Wikiprint Book

Title: EwEugDefiningTheSystem

Subject: Ecopath Developer Site - EwEugDefiningTheSystem

Version: 6

Date: 2024-03-29 08:04:15

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The ecosystems that can be modelled using Ecopath can be of nearly any kind: the modeller sets the limits. However, each system should be defined such that the interactions within add up to a larger flow than the interactions between it and the adjacent system(s). In practice, this means that the import to and export from a system should not exceed the sum of the transfer between the groups of the system. If necessary, one or more groups originally left outside the system should be included in order to achieve this.

The groups of a system may be (ecologically or taxonomically) related species, single species, or size/age groups, i.e., they must correspond to what is generally known as 'functional groups'. Using single species as the basic units has clear advantages, especially as one then can use estimated or published consumption and mortality rates without having to average between species. On the other hand, averaging is straightforward and should lead to unbiased estimates if one has information on all the components of the group. The input parameters of the combined groups should simply be the means of the component parameters, weighted by the relative biomass of the components. Often one does not, however, have all the data needed for weighting the means. In such cases, try to aggregate species that have similar sizes, growth and mortality rates, and which have similar diet compositions.

A procedure has been incorporated in ?FishBase which assembles, for any country, a list of the freshwater and marine fish occurring in different habitat types, and other information useful for Ecopath models (maximum size, growth parameters, diet compositions, etc.)

For tropical applications, grouping of species is nearly always needed: there are simply too many species for a single-species approach to be appropriate for more than a few important populations. It is difficult to provide specific guidelines on how to make the groupings, as this may differ among ecosystems. Generally however, one should considers the whole ecosystem, e.g., for an aquatic model, one or two types of detritus (e.g., one to include mainly marine snow, the other discarded bycatch, if any), phytoplankton, benthic producers, herbivorous and carnivorous zooplankton, meio- and macrobenthos, herbivorous fish, planktivorous fish, predatory fish, etc., and that at least 12 groups are included, including the fishery (any number of fleets/gears), if any. But most important is the personal judgment of what is appropriate for your system.

Special consideration needs to be given to the bacteria associated with the detritus. One option, applicable in cases where no special emphasis needs to be given to bacterial biomass, production and respiration, is to disregard the flows associated with these processes, which are, in any case, hard to estimate reliably (see contributions in Moriarty and Pullin, 1987), and which tend to completely overshadow the other flows in a system. (In such cases, one assumes that the bacteria belong to a different, adjacent ecosystem linked to yours only through detritus export). Alternatively, bacteria can be attached to one or all of the detritus boxes included in a system. To do this, create a 'box' for the bacteria, and have them feed on one or several of the detritus boxes. (This is required because detritus, in the Ecopath model is assumed not to respire). Consider, finally, that there is no point including bacteria in your model if nothing feeds on them.

For an overview of the ecosystem concept in ecology, we suggest that you consult the book by Golley (1993).