



Bridging the gap between policy and knowledge
on biodiversity in Europe

Method 2

Causal Criteria Analysis

Summary of method

Causal Criteria Analysis synthesizes understanding of causal linkages in a system, by testing against a set of pre-defined criteria for causality.

It combines pictorial relationships between factors depicting hypothesized or known causal linkages in a system, with literature review to synthesize evidence for specific links in the chain. The diagrams (called influence diagrams, if they include management actions or policy options) are used as scaffolds to synthesize and present evidence. They can also serve as a first step to more elaborate modelling approaches.

The review stage preferably employs the systematic review or rapid evidence assessment method, in which studies are critically appraised and weighted. It could also employ expert consultation, using formal consensus method such as Delphi, or a Bayesian Belief Network approach to elicit knowledge.

The six causal criteria used in the Eco-Evidence software (references below), against which evidence is tested, are: plausibility, evidence of response (e.g. biological response); evidence of a dose-response relationship with the causal agent; consistency of association; evidence of the causal agent found in biota; agreement among hypotheses.

Key references

The Eco-Evidence software is one route to conducting Causal Criteria Analysis, and includes a literature review method. This is available from: <http://toolkit.ewater.org.au/Tools/Eco-Evidence>.

Norris RH et al (2012) Analyzing cause and effect in environmental assessments: using weighted evidence from the literature. *Freshwater Science* 31(1):5-21

Nichols S et al (2011) Eco Evidence analysis methods manual: a systematic approach to evaluate causality in environmental science, eWater Cooperative Research Centre, Canberra.





Examples of application

The causal criteria approach was famously used to demonstrate the health effects of smoking in the US.

USDHEW (1964). *Smoking and Health*. Report of the Advisory Committee to the Surgeon General of the Public Health Service. U.S. Dept. Health Education and Welfare, Washington, U.S.

Causal Criteria Analysis

Cost

Staff time: One month to several years FTE. Stakeholder time and travel expenses

Depends on:

Whether or not a formal literature review stage is included (see costs for Systematic Review or Rapid Evidence Assessment)

Number of stakeholders/experts involved

Level of disagreement among stakeholders/experts

Level of detail: text or tabular explanation of the CCA, and number of nodes (factors) and relationships (links) in CCA

Facilitator/moderator, if done in participatory mode

Scale of the problem (no of sectors, countries involved/addressed)

Time required

The system diagram can be done within one day (or less, e.g. if done as desk research). Reviews of evidence for each link take 1 week-24 months, depending on method

Repeatability

Moderate. If done with two different groups of people or individuals, the chain will likely differ

Transparency

High (if well documented)

Risk of bias

Moderate. Depends on representativeness of knowledge holders involved, and whether individual input is incorporated or obtained in group discussion

Scale (or level of detail)

Flexible

Potential to address detailed questions or broader problems

Capacity for participation

Potential to be moderate to high

Data demand

Low

Can point to further data demands

Requires expert judgement

Requires stakeholder input if done in participatory manner

Types of knowledge

Scientific, technical, opinion-based; explicit, tacit

Types of output

Flow diagram, causal chain, can be an influence diagram that includes possible management actions or policy decisions

Explanatory report/information attached

Specific expertise required

Does not necessarily require specific expertise

For participatory CCA, need skills in creating teams and in facilitation

Strengths

Weaknesses

System perspective of a problem: can include multiple scales, multiple sectors, multiple actors

Flexible level of complexity: can be done in a very simple manner by one person or in a complex participatory manner

Visualization

Can be used transparently

Good for a starting point/scoping/prototyping, can lead into a quantitative model

Can point to data/information needs

Can inform decision/policy making especially if done as an influence diagram that includes one or more possible actions or policies

Can be biased, depending on facilitation and representativeness

Final results are only as robust as the literature review method employed

