# 18 Mass-balances

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|---|---|
| **What** | nameofinstance.xml |
| **Required** | no |
| **Description** | Determine mass balance for a specified polygon |
| **schema location** | https://fewsdocs.deltares.nl/schemas/version1.0/massBalance.xsd |



## Introduction

The mass-balances module determines the inflow, outflow and storage change within a give polygon from available flow fields. The various parts of the mass balance are computed separately and result in a *scalar* timeseries:

- To compute the horizontal inflow and outflow, you need to have timeseries of the flow in x- and y-direction defined on a rectangular grid.
- To compute the vertical flow, you need to have timeseries of the flow coming in through the lower face of the grid cells and the flow coming in through the upper face.
- To compute the storage change, you need either the storage change per grid cell or the water table per grid cell. In the first case, the computation consists of summing the values over all grid cells within the given polygon, in the second case, the change over time must be computed as well.

The polygon for which the mass balance is determined is defined via the *location set* of the output timeseries: the locations defined in that set are taken as the vertices of the polygon. Grid cells are considered to be inside the polygon if their centre is.

In the sections below the different elements of the configuration are described

– **TODO: screendumps of the schema parts** –

### Horizontal flux

The input for determining the horizontal flux consists of:

- The flow velocity in the x-direction
- The flow velocity in the y-direction

The timeseries must be defined on the same rectangular grid for the same times.

The output consists of a timeseries of the nett in- and outflow, where the *flow rate* through the side faces is computed as the flow velocity times the length of the side times a thickness of 1 m. The result is a flow rate in m3/s (assuming the flow velocity is given in m/s and the grid size in m).

### Vertical flux

The input for determining the vertical flux consists of:

- The flow velocity at the lower face of each grid cell
- The flow velocity at the upper face of each grid cell

The timeseries must be defined on the same rectangular grid for the same times.

The output consists of a timeseries of the nett in- and outflow, where the *flow rate* through the faces faces is computed as the flow velocity times the length and width of the grid cell. The result is a flow rate in m3/s (assuming the flow velocity is given in m/s and the grid size in m). Effects of porosity are not taken into account.

### Storage change

The input for determining the storage change consists of either:

- The storage change rate per grid cell (that is, the change in the water table per time step)

or

- The water table or water level per grid cell

The timeseries must be defined on the same rectangular grid, and in the latter case there must be at least two times.

The output consists of a timeseries of the nett change in storage, where the *stored volume* per grid cell is computed as the water table times the length and width of the grid cell. The result is the change in the volume of water present within the area delimited by the polygon. Effects of porosity are not taken into account.

## Remarks

While the above description refers to volume or mass balances, the module is more generally applicable to any parameter that represents a mass balance, for instance, if instead of flow velocities, you specify the flux of nutrients (concentration times flow velocity), you can compute the nett inflow/outflow of nutrients through the given polygon.

Porosity is not taken into account in the module, but you can correct for that via the transformation module.