FORMAK Overview

Community Monitoring of Forest Trends

Tiakina ngä uri o te wao tapu nui a Täne
Safeguard our kindred; all living things of the forest.

Mäori see Te wao nui a Täne as a complex system of inter-related, inter-dependent components, closely linked through whakapapa (genealogy).

Because of these close linkages, impacts on any component in the system affects the entire system.

Täne is seen as the creator and guardian of the forest as well as the creator and guardian of people, so people are related, through whakapapa (genealogy) to all living things of the forest.

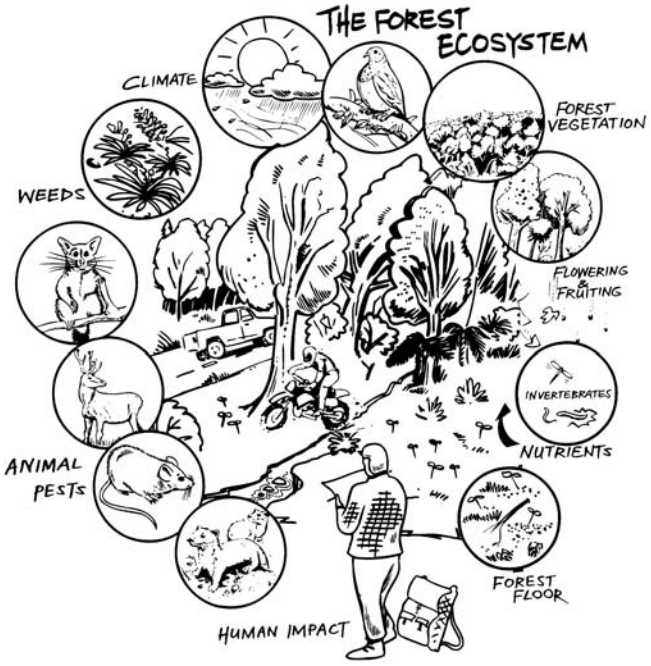
FORMAK helps monitor some of the component parts so we can work to safeguard the forest ecosystem – our kindred; all living things of the forest.

1. Introduction

1.1 Parts of the forest ecosystem at one site - Sites across the country.

Tirohia te whänuitanga o te wao tapu nui a Täne

The native forest ecosystem is made up of many interrelated parts, as shown in the figure below.



FORMAK is based on monitoring a variety of aspects of the forest ecosystem on one “Site”.

The FORMAK “Site” is an area of forest which is broadly similar in terms of forest type and management, and is logically treated as one unit. Small forest remnants are generally treated as one FORMAK site.

Within FORMAK, many different groups and individuals are monitoring different sites around the country. This provides huge opportunities to share information, understand wider trends in forest ecosystems, and learn how to better manage native forests.

This sharing of information is encouraged by the provision of a web site (www.formak.co.nz) where data can be entered and summaries generated. Summary information can be made available to others.

1.2 Monitoring by Community and Landowners

Mä te iwi whänui tonu ënei mahi, kia möhio ai te katoa, kei a rätau te mana kaitiaki o te wao tapu nui a Täne

FORMAK is aimed at assessments and measurements being undertaken by landowners, community groups, Iwi and other volunteers who have an interest in an area of forest, but not necessarily much time. The aim is to provide a relatively easy set of measurements that will require around 5 days per year for 1-2 people.

The focus is on doing repeat measurements on a regular basis. This will vary from twice a year, to annually, or every 2 years depending on the FORMAK module.

1.3 Trends over time – not instant results

Mä te whakaemi i ngä mätauranga e pä ana ki ngä ähuatanga o te wao nui a Täne ka ata mohio kei hea ngä huarahi kaitiakitanga e hora ana

FORMAK provides a system to do regular repeat measurements at a site. This allows us to look at ongoing changes or "trends" that are occurring. One or two dots on a graph of seedling density, as shown below, don't really mean much. But as we build up multiple dots, from more measurements over several years, this may show us that there is a downward trend in seedling density.

This approach of looking at trends from repeat measurements is very important to FORMAK. It allows us to reduce the work involved in individual measurements – and it can tell us much more in the long term.

As natural living systems, the components of forest ecosystems vary considerably within what we can call "natural variation" over time. There can also be considerable variation in, for example, seedling number from one area of a site to another. Some of the components of an ecosystem, for example birds, can be difficult to assess precisely.

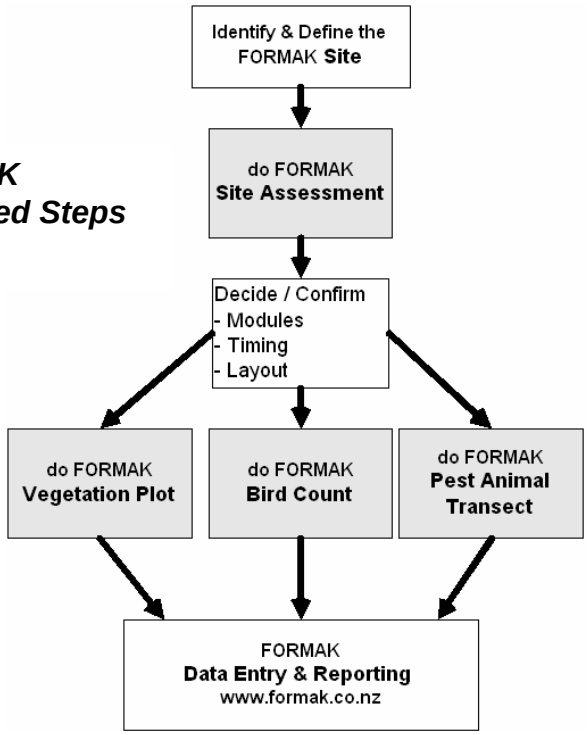
This means that if we want to look at specific changes between two points in time, very large samples are required to get the precision we need to check if differences are real. Sometimes differences may be real, but be part of a regular normal pattern of fluctuation that occurs for example with years of greater fruiting and flowering. FORMAK takes the approach of collecting a time series of data so that this can be examined to look at trends over time. By looking at measurements over, say 5-10 years, allows us to see if there are upward or downward trends in a measurement, or if there is just considerable fluctuation.

1.4 Beginning to understand relationships

Another important aspect of FORMAK is that it aims to begin looking at several aspects of the forest ecosystem at one place. This means we can start to understand how different parts of the forest interact. For example, how bird numbers start to increase once possum and rat numbers are reduced or how the understorey and forest floor change once stock are removed.

2. What are the Steps

Using FORMAK
The Generalised Steps



2.1 The FORMAK Site

The FORMAK site assessment identifies and defines the site that is being monitored. This step must be completed before any other monitoring can be established.

The FORMAK site assessment also helps you get to know the site and confirm what are the key management issues and priorities for monitoring. In many cases, all four modules of FORMAK will be used.

What is a Site?

A site is an area of forest that is logically one unit for monitoring. It needs to be one or more of:

- Generally managed as one unit, receiving the same general pest control etc.
- Similar forest that would be logically grouped together
- One geographic unit
- A small area / remnant that is treated as one unit because of its size.

2.2 FORMAK Site Assessment

To create a site for monitoring using FORMAK, you must first complete a Site Assessment". This identifies the broad area your monitoring relates to and gathers general information on visual signs of condition of the area.

Once a site is established, the other monitoring modules can be undertaken within this site.

2.3 Confirm other Modules to be Used and Their Layout

Choice of Modules
Once you have completed a Site Assessment, decide on the other FORMAK modules that will be used on the site.

The use of the other three modules is designed to give monitoring of three important components of a forest ecosystem – vegetation, birds, and animal pests. It is important to note that there are other important parts of the forest ecosystem that we are not measuring. The parts chosen have been selected because they can be assessed, are important, and are better understood than some other components such as invertebrates. Other modules may be added to FORMAK in the future. Approaches for monitoring other aspects of forest ecosystems are presented in the Native Forest Monitoring publication.

In many cases, all three modules for vegetation, birds and animal pests may be used. Wherever appropriate, all modules should be used on the site to provide opportunities to look at relationships between changes in different parts of the forest ecosystem.

In situations where an area is of low value and/or there is little time and money for monitoring – just the site assessment may be undertaken. This may be repeated in future years to provide a broad visual overview of any major changes. In some situations modules may also be chosen in relation to the current level of skill of those doing the monitoring. The site assessment and animal pest transect are suitable for those with only basic skills in plant and bird identification. These can sometimes be undertaken as a first step. Assistance may then be gained from more skilled people, or time taken with learning plants and birds, before the vegetation and bird modules are implemented.

Some points to consider when deciding on priorities for measurement are:
- Management: e.g. is their particular emphasis on managing values related to vegetation or to birds on the site.
- Skills: Are there particular skills within the group (e.g. bird or plant identification)
- Time of year when you start: Some modules need to be used at particular times of year (e.g. birds and pests). If you are close to that time of year, you may need to measure them first, then move on to vegetation which is more flexible in timing.

Location of measurements
Location and layout of measurement plots, counts or transects is discussed in more detail under the instructions for each module. However some important points you should try to incorporate are:
- Where possible plan the location of vegetation plots, bird counts and animal transects for common access e.g. along the same line, accessed off the same walking track etc. Keeping the locations similar means
  - You can potentially measure a variety of things at the same time, on the same visit without loosing time travelling to different locations.
  - It helps ensure that measurements are in the same general location / habitat so that trends in different measurements can be more logically related.
  - All measurement are set out in a way that is easy to access, reducing time getting on site through difficult terrain.
- Ensure the repeat visits to bird count locations or pest animal transects will not damage vegetation plots. Make sure that vegetation plots are not in a position where you will trample through them when accessing other measurement locations, as this will influence seedling growth.

2.4 Use of the Modules

A very brief summary of the 3 other modules is given below. More detailed explanations and instructions are given under the section on each module.

FORMAK Vegetation Plot: This involves setting up a number of permanently marked plots where measurements of forest canopy, understorey and forest floor are made. Individual plant species are identified. These are normally re-measured every 2 years. They usually take 2-3 hours to measure and commonly 5 are established across a site.

FORMAK Bird Count: Points on the site are marked where 5 minute bird counts are undertaken. All birds seen or heard over a 5 minute period at the point are recorded by species. Counts are generally repeated a number of times within the month they are assessed each year.

FORMAK Pest Transect: A transect line or lines are established across the site. Rodent and possum relative numbers are assessed on this line by placing out wax blocks for two nights and identifying the number chewed by different species. Presence of faecal pellets of different large pest animal species are also recorded at wax block sites.

2.5. Data entry and analysis

The FORMAK web site provides data entry for each of the four modules of FORMAK.

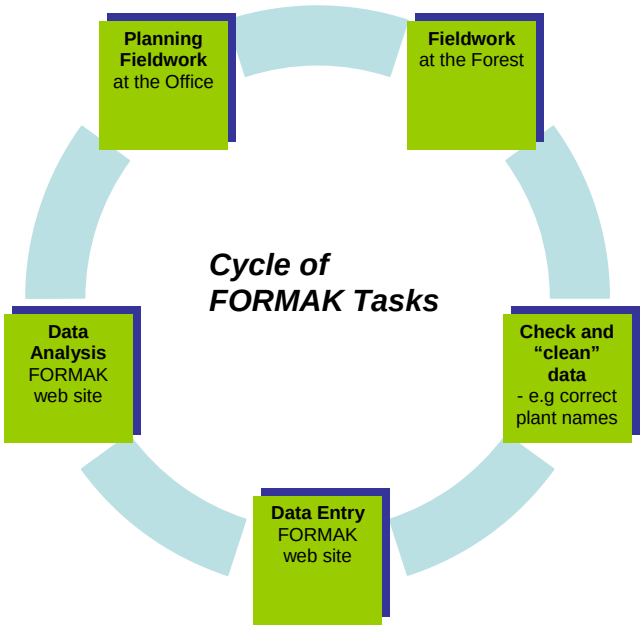
Once field work is complete, field forms are carefully checked. Any plant species that have been given interim names during field work are correctly identified and the interim name replaced by the correct one on the field forms. Data is then entered via the internet.

Generation of summary reports and charts of the data can be undertaken. This allows examination of trends as users begin to build a series of data.

When data is entered, users are encouraged to make the data summaries publicly available. This is voluntary, but the more people do this, the more valuable the website is to others who can start to look at wider trends in data across a number of sites.

2.6 Ongoing repeat measurements using of FORMAK?

Each of the modules of FORMAK has the same general process in initially planning for and undertaking measurements then working through to data entry and analysis. A key aspect of FORMAK is that the measurements are done regularly and in an ongoing way to build up a time series of measurements so that trends can be examined. The cycle of tasks in use of each of the FORMAK modules is set out below.



3. What FORMAK can do.

- Collect regular measurements by community groups and others to begin looking at trends over time.
- Develop greater understanding by community groups, landowners and others of the significant issues and interactions going on in the management of a forest area.
- Develop a large number of sites where assessments are undertaken to allow broad comparison and examination of trends on different sites.

4. What FORMAK can't do

- Assess precise changes between two measurements (e.g. statistically significant differences in relative abundance of possums following a control operation). The methods within FORMAK could potentially be used for more precise studies, but this requires specialist attention to sampling and experimental design (see Native Forest Monitoring (NFM) for an introduction to this).
- Assess some specific pests and species. For example, FORMAK does not monitor stoats. Other methods such as tracking tunnels will be required to do this (see NFM).