National Science Challenges

OUR LAND AND WATER

Toitū te Whenua, Toiora te Wai

Designing Effective Farm Environment Plans

Guidance for: government, regional councils, primary industry bodies, farm consultants and advisors, farmers and growers

New rules will require every farm in Aotearoa New Zealand to have a Farm Environment Plan (FEP) for freshwater quality improvement, to be certified and regularly audited. This world-first approach to national-scale FEP coverage will later integrate these freshwater plans as modules of a full FEP that also addresses soil, greenhouse gas, biodiversity and more. The regulations governing FEPs and what they must contain are not yet finalised (as at March 2021). The focus of this guidance is freshwater, in line with Our Land and Water's objective.

FEPs must describe on-farm land management actions to contribute to freshwater improvements at catchment level. FEPs should be flexible, farm-specific tools that empower farmers to change and adapt. However, individual FEPs need to be linked with the wider catchment context to solve the many unique problems that put pressures on our waterways. Some standardisation of FEP templates and processes is therefore essential to ensure on-farm environmental actions are aligned, and to enable effective planning, recording and auditing across sectors.

The Our Land and Water National Science Challenge has prepared the following guidance for designing effective FEPs, FEP templates and processes, to help those putting the new legislative requirements into action. This guidance is based on our current knowledge of the FEP process and its requirements, and is informed by Our Land and Water-funded research and expert opinion.

The unique circumstances of each catchment.

To be effective, farm plans must reflect the varied soils, weather, land use and farming practices that ultimately contribute to the health of waterways, as well as the values the community wants to protect.

Different situations require different solutions.

An effective farm plan will include mitigation actions that target specific local issues, going beyond 'good management practice' (GMP) where necessary.

Opportunities to partner with tangata whenua.

Te Mana o te Wai – a key part of government freshwater policy – requires councils to work with iwi. Catchment groups and mana whenua have an opportunity to build new partnerships around a shared vision for land and water. Catchment groups that empower and work successfully with local marae, hapū and whanau will be in a strong position to demonstrate that they take their responsibilities seriously and are implementing a plan of action. Establishing enduring partnerships can be a long process that requires resourcing and time, and it's important to be guided by the priorities of mana whenua.

It's all about outcomes.

Farm plans should be living documents, reviewed on a regular schedule to assess the actions that have been implemented and the farm's progress towards environmental outcomes. Assessment based on outcomes may encourage more ambitious FEPs and reduce the risk of 'playing it safe' by planning only actions farmers are certain they can achieve.

What is a catchment?

A catchment is an area of land where rain flows into a stream/creek, river, lake, aquifer, wetland or estuary.

What is a sub-catchment?

Catchments can be divided into smaller areas known as sub-catchments, where rain flows to the same water body at the same point.

1 Identify catchment and sub-catchment objectives.

Key objectives (such as swimming) and issues or contaminants of concern (such as ***E. coli***) should be identified for each catchment, drawn from the regional council plan. Specifying objectives for each sub-catchment may require further discussion between council staff, farmers, communities and tangata whenua. Te Mana o Te Wai requires that first priority be given to the health and well-being of water bodies and freshwater ecosystems.

2 Integrate farm maps in FEPs.

The physical characteristics of a farm must be considered. For example, actions to mitigate contaminant loss are most effective near the sources of those losses (Critical Source Areas). These are often small areas of a farm or catchment. Farm consultants/advisors should accurately locate Critical Source Areas on a farm map with Geographic Information Systems (GIS) layers (such as rainfall, SMAP soil type, drainage) so they can be effectively addressed.

3 Encourage catchment groups to develop sub-catchment plans.

A coordinated approach can link adjacent farm plans and enable neighbouring landowners to identify local objectives and indicators for sub-catchments. Farmers and farm planners can then prioritise the solutions unique to their soils, land use practices and waterways, as well as pool resources to undertake shared works. For example, if restoring a wetland on one farm will make the biggest difference to a healthy waterway, other landowners could help with the work. (See 'Connecting Local Farm Plans to Improve Waterways'.)

4 Use common indicators and definitions.

Recording land management actions in a consistent way in a central repository will allow data from many farms to be compiled, linked to water quality outcomes, and efforts reported both at the catchment and national scale. To be robust and accepted by land managers, indicators must be practical on farm and inform the prioritisation of actions to mitigate contaminant losses. (See 'What makes a robust indicator?')

5 Prioritise mitigation actions.

Within FEPs, start with actions that provide the greatest long-term reduction in contaminants per dollar spent, based on contaminants targeted in the catchment or sub-catchment plan. Plan additional actions where necessary to achieve catchment-wide goals. A mitigation prioritization tool is currently in development by Our Land and Water and Dairy NZ, that will connect to water quality data drawn from the LAWA platform (due to complete: June 2021).

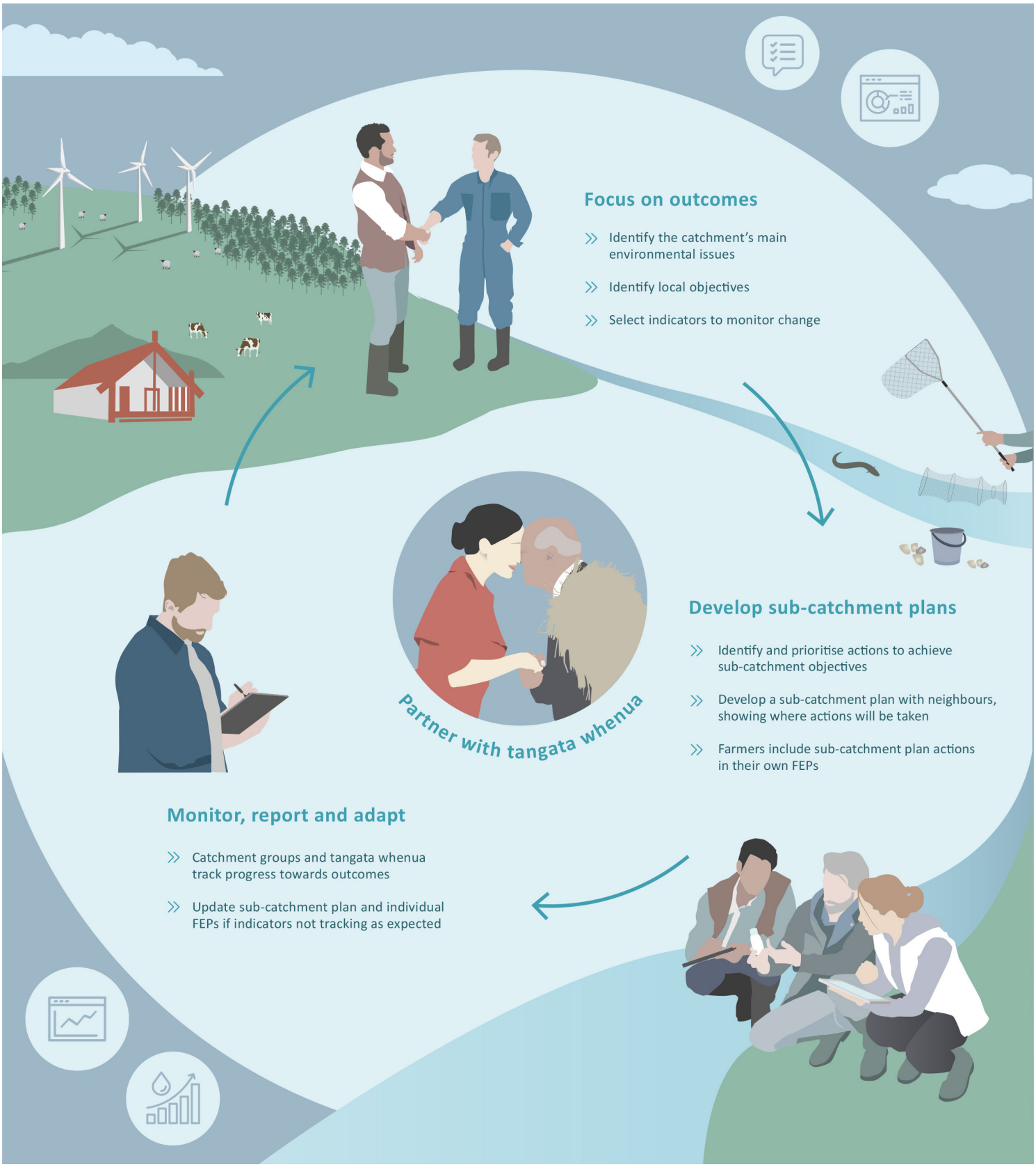
6 Monitor and adapt.

To enable continual improvement and diagnose problems, catchment groups should monitor their own catchments. Tangata whenua should be involved to track progress and indicators based on mātauranga. Farm plans should be audited and reviewed based on progress towards sub-catchment outcomes. Water quality should be monitored close to where actions have been implemented, because large water bodies downstream may take years to show improvement (average NZ response time = 5 years). If sub-catchment indicators are not tracking as expected, associated farm plans should be reviewed and updated, bearing in mind other sources of contaminants and including these where possible. (See Figure 1.)

7 Report on-farm efforts.

Once an FEP is established and mitigation actions have been recorded, it is critical to disseminate information to the wider community. This will allow communities to learn from each other about successful (and unsuccessful) FEP processes. Communities will need to consider privacy and confidentiality of the information.

To make farm plans an effective tool for improving waterways, we propose a four-step approach based on collective action delivered by catchment groups. Planning together is more efficient for everyone. Linking farm plans to sub-catchment priorities, and to each other, enables landowners to exchange knowledge and identify solutions unique to their soils, land use practices and waterways.



Support for Catchment Groups

Catchment groups can play a key role in coordinating action to improve waterways, across property boundaries. Some catchment groups have reported that having a paid coordinator has enabled them to make progress much faster. The New Models of Collective Responsibility research programme for the Our Land and Water National Science Challenge will produce (by 2022) recommendations for catchment groups, including how government, councils and the primary sector can support catchment collectives.

Common Definitions and Measurements for Actions

While every farm is different, we need to align, record and compile actions taken on multiple farms in the same catchment. Standard definitions of actions and common measurement indicators are required.

Clear action definitions or protocols will provide clarity for land managers and make it more likely an action will work as designed. For some actions, where there are good reasons to vary on-farm practice, guidelines may be more appropriate than rigid definitions.

Standardised measurement indicators need to be developed for each FEP action that are outcome-based and consistent across scales, sectors, and for multiple end users. This will enable land managers to measure their actions and track progress of their achievements over time, and allow actions to be recorded in a way that enables data from multiple farms to be compiled, and progress compared across sectors. This will help councils and others assess the rate of progress and whether additional actions are required. In future, some indicators could be linked to accreditation or incentive schemes to reward sustainable practices.

Researchers, industry sectors and government must work together to develop these common definitions and measurements, and they must be designed with farmers in mind, to promote buy-in and innovation. This work is in progress, initiated by the Register of Land Management Actions research programme for the Our Land and Water National Science Challenge (due to complete: June 2022).

What makes a robust indicator?

1. **Accessible:** Data is widely used and accessible, such as riparian planting and fencing.
2. **Valid:** It measures something that can be cross-checked at catchment scale, such as aerial imagery.
3. **Performance-based:** Measures performance rather than tracking intentions.
4. **Meaningful, communicable, comprehensible:** Indicator makes sense to land managers and can be communicated to the wider community.
5. **Clearly defined and standardized:** Indicator follows standards and can be measured consistently.
6. **Accepted by stakeholders:** It is cost-effective to monitor and will therefore be easily accepted.

Water Quality Monitoring Networks

A fit-for-purpose national water quality monitoring and assessment network is required to make it possible to measure improvement in water quality and attribute this to on-farm actions. New water quality monitoring networks and technologies will be needed, as the current network is not able to detect targeted improvement from specific on-farm actions.

Good quality spatial data will also help develop and improve water quality models that can predict change at a lower cost and level of monitoring.

Building Capacity to Deliver FEPs

A skilled network of professionals is required to deliver national FEP coverage in time to meet policy objectives. We need people qualified to work with farmers to prepare individualised, evidence-based, holistic plans. We also need people trained to certify and independently audit those plans, skilled catchment coordinators and data collectors, and regional networks. This requires investment in workforce training and professional development.

Any shortage of capacity and capability to deliver FEPs will need to be managed – for example, by classifying and prioritising catchments according to their value and risk.

Collaborative partnerships must be nurtured between professionals who prepare plans, those who independently audit them, and the farmers responsible for their day-to-day implementation. This will require national and regional level investment to thrive and deliver results, and will take time. Partnership offers credibility, empowers farmers with the confidence to act, and will contribute to more robust and effective FEPs.

Data Collation and Reporting

A national repository is needed to compile on-farm action data and water quality improvement across sectors, and report at national and catchment scale. The information captured will be of wide public interest, and care must be taken concerning privacy to ensure trust and uptake of FEPs is not eroded. The Register of Land Management Actions research programme for the Our Land and Water National Science Challenge is leading this work (due to complete: June 2022).

Regulation to Incentivise and Prioritise Actions

National or regional regulation may be required so that objectives and actions at the farm-scale can be prioritised. They might also aid with any trade-offs between multiple objectives that need to be clarified and aggregated at larger scales (at the catchment scale for water quality, and nationally for greenhouse gas emissions). If we are unable to effectively do this, we might fail to make decisions or take action due to uncertainty.

Proposed System Integration of FEPs

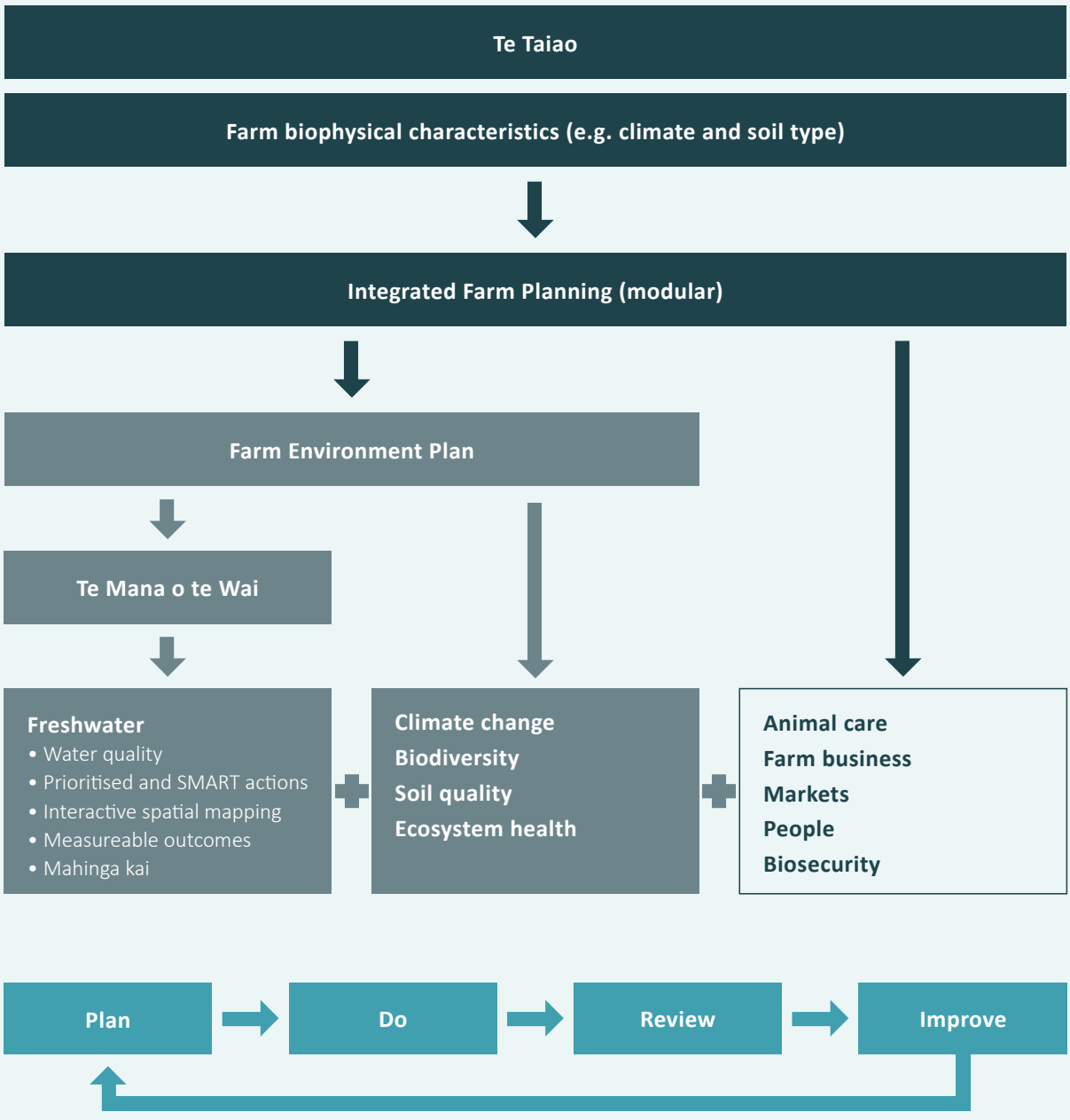


Figure 1: *Integration of mandatory and enforceable freshwater farm plans as part of wider policy and integrated farm planning developments.*

Credit: Adapted from Stokes et al

Key Publications

Demonstrating efficacy of rural land management actions to improve water quality - How can we quantify what actions have been done? by Katharina Doehring, Roger G. Young, Christina Robb (Journal of Environmental Management, September 2020) doi.org/10.1016/j.jenvman.2020.110475

A strategy for optimizing catchment management actions to stressor–response relationships in freshwaters by Richard W. McDowell, Marc Schallenberg, Scott Larned (Ecosphere, October 2018) doi.org/10.1002/ecs2.2482

Reflecting on the journey of environmental farm planning in New Zealand by Simon Stokes, Katrina A. Macintosh, Richard W. McDowell (New Zealand Journal of Agricultural Research, February 2021) doi.org/10.1080/00288233.2021.1876108

For those without institutional access to journal articles, we are happy to put you in touch with the lead authors to request a copy.

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National SCIENCE Challenges

OUR LAND AND WATER

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Our Land and Water (Toitū te Whenua, Toiora te Wai) is working towards an agri-food and fibre system that enhances the vitality of te Taiao with a diverse mosaic of land uses that improve the health of land, water and people.

Our Land and Water is one of 11 National Science Challenges that focus on defined issues of national importance. Our Land and Water is hosted by AgResearch, funded by the Ministry of Business, Innovation and Employment, and supported by 16 partner research organisations.

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