

Hydrological data sharing

The New Zealand experience

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Partners / Providers



New Zealand

Total Land Area

268,000 km²

Rhine basin: 185,000 km²

Murray-Darling: 1,061,469 km²

Mississippi: 2,981,076 km²

De La Plata River: ~3,200,000 km²

Longest River

Waikato River
425km , 264mi

Largest River (by volume)

Clutha River
613m³/s , 21,600 cu ft/s

Auto Rainfall / River stations 1000+ / 500+

Population

Est. 4.693 million



New Zealand

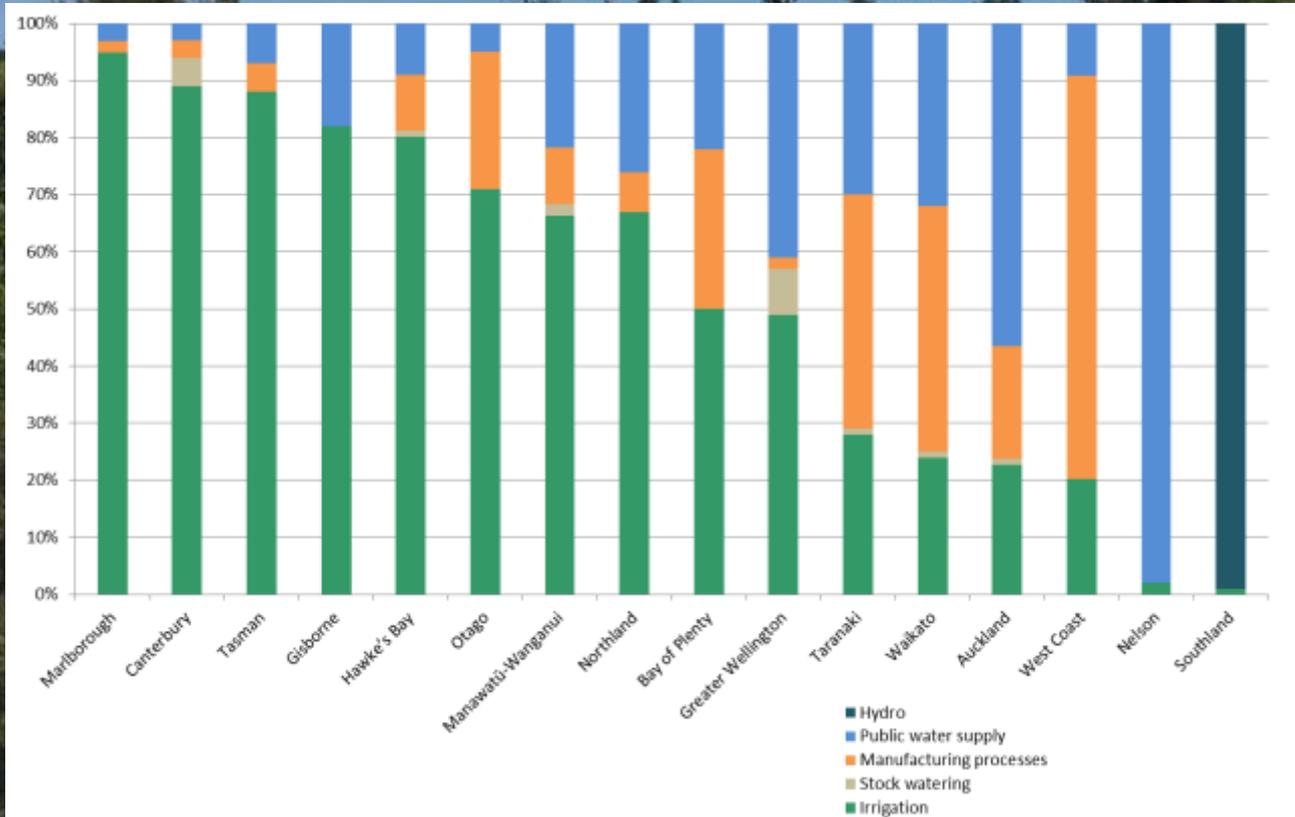
The average annual precipitation for New Zealand as a whole is 2.1 m. In mountain portions of the West Coast of the South Island, it exceeds 10 m per year.

Seasonal differences in precipitation are substantial, regularly leading to summer water deficits in many parts of the country, though the season of greatest and least precipitation differ from region to region. The amount of precipitation also varies inter-annually in response to both ENSO and IPO cycles



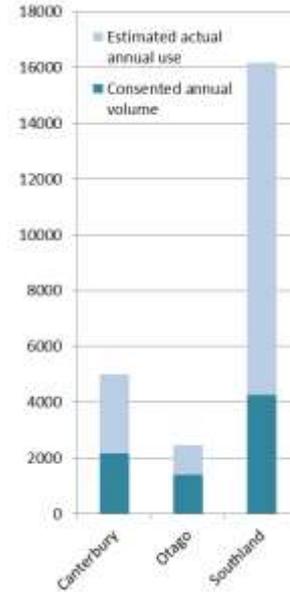
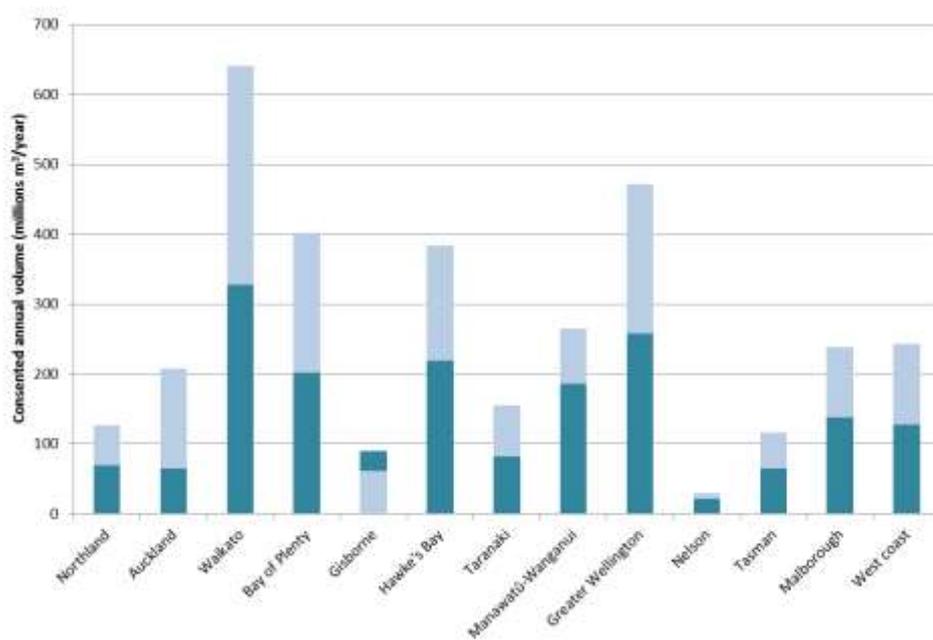
New Zealand

Regional variations in the use of allocated water, 2010



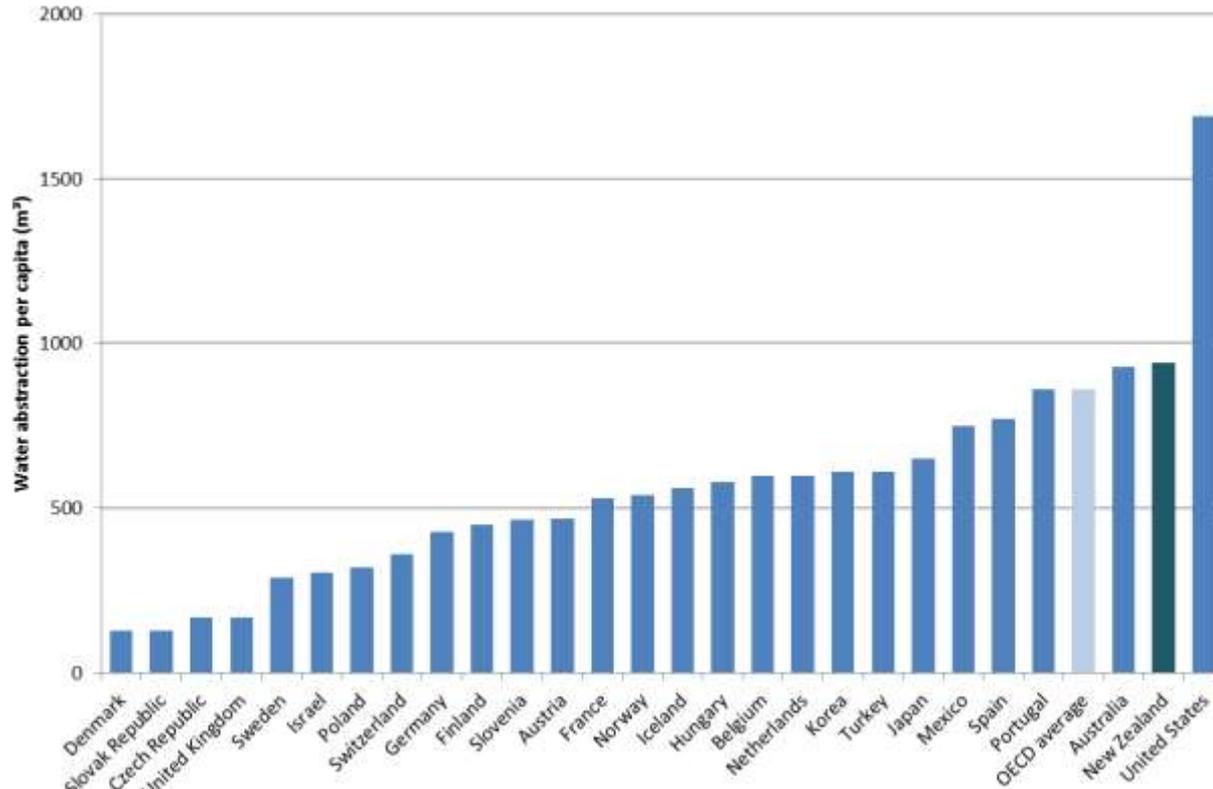
New Zealand

Actual water used compared to consented annual volumes (Mm³/year) for each region in 2010

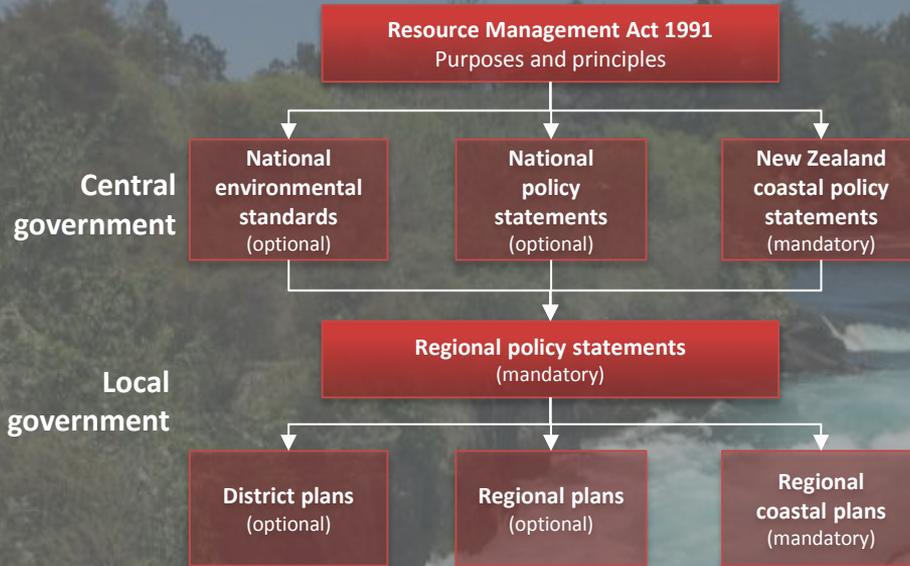


New Zealand

Ranking of water abstraction per capita for OECD countries in 2007



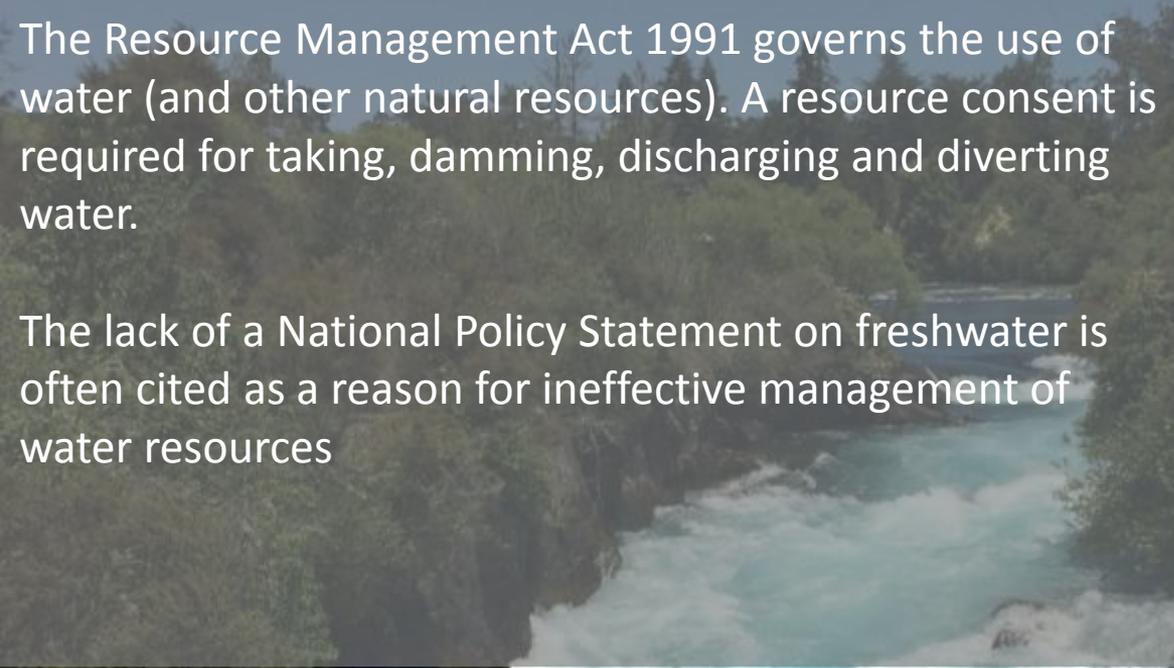
New Zealand



New Zealand

The Resource Management Act 1991 governs the use of water (and other natural resources). A resource consent is required for taking, damming, discharging and diverting water.

The lack of a National Policy Statement on freshwater is often cited as a reason for ineffective management of water resources



New Zealand

Growing demand for irrigation water

- Land use intensification
- Impacts on water quality for surface, groundwater and coastal environments

National Policy Statement for Freshwater Management

- In a nutshell, the NPS-FM directs regional councils to set objectives for the state their communities want for their water bodies in the future and to set limits to meet these objectives.
- The NPS-FM must be fully implemented no later than 31 December 2025 (or 31 December 2030 in certain circumstances).



New Zealand

2009-Land and Water Forum

2011-Open Government Declaration

2014-National Policy Statement

2015-ICT Strategy

2015-Environmental Reporting Act

The **Land and Water Forum** brought together a range of stakeholders consisting of industry groups, electricity generators, environmental and recreational NGOs, iwi, scientists, and other organisations with a stake in the governance of the natural resource. The **Open Government Declaration** provides direction about how local authorities should carry out their responsibilities under the Resource Management Act 1991 for managing fresh water.

The **Government ICT Strategy** was revised in 2015 to ensure that, in a dynamic technology environment, it can achieve the government's aim of an ICT-enabled transformation of public services to New Zealanders

The purpose of this Act is to require regular reports on New Zealand's environment.

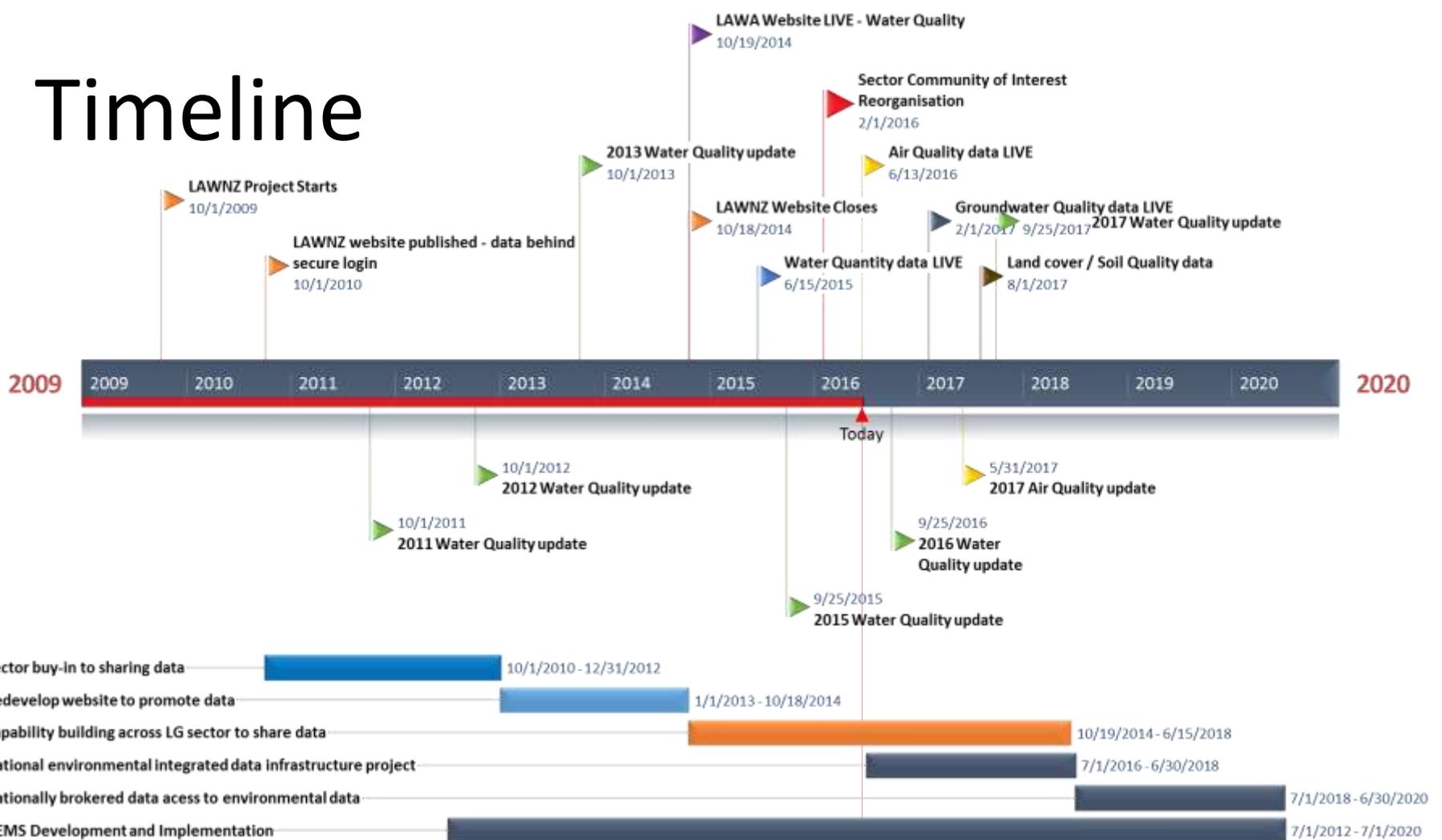


Drivers

- National Reporting
- Consistent data
- Reliability



Timeline



Federated infrastructure

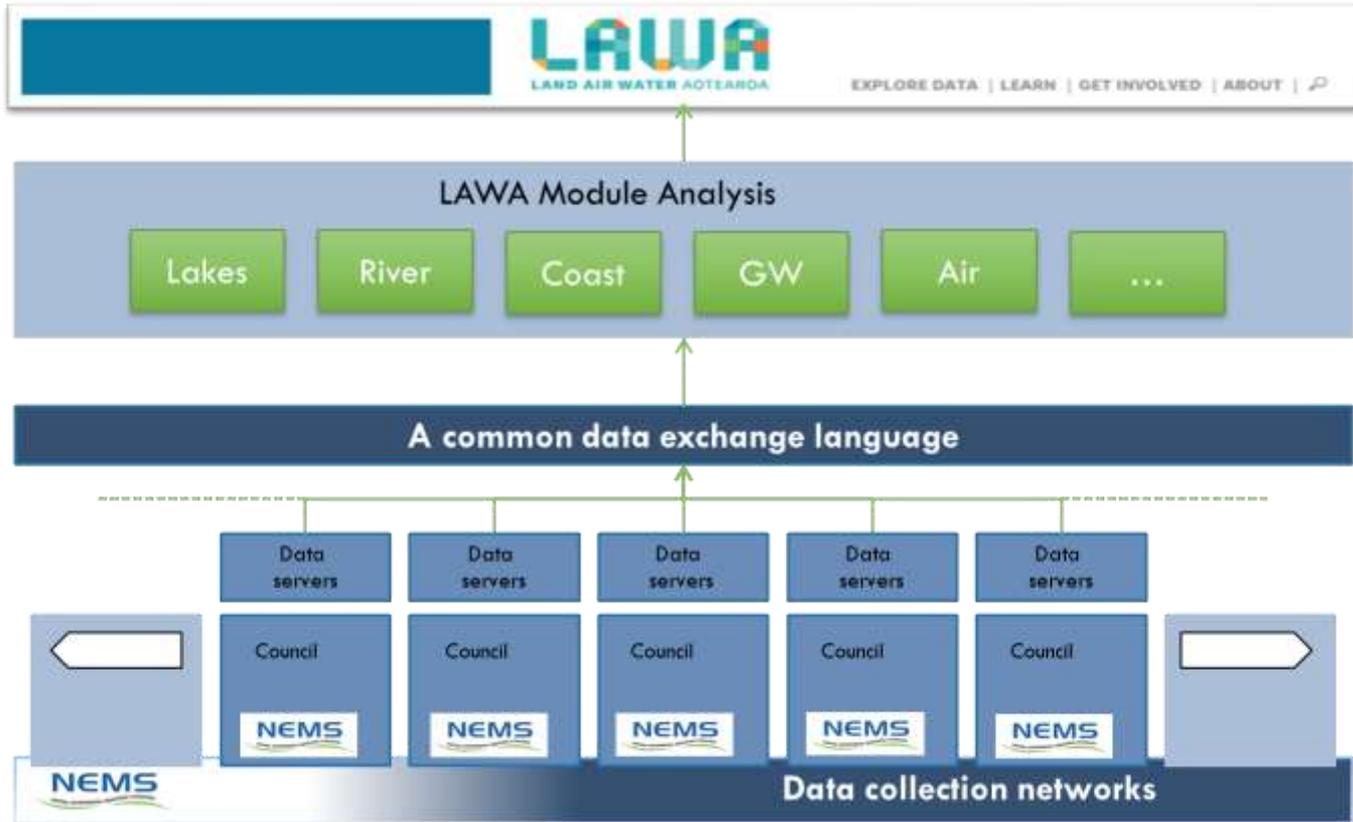
National (public facing) reporting platform(s) (LAWA)

Standard protocols

National (federated) data management system

Integrated collection networks

Standard monitoring protocols and methods.



Reporting

Analysis Teams

Data servers for LAWA

Secure Council Systems

Products in use in regional sector

- Hilltop (13)
- Kisters (2)
- Aquatic Informatics / 52 North (1)
- ESRI (16)



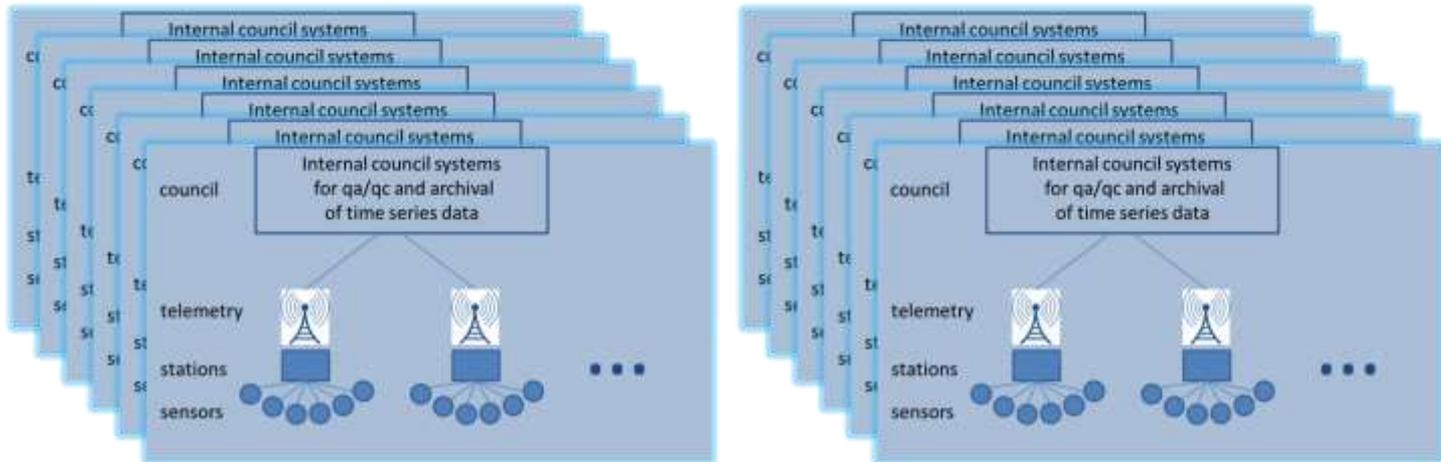
NZ data federation premise



SOS2 and WaterML2 are internationally-based Standard languages for asking a question to a time-series data server, and for getting the data back

Constraints here – water quality

Eg. Hilltop, Kisters, 52North





LAWA connects you with New Zealand's environment through sharing scientific data

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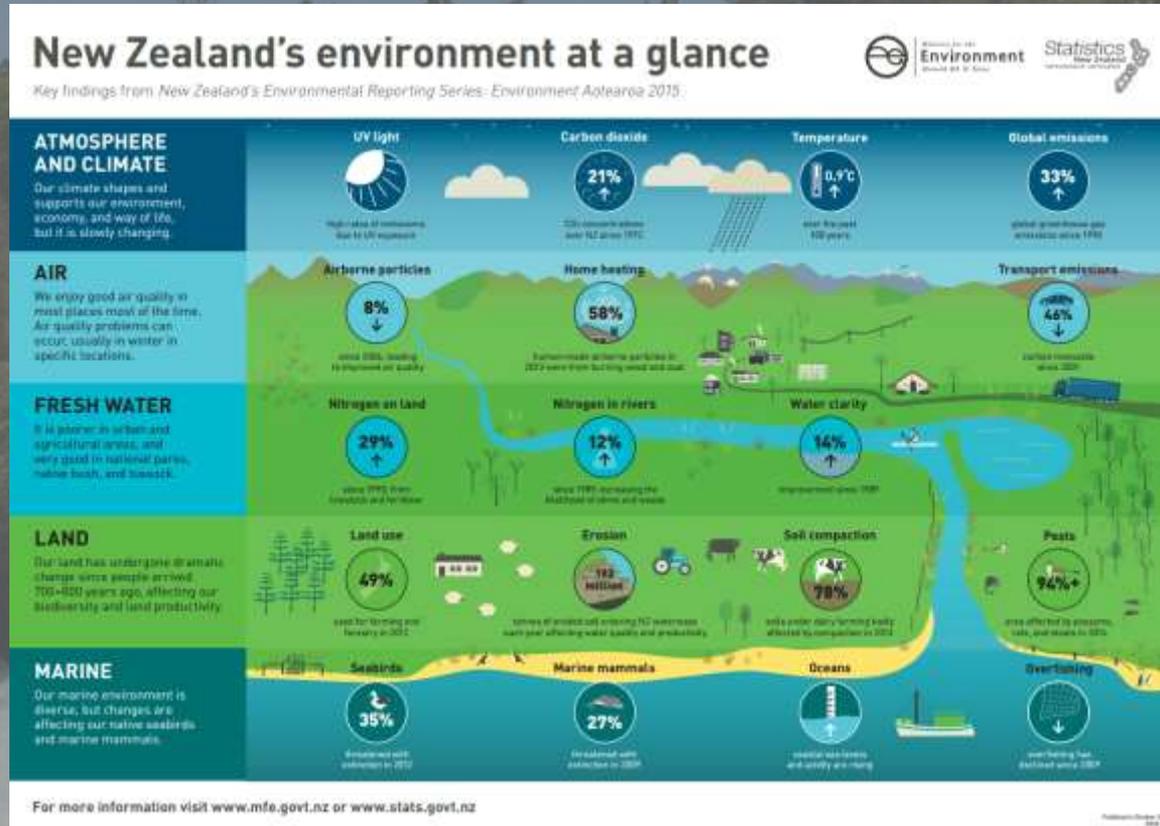
Outstanding issues

- New data delivery methodology for agencies
 - Lot of initial confusion within different domain working groups
 - Little to no cross pollination within organisations currently
- Still lacking consistency
 - No persistence
 - Lacking connectivity across domains
 - Naming conventions
- No easy discoverability (failing NZ Inc).

Supporting sector goals

- Reliance on:
 - Governance model:
 - Reporting (EMaR)
 - Communities of interest (SIGs – Domain Experts)
 - Standards (NEMS):
 - Promotion of interactions between the Governance model and the SIGs

Existing national reporting



Existing national reporting

Table 1: Trends for water clarity, nutrients, and macroinvertebrate community index at NIWA sites, 1989–2015

VARIABLE	TREND	SITES SHOWING A STATISTICALLY SIGNIFICANT INCREASE (%)	SITES SHOWING A STATISTICALLY SIGNIFICANT DECREASE (%)	SITES SHOWING AN INDETERMINATE TREND (%)
Clarity	↗	64	9	27
Total nitrogen	↘	60	14	26
Nitrate-nitrogen	↔	52	27	21
Ammonia-nitrogen	↘	4	78	18
Total phosphorus	↔	38	50	32
Dissolved phosphorus	↘	51	14	35
Macroinvertebrate community index (MCI)	↔	5	15	80

Source: Larned et al (2015)

Note: Trends for NIWA's National River Water Quality Network (77 sites). Data are for the period 1989–2015, except for the MCI (covering 462 NIWA and regional council sites) which are for the period 2004–15. Green arrows indicate improving water quality; red arrows indicate declining water quality. No trends could be determined for nitrate-nitrogen, total phosphorus, and the MCI. Percentages may not add to 100 percent due to rounding.

Natural Resources Sector \$\$\$

- The Natural Resources Sector (NRS) is a network of eight government agencies responsible for the careful and responsible management of New Zealand's natural resources.
- Their goal is to improve the productivity of New Zealand's resource-related industries while reducing their environmental impact.



Ministry for Primary Industries
Manatū Ahu Matua



Ministry of Business,
Innovation & Employment



INTERNAL AFFAIRS



Te Tari Taiwhenua

newzealand.govt.nz

Current Data Infrastructure

View file attachments

Secondary users & decision makers



National Data Publishers



Agency Data Publishers



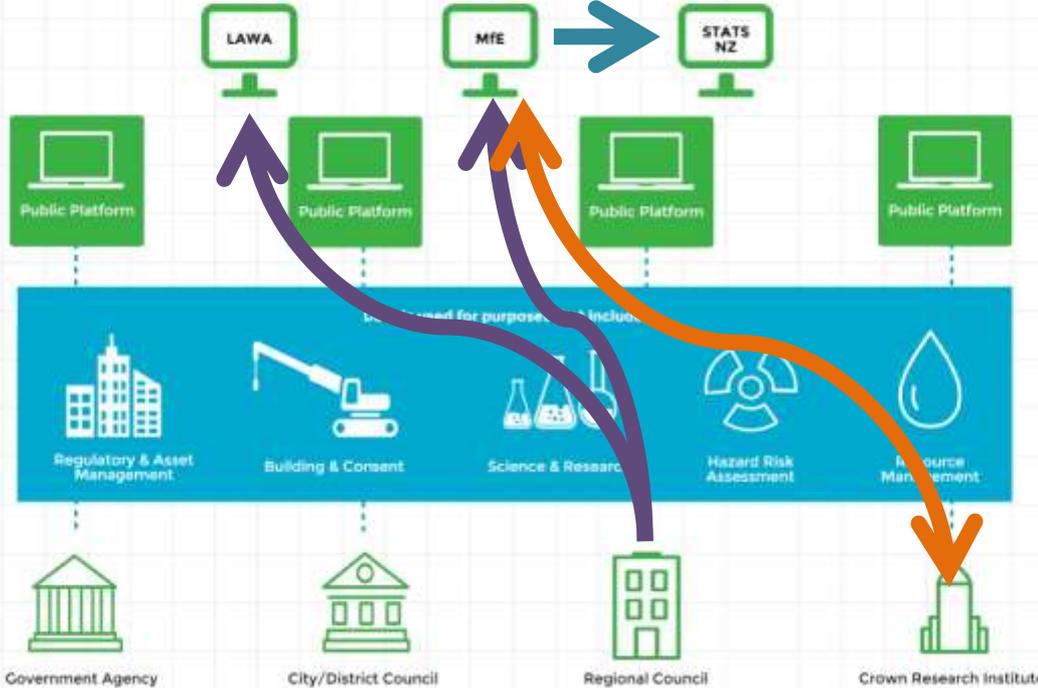
Agency Data Users (primary decision makers)



Data Collectors & Providers



Users include: researchers, iwi, landowners, primary sector businesses



What is wrong?



1. Inadequate Platforms

Some platforms do not:

- ✗ Allow data to be easily integrated from multiple sources



2. Data not readily useable

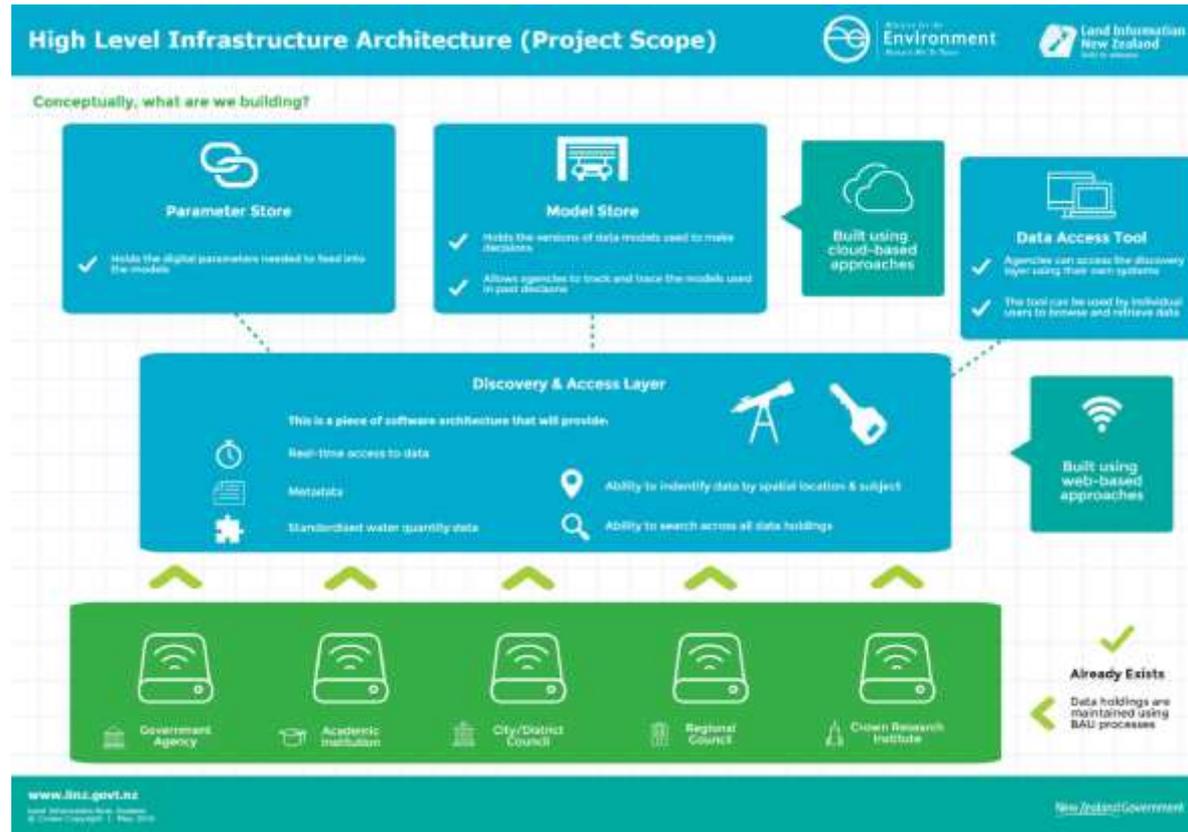
- ✗ Data is difficult to find
- ✗ Data is unavailable in real time
- ✗ Inconsistent data classification
- ✗ No common language used to describe data



3. Inconsistent Collection

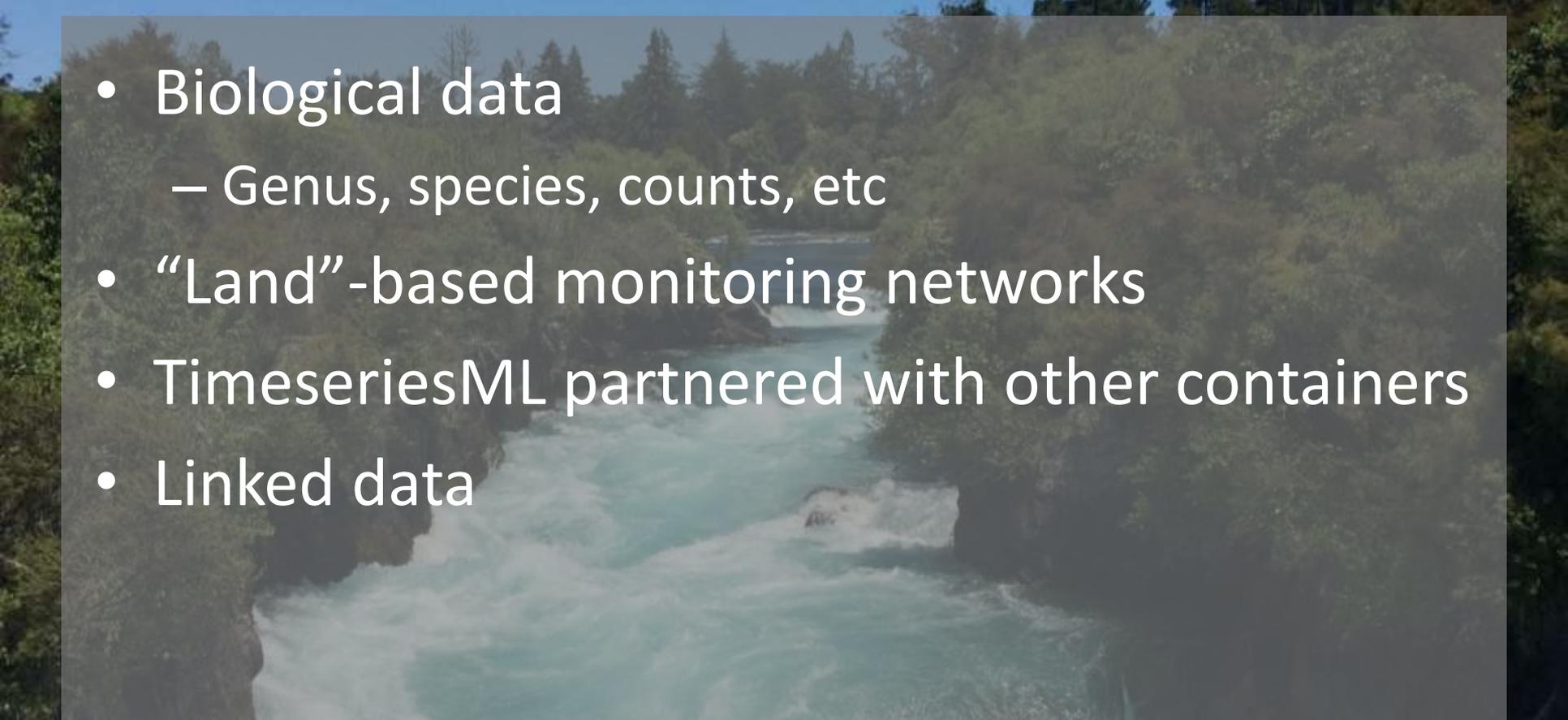
- ✗ Data is collected using different methods, standards and sensors
- ✗ Different models used for making decisions

Building on federated systems



Upcoming challenges for NZ

- Biological data
 - Genus, species, counts, etc
- “Land”-based monitoring networks
- TimeseriesML partnered with other containers
- Linked data



Discovery

- This is the next challenge!!!
- Profile O&M, not fully implemented yet
- GetDataAvailability.
- Stats rather full large volume timeseries.
 - MORE Focus on PUBLIC CONSUMPTION
 - >90% users don't/can't handle large temporal datasets.

Discussion – questions for HydroDWG

- SOS 2.0 capability
- Water quality extension?
 - Describing sample collection and observation metadata as opposed to measurement metadata
- Feature data model
 - GetCapability / GetDataAvailability across a single feature and return everything that might be observed and measured.
- Introduction of statistical offering within O&M?
- Improved data quality offering
 - Introducing numeric values?