



**For now &
our future**

Stream bank erosion as a result of socio-economic goals

Tim Ellis (ES), Janet Hodgetts (SciArt) and Jane McMecking (ORC)

Acknowledgements

- Ministry for the Environment
- Ton Snelder (for MfE)
- Rachael Millar (ES)
- Nick Ward (ES)
- Keryn Roberts (ES)
- Colin Young (ES)
- Kevin Marshal (ES)
- Emma Moran (ES)
- Karen Wilson (ES)
- Graham Sevicke-Jones (ES)
- Chris Jenkins (ES)
- Tess Brosnan (ES)
- Bronwyn Auckram (ES)
- Mark Oster (ES)
- Gary Morgan (ES)
- Paul Pollard (ES)
- Clint Cartwright (ES)
- Dianne Williams (ES)
- David Moate (ES)
- Sean Brown (ES)
- Kylie Haberfield (ES)
- Daniel Hikuroa (Auck. Uni.)
- Dean Whaanga (TAMI)
- Eva Hendriks (TAMI)
- Stewart Bull (Ngāi Tahu)
- Ailsa Cain (ex-iwi liaison)
- Jane Kitson (Consultant)
- Les Basher (Manaaki Whenua)
- Murray Hicks (NIWA)
- Andrew Hughes (NIWA)
- Graeme Nicholas (ESR)
- Mal Green (Streamlined Env'l)
- Tapuwa Marapara (SIT)
- Sir Alan Mark (Otago Uni)
- James Dare (BoPRC)
- Deb O'Connell (CSIRO)
- Rebecca Bartley (CSIRO)
- Scott Wilkinson (CSIRO)
- Peter Hairsine (ex-CSIRO)
- Nick Abel (Aust. Nat. Uni)
- Lisa Pearson (LAWS)

Main messages

- Emergent property of a self-organising system (not a mechanistic system)
- Overall controlling variables are socio-economic
- These variables and feedback loops are typically not included in our world views and simulation models
- Riparian protection addresses the symptom, not the cause
- A systems approach is required with intervention at multiple scales

Background

- Stream banks are one source of problem sediment
- Simulation models are used to allocate resources to mitigations e.g. riparian protection
- Perceived knowledge gap
- Ministry for the Environment requested a review:
 - SedNet model
 - Stream bank algorithm
 - Information held by Environment Southland

Methodology – review of factors affecting SBE



Clearing



Gold mining



Burning and grazing



River cuts



Sub surface drains



Wetland removal



Flooding



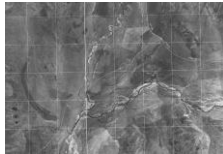
Straightening and shortening



Flooding (again)



Riparian veg. removal



Flood channel vegetation removal



Gravel mining



Stop banks



Surface drain maintenance



Land management

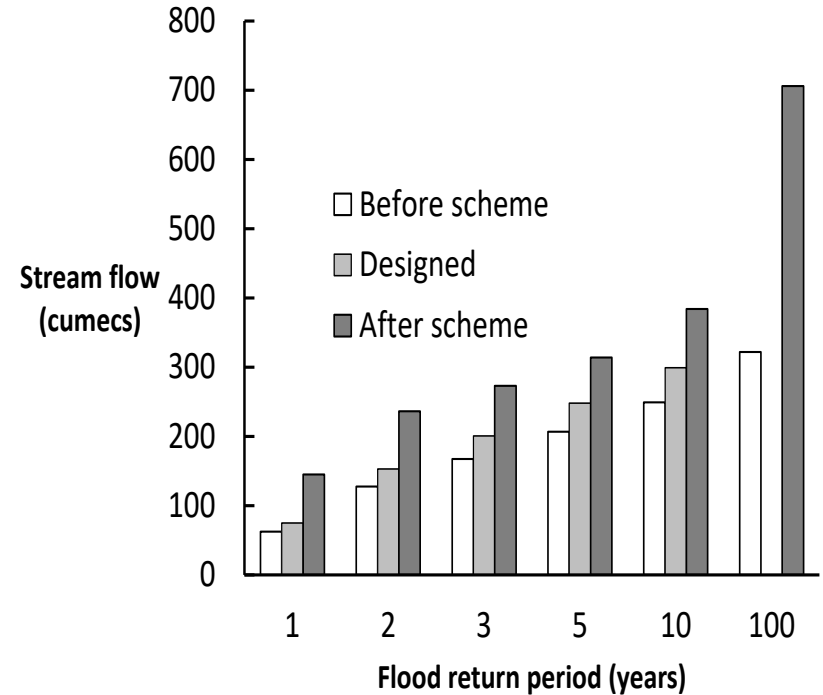
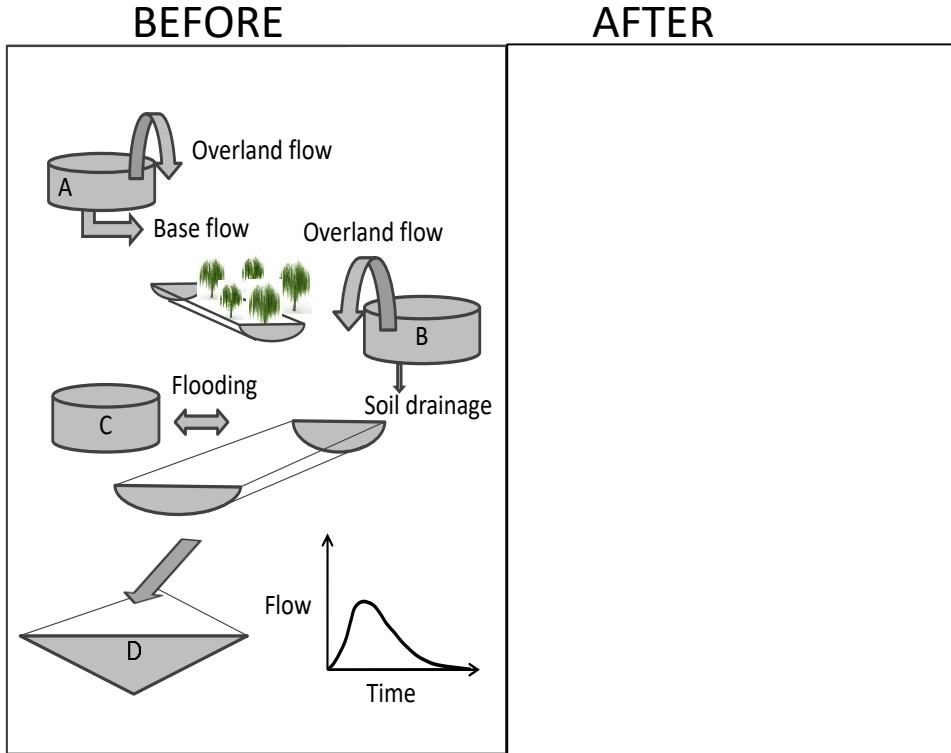


Flow regulation



Systems thinking

RESULTS 1 - designed hydrology (leakiness)



'While water flows...' (Southland grows) - Poole (1990)

RESULTS 2 – think about the whole system

- Causal interactions and feedbacks:

- Socio economic controlling variables
- Land use change
- Altered hydrology and channel disturbance
- Altered stream bank erosion

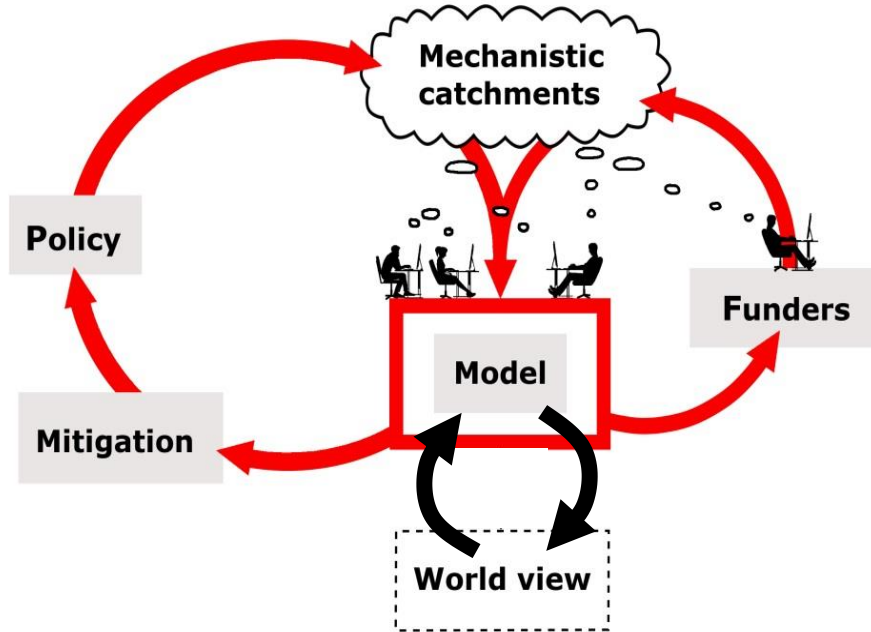
Broad scale



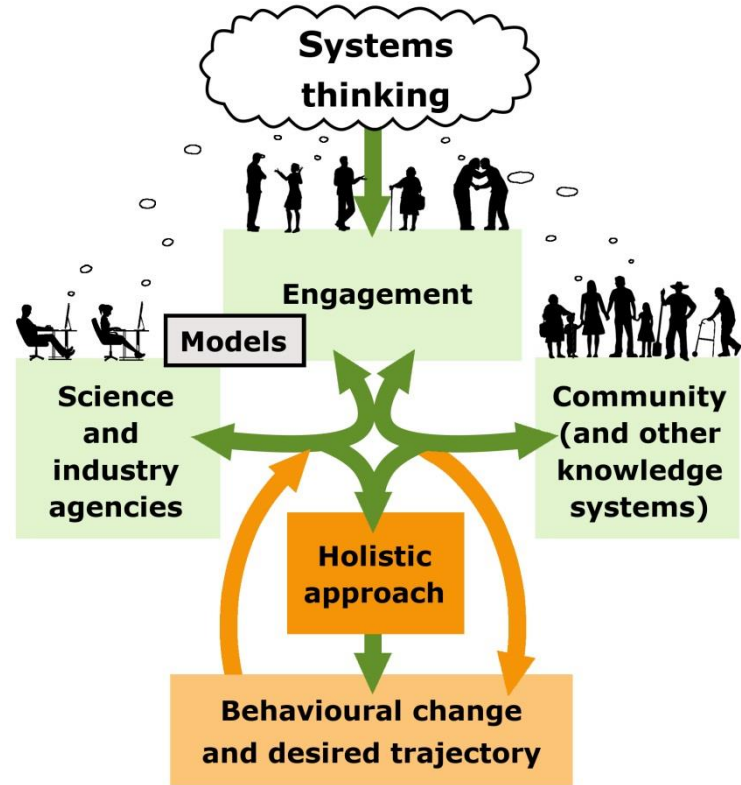
Fine scale

- Disequilibrium and time scales ... and climate change
- Thresholds and system transformations

Conclusions - two world views



(Clean and simple, can facilitate blame)



(Messy! Shared responsibly)

Main messages

- Catchments are self organising (not mechanistic) systems that include humans
- Social processes have led to sediment problems – abandon blame
- Learn from the Mātauranga Māori world view
- We recommend understanding social, economic and ecological histories, controlling variables and trajectories, supported by simulation models, and not the other way around

Building connections

- Are we focused on symptoms and not the causes?
- Look at the evidence – if we want a different result how do we do things differently?
- Should we address the ‘model-funding-model’ conceptual loops?