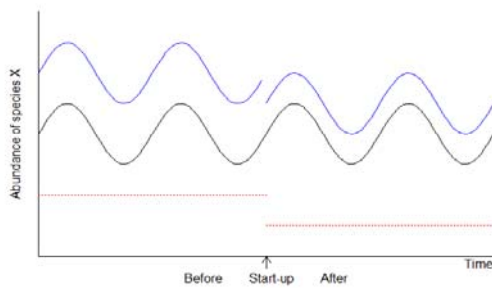
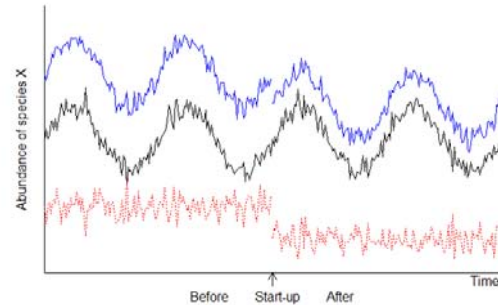


B) In more plausible but still naïve view, the abundances fluctuate (e.g., seasonally), but the difference still remains constant except as start-up of the plant.



C) In more realistic view, the abundances fluctuate partly in synchrony and partly separately; the former fluctuations disappear in the differences but latter remain, and the power plant effect must be distinguished from them.



Before-After-Control-Impact (BACI) designs

Commonly used to monitor for potential environmental impacts.

Need to measure response on control and impacted sites both before and after the impact.

BACI very very useful design when lack of randomization is the only problem.

Classical Experiments

- Clearly defined, very strong inference
- May have to be done in microcosms or on a small scale

Quasi Experiments (wide range of types)

- Weaker inference, BACI is the best but it is not always feasible. Replicated BACI is better still.
- Many Quasi Expts don't have adequate replication and are only run because better designs not possible.
- Be clear about what the experimental unit is, to avoid pseudoreplication.

Environmental Impact Assessment Examples

Planned Impacts

- -Dam Construction
- -Huge Scale Palm Oil Plantation
- -Hunting or Harvesting Regulation in Crocodile

Unplanned Impacts

- -Oil Spill
- -Bush Fire
- -Invasion of a disease, or an exotic species

Environmental Impact Assessment

Planned Impacts

- Before and After Measurements Usually Possible
- Better Chance to Find Controls?

Planned Impact like Baram dam construction where it possible to obtain information on similar rivers without dam. (i.e. control rivers are replicated)

Sometimes just have one control and one impacted river, say and have "replicate" sites within each. Restricted inference just to the effect on that one river where the dam will be constructed. This is pseudo replication but it may be the best one can do in practice.

Environmental Impact Assessment

Unplanned Impacts

- Only after the impacts measurements possible (unless very lucky)

Why BACI? / Assumption

- Temporal changes may be confounded with environmental impact.
- Site-differences may be unrelated to environmental impact.
- BACI assumes if no impact took place then the control and impact sites track each other (i.e. one would have parallel lines.)

When is BACI best?

BACI designs are good for:

- Large potential changes after impact
- Changes are permanent after impact
- Monitoring to protect against disasters
- Monitoring for changes in the MEAN

BACI designs are poor for:

- Small potential changes after impact
- Gradual changes after impact (i.e. not a step change)
- Long term monitoring
- Monitoring for changes in VARIABILITY

Analysis

- Bayesian approaches – size effect