

Notes on

Performance Monitoring

Treatment & Response:

Cochran offers the following definitions on Treatment and Response in his work on the analysis of observational studies: studies designed to look at causal effects of treatments but where for one reason or another the investigator cannot use controlled experiments:

*“In Controlled Experiments the term **treatments** is often used for the agents the experimenter applies in order to measure the agents’ effects. Where appropriate we will continue to use this term to denote the different experiences or agents in different groups of people. The term **responses** will denote the measurements taken to throw light on the presumed effects of the treatments. “*

Cochran then goes on to note three different treatment situations:

1. It is not feasible to attempt detailed measurements as to “level” of treatment, but only compare treated and untreated groups.
2. Level of treatment is roughly the same for a defined sub-group, but varies among subgroups.
3. It is possible to measure the treatment level separately for each individual unit (person, tree, stand, etc.)

Treatment/Response Examples
(from Cochran, 1983)

Wearing Seat Belts/ Severity and type of injury
Rise in taxes/Consumer spending and saving
Water fluoridation/Status of children’s teeth
Smoking cigarettes/Mortality and illness from specific causes.

Reference: W.G. Cochran.1983. “Planning and Analysis of Observational Studies”. John Wiley and Sons.

A Pragmatic Perspective to Monitoring

Consider the problem of monitoring in terms of three dimensions:

- Initial Conditions (What was the site like before any treatment)
- Actions: What was done at some point in time (Treatments, Controls)
- Consequences(What happened after).

The goal of monitoring is to be able to make contrasts or comparisons that aid in making management decisions. Given roughly similar Initial Conditions, does a particular Action have roughly the same Consequences?.

One can make comparisons among Initial Conditions. Given the same Treatment, do different initial Conditions lead to different consequences? (Consider genotype-environment interactions in tree breeding programs)

One can make comparisons among Actions. Given the same Initial Conditions, do Different Treatments have different consequences?

One Can make comparisons among Consequences. Given a set of defined consequences (a classification) which Treatments and which Initial Conditions correspond to a particular Consequence type?

Hierarchy of Desirable Characteristics in a Monitoring Program:

1. Clear Management Objectives define Information Needed which defines What to Measure.
2. Make Measurements consistently according to a fixed protocol
3. Make comparisons (see the “three dimensions”)
4. Use Sampling Methodology to estimate population characteristics
5. Make connections across monitoring programs
6. Make monitoring information available to those who need it to make decisions, in a form that facilitates decision making.

