecosystem
services be
protected?**

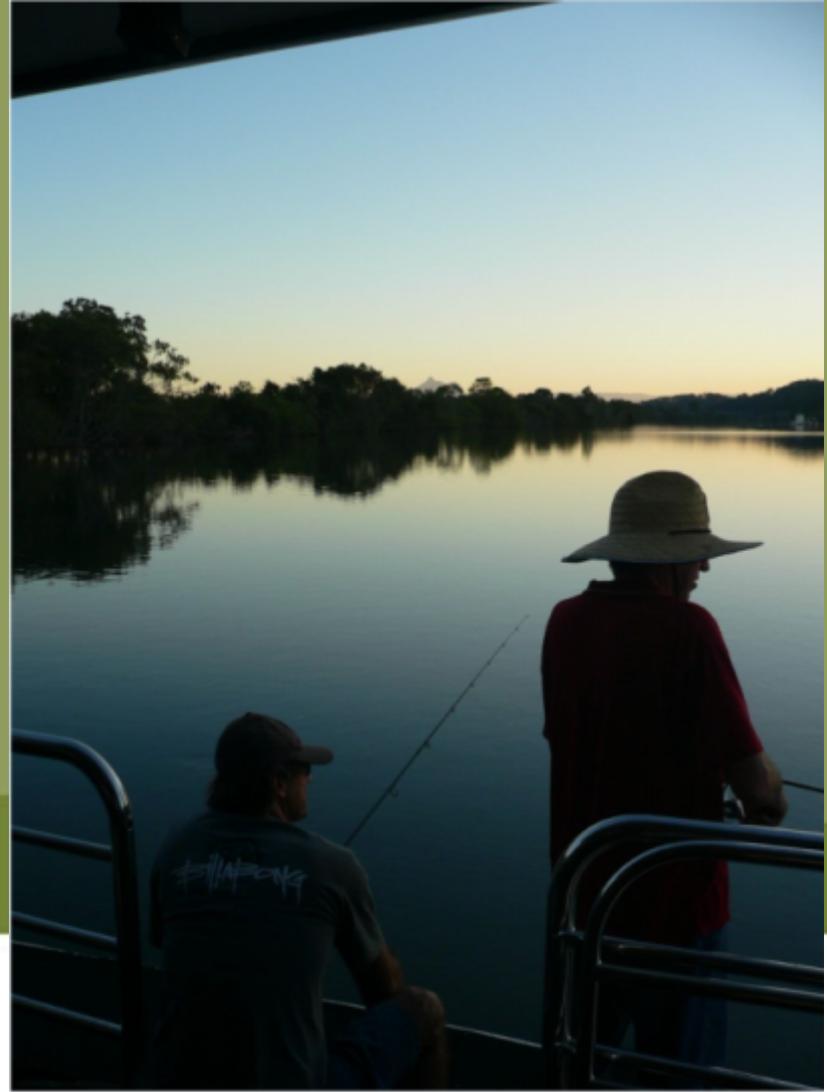


**Ecosystem processes
are enhanced by habitat
complexity at the valley
to reach scale.**



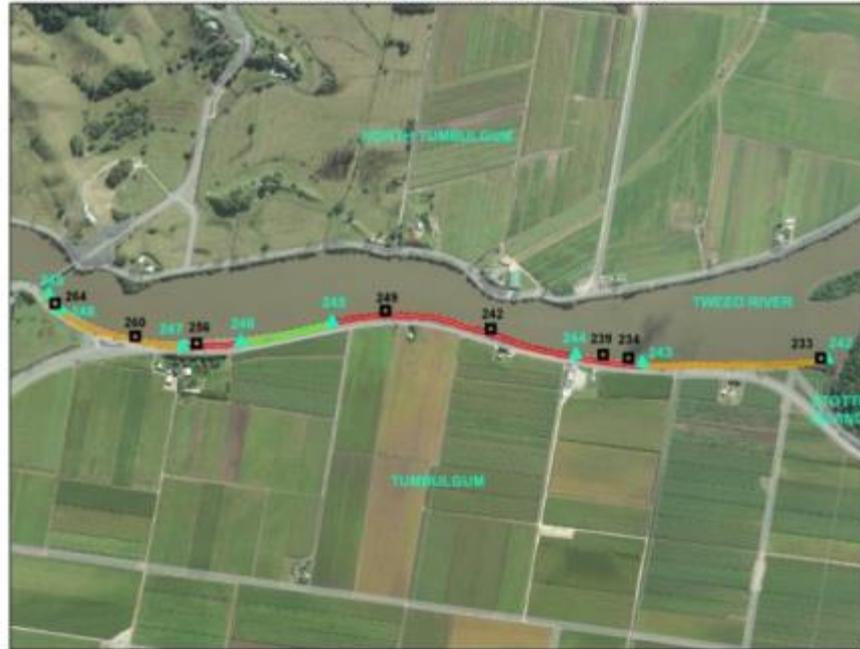
“The contribution that healthy rivers make to our economies and wellbeing is extraordinary, but often taken for granted.”

Riversymposium 2015



- 6000m of severe erosion less than 7 metres from the road (high risk)
- Typical cost to stabilise banks with rock armour is \$1500/ metre
- Potential cost of \$9,000,000 over 10 years

Reach R5: Tumbulgum Bridge to Stotts Island (right bank)



Legend

- ▣ Reach photo no.
- ▲ R5 waypoints
- ▭ Parcel Boundary
- ▭ Road Reserve
- ▭ Suburbs
- Erosion Risk:
 - ~ Generally stable
 - ~ Vulnerable
 - ~ High risk



What is the real \$ value of a healthy river bank providing a full range of ecosystem services?

Can we have a stable river bank and ecosystem services?



Ecosystem service valuation techniques (community willingness to pay)

- **Question:** There is no market selling or purchasing the benefits of healthy river banks (visual amenity, fish habitat), how do you accurately allocate a price?
- **Answer:** What is the replacement cost if those ecosystem services are lost?
- The replacement cost for a stable river bank in some reaches of the Tweed is at least \$1500 per linear metre. Probably more if it is to be attractive and have good habitat qualities.

- The ecosystem services required by society must drive the design process.
- Ecosystem services can/should/must be used as a pathway for increased investment in sustainable outcomes for river bank stabilisation.



Example log revetment works prior to revegetation.

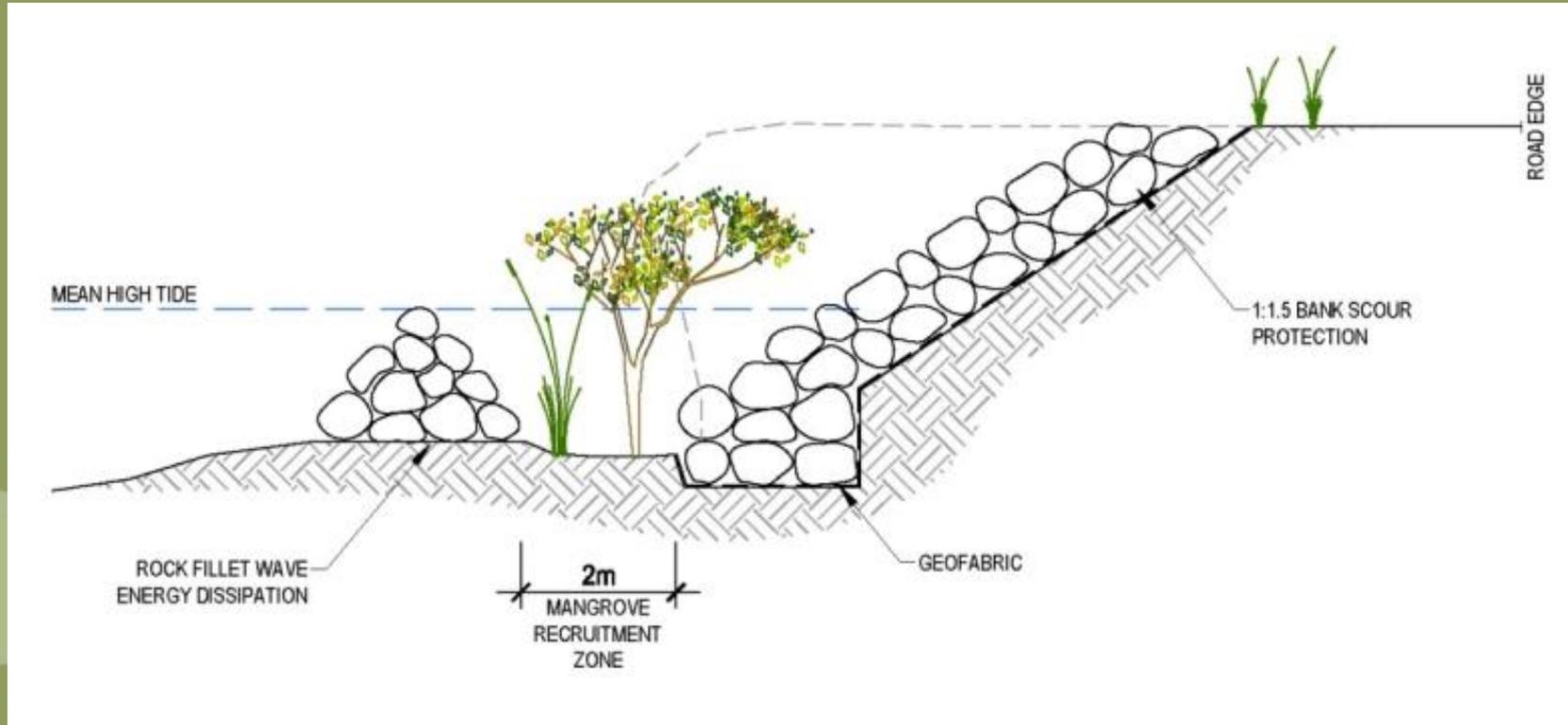
The acceptable risk of erosion continuing (i.e. zero) will drive the design process toward fully engineered, rock armour solutions.



What do you put back?

	Aq. fauna					Erosion / deposition		Amenity and aesthetics
	Shelter (day-time protection)	Spawning or egg laying sites	Foraging sites	Food	Shade (temp. regulation & dappled light)	Bank erosion protection	Facilitation of sediment deposition	Naturalness
1823: Lowland rainforest habitat								
Mudflats (exposed bench at low tide)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
LWD on the bank face & bench	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Vegetation community – intertidal zone & overhanging	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
Today: Traditional rock revetment								
Mudflats (exposed bench at low tide)			<input checked="" type="checkbox"/>					
Vegetation community – intertidal zone (very sparse – below rock work only)								
Bank face - rock armour	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		

Option available for stabilisation



**Mangrove fillets
work well, but:
there must be a
stable intertidal
bench present.**



Summary and conclusions

- **Climate change impacts will accelerate erosion of riverine foreshores.**
- **Increasing pressure for governments to fund and implement sustainable bank stabilisation designs.**
- **Work must be undertaken pre-emptively. Reactive and crisis driven work and funding models is delivering bad outcomes.**
- **The ability to build trees into heavy rock armouring will a key to success.**

Summary and conclusions

- **At a local scale, highlight the importance of the ecosystem services provided by river banks for peoples livelihoods.**
- **Existing bio-engineering approaches to river bank stabilisation design are not sufficient to manage high risk situations.**
- **Valuing and paying for ecosystem service provision is a pathway to increase investment in sustainable river bank erosion stabilisation.**

Thanks, for listening, please get in touch to collaborate further on this issue.

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