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(Industrial!) (in New Zealand!)

Sustainable Wastewater Management: Challenges and Options for Multiple Discharge

A presentation for the New Zealand Trade and Industrial Waters Forum 2023

By Lobo Coutinho, Jason Park, and Lucy Cramp

“Most of the Industrial Sites in New Zealand are constrained in wastewater discharge capacity”

The Problem

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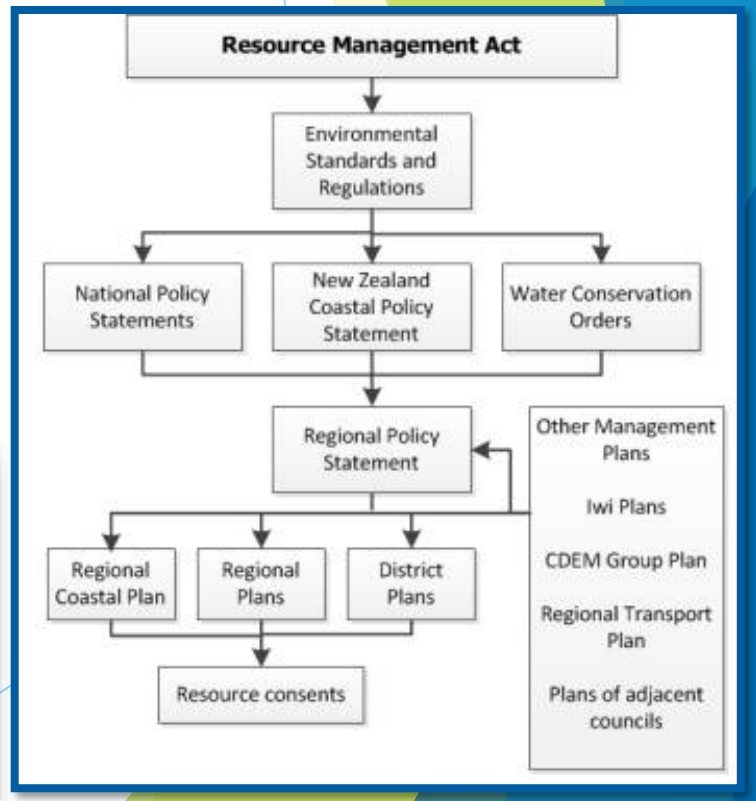
Wastewater Discharge: The Rules
(changing)

- Resource Management Act 1991 (and proposed RMA Reforms)
  - Primary Legislation for Environmental Management
- National Policy Statement for Freshwater Management 2020 (amended 2023)
  - Te Mana o te Wai – integrated and holistic well-being of a freshwater body
  - Involvement of tangata whenua – cultural values
  - Protection of Natural Values of FMU's – biological, visual, and physical
- Regional Plans – and plan changes
  - Catchment plans
  - Freshwater Management Plans
  - Nutrient budgets and allocation
- Local Plans and Rules
  - Trade Waste Bylaws



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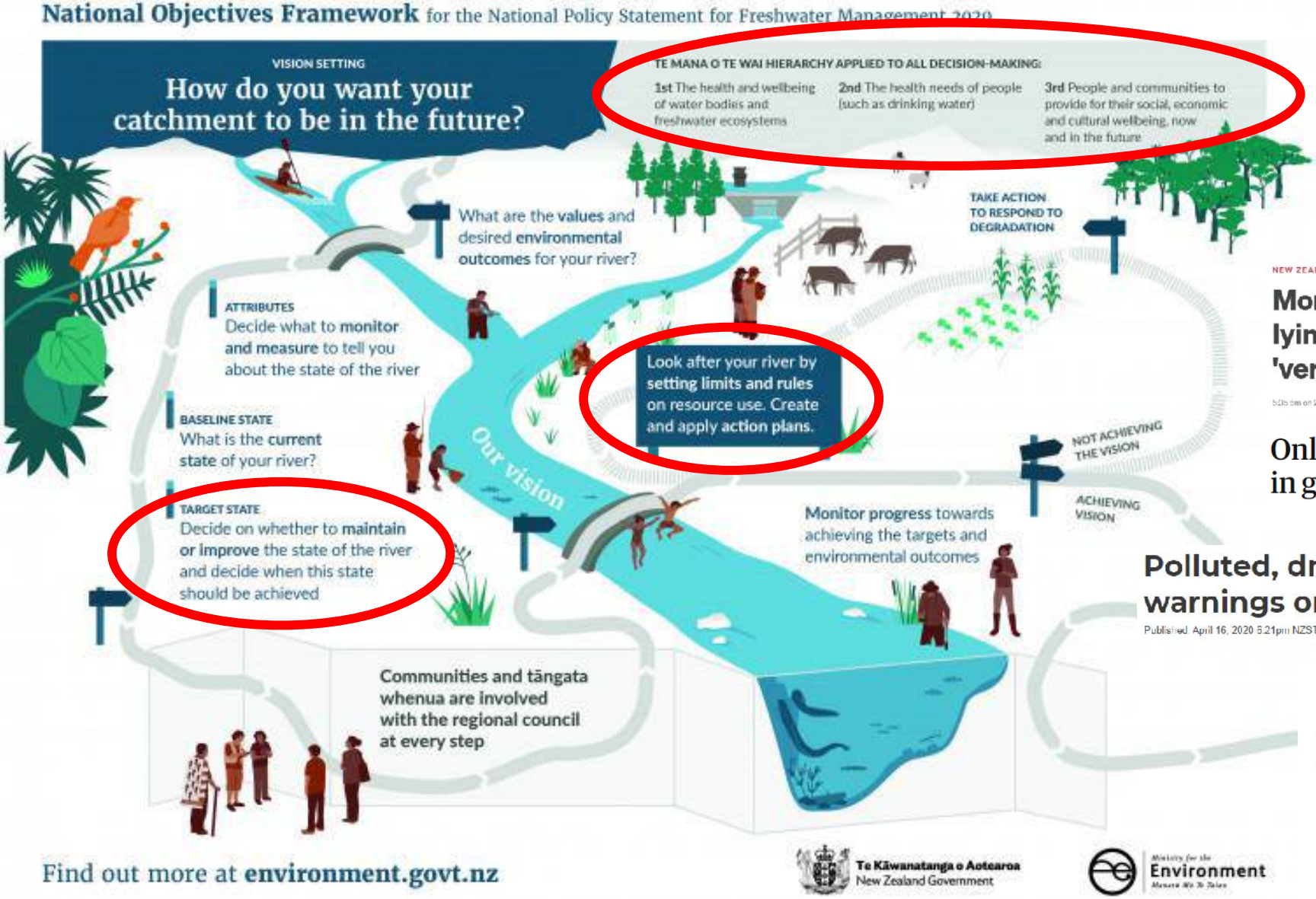

NEW ZEALAND / ENVIRONMENT

More than 80% of New Zealand's low-lying lakes and rivers surveyed 'poor' or 'very poor'

RNZ

Only 2% of New Zealand's large lakes are in good health, bleak report finds

The Guardian

Polluted, drained, and drying out: new warnings on New Zealand's rivers and lakes

Published April 16, 2020 5.21pm NZST

Otago Daily Times

Dunedin 7 | 1 Thursday, 10 August 2023 Send us news & photos

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Wednesday, 12 April 2023

New report shows 'appalling' state of NZ's freshwater

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Wastewater Discharge: Cultural Aspects

(Based on: 2020 MfE Report on Wastewater Sector[1], Chapter 4, by Antoine Coffin and Te Pio Kawe.
Pauling and Atarea. *Tiaki Para A Study of Ngāi Tahu Values and Issues Regarding Waste*. Landcare Research, 2010.
The Cultural Significance and Importance of Water, course by Troy Brockbank, Water NZ 2022)

- Cultural views on wastewater discharge can vary from Iwi to Iwi based on:
  - Tikanga (right ways of doing things),
  - Matauranga (knowledge, world view),
  - Uara (values), and
  - Matapono (principles)
- There are some common, shared, and similar values and perspectives.
  - Wai (water) is a taonga and essential to life.
  - It has a mauri (life force) and can be a medium for both enhancing and removing tapu.
  - Papatūānuku (Mother Earth) is a primal parent, the foundation of all life, the cleanser and the place where all life returns
- Values and Issues Regarding Waste(water).
  - Issues of environmental pollution/degradation,
  - human health issues,
  - impacts on abundance and access to mahinga kai,
  - treatment and disposal methods and impact on wāhi tapu (sacred places).
- Of great concern is the presence of hazardous wastes, human waste, industrial, biological and farm wastes.
- Strong disapproval of discharge to water, freshwater, recreation areas, marine environment, and food crops.
- Higher approval of discharge to forestry, non-food crops, and discharged to wetlands.

Whakataukī:	Proverb:
He taura whiri Kotahi mai anō te kopunga tai no i te pu au	From the source to the mouth of the sea all things are joined together as one

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1: BECA, Boffa Miskel, GHD 2020. *The New Zealand Wastewater Sector*. Prepared for Ministry of the Environment. October 2020

Karakia Tīmatanga

Ko Ranginui e tū iho nei
Ko Papatūānuku e tākoto nei
Ka heke iho ngā roimata i a Rangi ki te nuku o te whenua
Ka kōmanawa ngā pūna roimata i a Papa, Ka hiki ake tāna pūkohu ki te rangi
Ka rere mai ngā roimata, rere ki uta, rere ki tai
Hei whāngai i te rangi
Hei whāngai i te whenua
Hei whāngai i te tangata
Ko tēnei te hurihanga o te wai

Ranginui is above
Papatūānuku is below
The tears/rain from Ranginui fall to the embrace of the land.
The springs of Papa flow out of the land, her mist rises to the sky.
The tears flow, to the hinterland, to the coast.
To sustain the sky
To sustain land
To sustain the people
This is the cycle of water

Wastewater Discharge: The Options

- Discharge to Trade Waste System
  - Council, New Water Entities
- Discharge to Land
  - Farmland, Forestry, Fields
  - Gardens, Sport Fields
- Discharge to Groundwater
  - Rapid Infiltration, Direct Injection
- Discharge to Water
  - Rivers, Lakes
  - Ocean Outfalls

Images: BECA, Boffa Miskel, GHD 2020. *The New Zealand Wastewater Sector*. Prepared for Ministry of the Environment. October 2020

Wastewater Discharge Options: The Challenges

Trade waste is defined in NZS 9201.23:2004 (model trade waste bylaw) as "***any liquid***, *with or without matter in suspension or solution, that is or may be* ***discharged from a Trade Premises to the Wastewater Authority's (WWA) Sewerage System*** *in the course of any trade or industrial process or operation, or in the course of any activity or operation of a like nature; and may include Condensing or Cooling Waters; Stormwater which cannot be practically separated, or Domestic Sewage.*"

- Challenges of Discharge to Trade Waste
  - Availability of connection and infrastructure
  - Volume and concentration limits – compliance
  - No ownership – Limited capacity for changes
  - Pressure from other developments
  - Charge costs

Otago Daily Times

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Wednesday, **23 March 2022**

Trade waste discharges straining Rolleston treatment plant

By Susan Sandys

93 0

Canterbury > Districts > Selwyn

The completion of the Darfield/Kirwee pipeline to the Pines Wastewater Treatment Plant is scheduled for this year. Photo: Supplied

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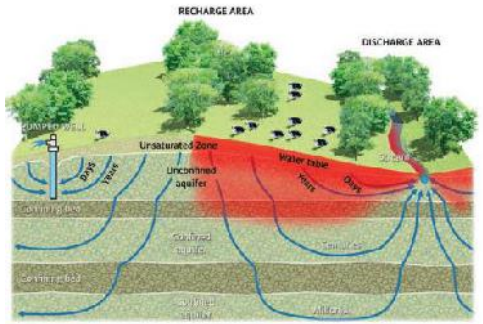
Wastewater Discharge Options: The Challenges

- Challenges of Discharge to Land
  - Land availability and coordination with other activities
  - Seasonal Soil Saturation
  - Contaminants – Sodium
  - Nutrient loss
  - Cost of infrastructure
    - Pipelines, irrigators
    - Storage Tanks, Ponds
    - Land



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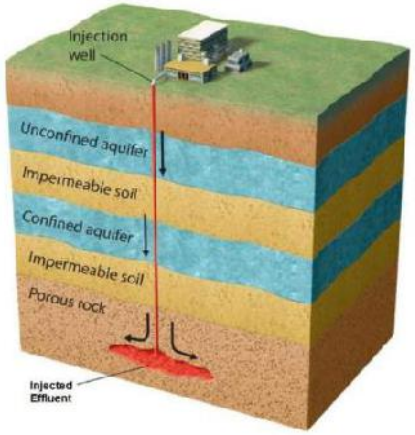
Wastewater Discharge Options: The Challenges

- Challenges of Discharge to Groundwater
  - Higher treatment required – bypass soil treatment
  - Seasonal groundwater levels
  - Soil Permeability
  - Groundwater mounding and ground stability
  - Land availability
  - Energy and infrastructure costs



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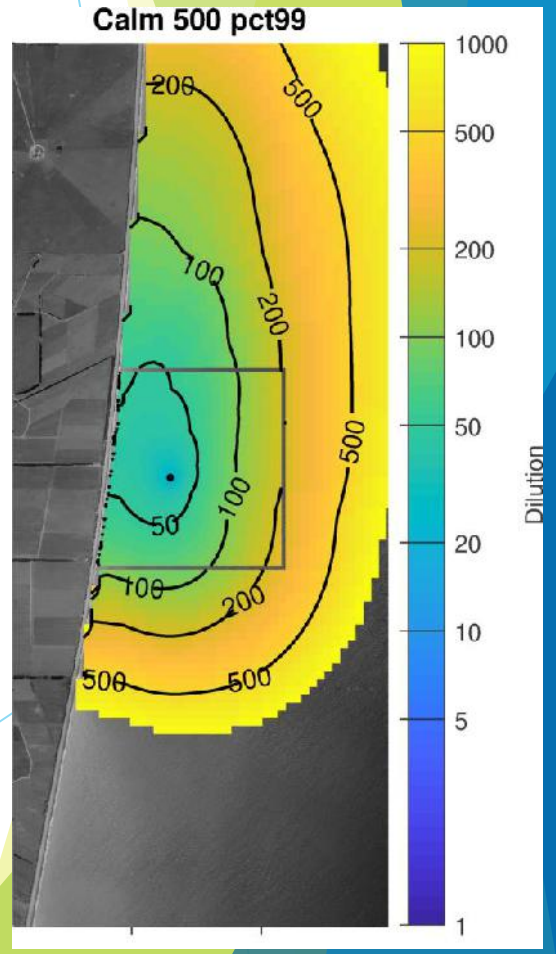
Wastewater Discharge Options: The Challenges

- Challenges of Discharge to Water
  - Cultural values and acceptance (or lack of)
  - Environmental impacts – Improvements!
  - Treatment requirements
  - Contaminants in catchments – attribute states
  - Natural values - NPSFM
  - Seasonal variations
  - Mixing in Ocean
    - Tides
    - Estuaries



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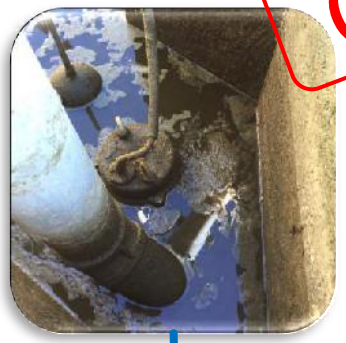
Wastewater Discharge Options: The ~~Challenges~~ Opportunities

- Holistic approach
  - Discharges are connected
- Involvement of tangata whenua
  - Cultural Values
- Protection of natural values
  - Natural features and habitat
- Improvements to the catchment
  - Reduction of nutrient loads



"Everything is in the catchment!"

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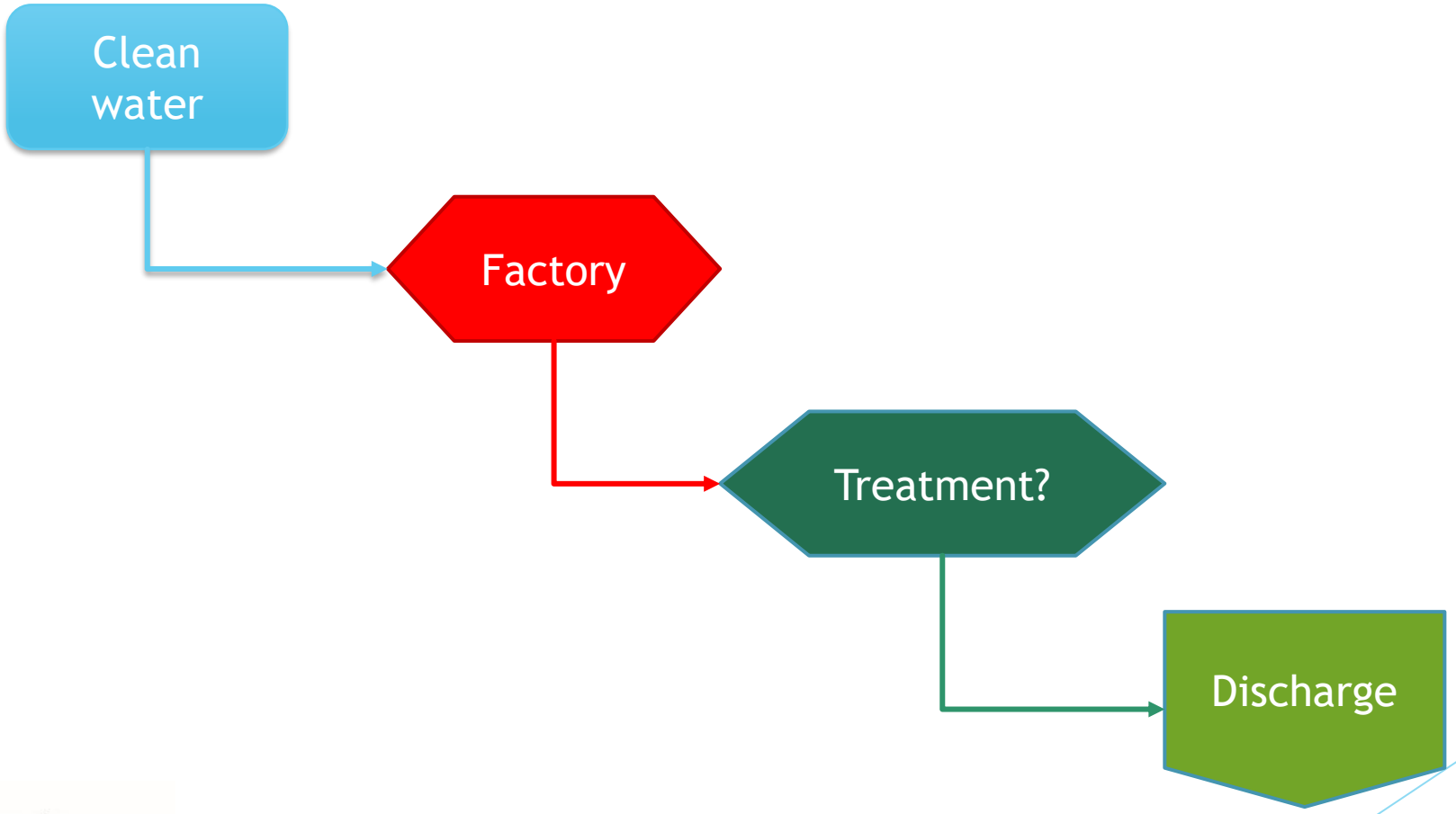
Wastewater Discharge Management: The Paradigm Change



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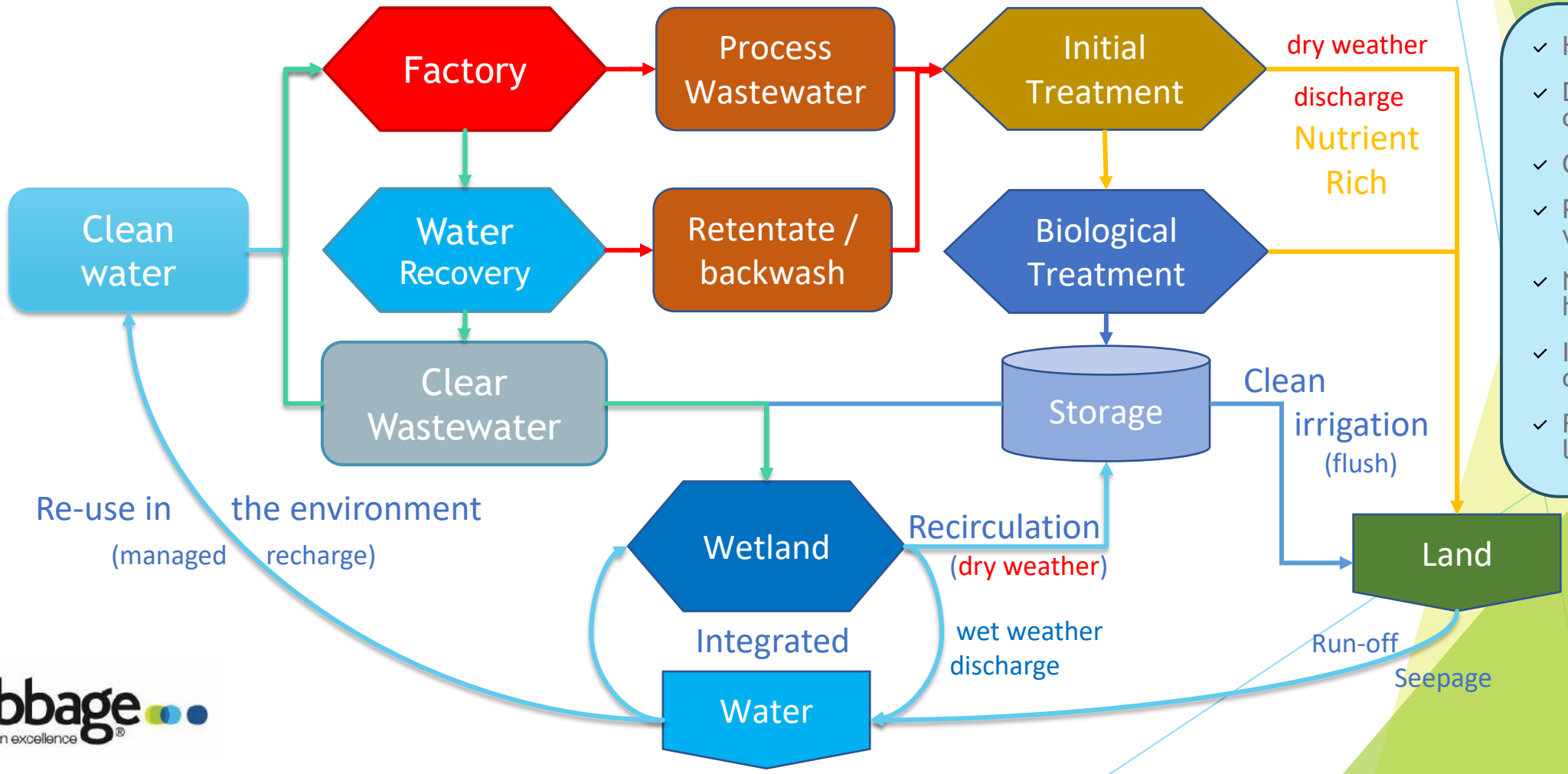
Sustainable

Wastewater Discharge Management: The Paradigm Change



- ✓ Holistic approach
- ✓ Discharges are connected
- ✓ Cultural Values
- ✓ Protection of natural values
- ✓ Natural features and habitat
- ✓ Improvements to the catchment
- ✓ Reduction of nutrient loads

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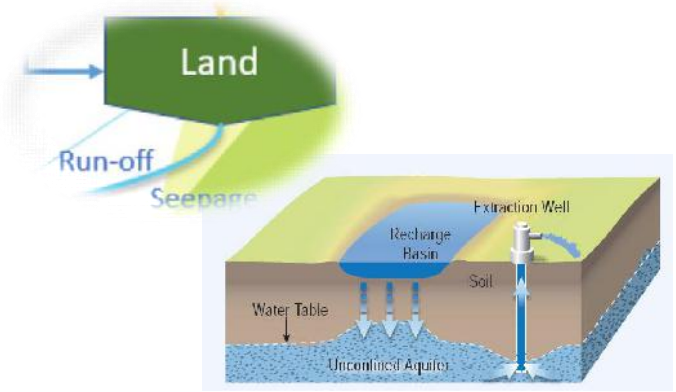
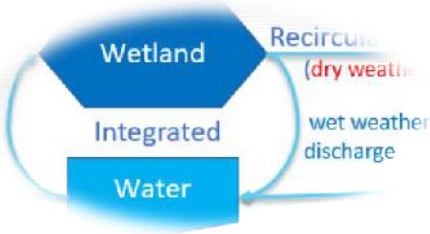
Sustainable Wastewater Discharge Management: The Details





UTILISING MĀNUKA TO IMPROVE WATER QUALITY

KEY BENEFITS OF MĀNUKA RIPARIAN PLANTING

- **Water Quality** — Decreased levels of nitrate and *E.coli*
- **Economic Return** — Opportunities for honey and essential oils development
- **Biodiversity** — Increased native planting and ecosystem services
- **Soil Stabilisation** — Decreased sedimentation and improved erosion control

Research Articles

Dickinson, N.; Mammitt, N.; Das, B.; McLaughlin, D.; Leung, D. and Robinson, B., (2015). Endemic Plants as Browse Crops in Agricultural Landscapes of New Zealand.

Franklin, H.M.; Dickinson, N.M.; Esnault, C.J.D. and Robinson, B.H., (2015). Native Plants and Nitrogen in Agricultural Landscapes of New Zealand.

Hanley, J.L.; Robinson, B.H.; Zhong, H.T. and Dickinson, N.M., (2014). The Phytoremediation Potential of Native Plants on New Zealand Dairy Farms.

Prosser, J.A.; Andersen, C.W.N.; Horswell, J.; Speir, T.W., (2014). Can Manuka (Leptospermum Scoparium) Antimicrobial Properties be Utilised in the Remediation of Pathogen Contaminated Land?

Prosser, J.A.; Woods, R.R.; J.A., H. and Robinson, B.H., (2016). The Potential In-situ Antimicrobial Activity of Myrtaceae Plant Species on Pathogens in Soil.

CBR is a multidisciplinary collaboration of 10 New Zealand research institutes, universities and research partners.

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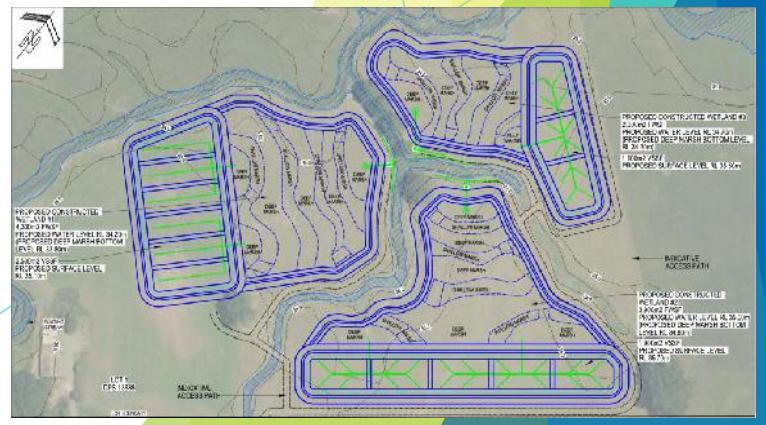
23 January 2023

NIWA is working with farming enterprises on a novel pollution mitigation technology to remove nutrients from agricultural runoff.

The FANS systems are typically set up next to a stream. The water is pumped to the water channels where native algae is seeded. The water returns to the stream after treatment. [Photo: Stuart Mckay / NIWA]



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Thank you

Questions?