**Additional file 3 Examples of study designs that have been included in environmental systematic reviews (SR) and meta-analyses (MA) addressing PECO or PICO-type questions**

| **Type of study design** | **Description**  | **Examples**  | **Source of examples** |
| --- | --- | --- | --- |
| **Controlled before-after control- intervention (BACI) study** (randomized or non-randomized) | A study in which differences in outcome(s) before and after an intervention or exposure of interest is applied are compared between intervention/ exposure group(s) and non-intervention/ non-exposure group(s)  | * Randomized: Effect on litter decomposition of transgenic herbicide-tolerant maize compared to conventional maize in randomized replicated field plots in Canada (1)
 | SR (2) |
| * Non-randomized: Invasive weed seed bank compared before and after three different roadside verge mowing regimes in Austria (3)
 | SR (4) |
| * Non-randomized: Vegetation diversity compared before and after three different types of meadow management in Finland (5)
 | SR (6) |
| * Non-randomized: Lake water quality compared before and after manipulation of fish biomass (7)
 | SR (8) |
| **Control-intervention (CI) study** (randomized or non-randomized) | A study in which the focus of comparison is the difference in outcome(s) between intervention/ exposure group(s) and concurrent control group(s) (or between different concurrent intervention/ exposure groups) | * Randomized: Effect on an insect pest and its natural enemies of transgenic insect-resistant maize compared to conventional maize in randomized replicated field plots in the USA (9)
 | MA (10) |
| * Non-randomized: Effects on biodiversity compared after manipulating deer abundance in replicated plots in the Midwest USA (11) and on islands in Canada (12)
 | SR (6) |
| * Non-randomized: Crop yields compared between a maize rotation with green cover crop (intervention) and a traditional maize rotation (control), at several community sites in two Mexican forest reserve areas (13)
 | SR (14)  |
| * Non-randomized: Insect abundance compared in eight alternating plots with herbicide treatment (intervention) and without herbicide treatment (control) situated along one edge of a cereal field in England (15)
 | MA (16) |
| **Before-after (BA) study**  | A study in which the focus of comparison is the difference in outcome(s) before and after an intervention or exposure of interest is applied | * Soil invertebrates monitored before and after a forest burn at a single site in the USA (17)
 | SR (18) |
| **Case-control study** | Exposure/intervention sites are compared to control sites without the exposure/ intervention. May include one or more pairs of cases and controls. | * Comparison of species diversity between community-managed and government-managed mountain forests in Nepal (19)
 | SR (20) |
| * Psychological health compared using post-flood phone interviews between previously flooded households (**cases**) and not-flooded households (**controls**) from the same locality in England (21)
 | SR (22) |
| **Temporal monitoring study (may be called prospective longitudinal or cohort study). Includes interrupted time series analyses.** | Monitoring based on data collected prospectively or retrospectively over a number of years. May include analyses of association, correlation or regression to explain trends or investigate temporality (sequence of events).  | * Soil properties sampled over 30 years in replicated small conventional-tillage and no-tillage plots at a single site in the USA (23)
 | SR (24) |
| * Birth outcomes monitored in women who were pregnant during, or became pregnant immediately after, natural disasters (hurricanes) in the USA (25)
 | SR (22) |
| * Time series of atmospheric organic pollutant deposition estimated using Tibetan snow cores (26)
* Time series of organic pollutant body burden obtained from archived Norwegian human tissue samples (27)
* Organic pollutants sampled using historic data from single sites, e.g. drinking water in Uppsala, Sweden (28), sediments of Lake Ontario, Canada (29) and sediments of Lake Chaohu, China (30)
 | SR (31) |
| **Spatial monitoring study**  | Multi-site sampling in one or few years  | * Organic pollutants sampled in the atmosphere at a range of globally distributed sites (32)
 | SR (31) |
| **Spatial and temporal monitoring study**  | Multi-year sampling at multiple sites.  | * Soil properties in arable crop rotations compared over 18-25 years between three tillage interventions in unreplicated small plots, repeated at four sites in Germany (33)
 | SR (24) |
| **Cross-sectional study survey of prevalence, occurrence, or characteristics** | A study that assesses the characteristics of a system at a single point in time.  | * Survey to determine occurrence and properties of algal beds in a Brazilian archipelago (34)
* Survey of changes in the diversity and trophic group structure of Caribbean coral reef fish populations across a depth gradient (35)
 | SR (36) |
| **Cross-sectional survey of people’s attitudes, opinions or beliefs (i.e. including interview, questionnaire or focus group)** | A cross-sectional study that requires human responses. Potentially at risk of recall bias. May be the main study design, but often included within another type of study design. | * Survey of attitudes, beliefs, knowledge and behaviour relating to butterfly farming in butterfly farmer (**cases**) and **control** groups (authors referred to it as a (quasi-experimental’ design) (37)
* Survey of attitudes, beliefs, knowledge and behaviour relating to efficient stove use **before and after** a monkey protection social marketing campaign in a Chinese nature reserve (38)
* Questionnaires and focus groups to investigate seaweed farming impact over time on fisher numbers in Philippine villages (39)
 | SR (14) |
| **Case study or descriptive study** | A study that is applicable to a single population or system at a specific time point | * Case studies of fish biomanipulation in three Danish lakes (40)
 | SR (8) |

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This additional file is part of the article *Principles and framework for assessing the risk of bias for studies included in comparative quantitative environmental systematic reviews.* Environmental Evidence journal 2022.