Accounting for Extra reduction

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RECOGNIZING that reductions in nutrient inputs in sub-basins may have wide-spread effects, WE AGREE that extra reductions can be accounted for, in proportion to the effect on a neighboring basin with reduction targets, by the countries in reaching their Country Allocated Reduction Targets

From Copenhagen Ministerial declaration, 2013

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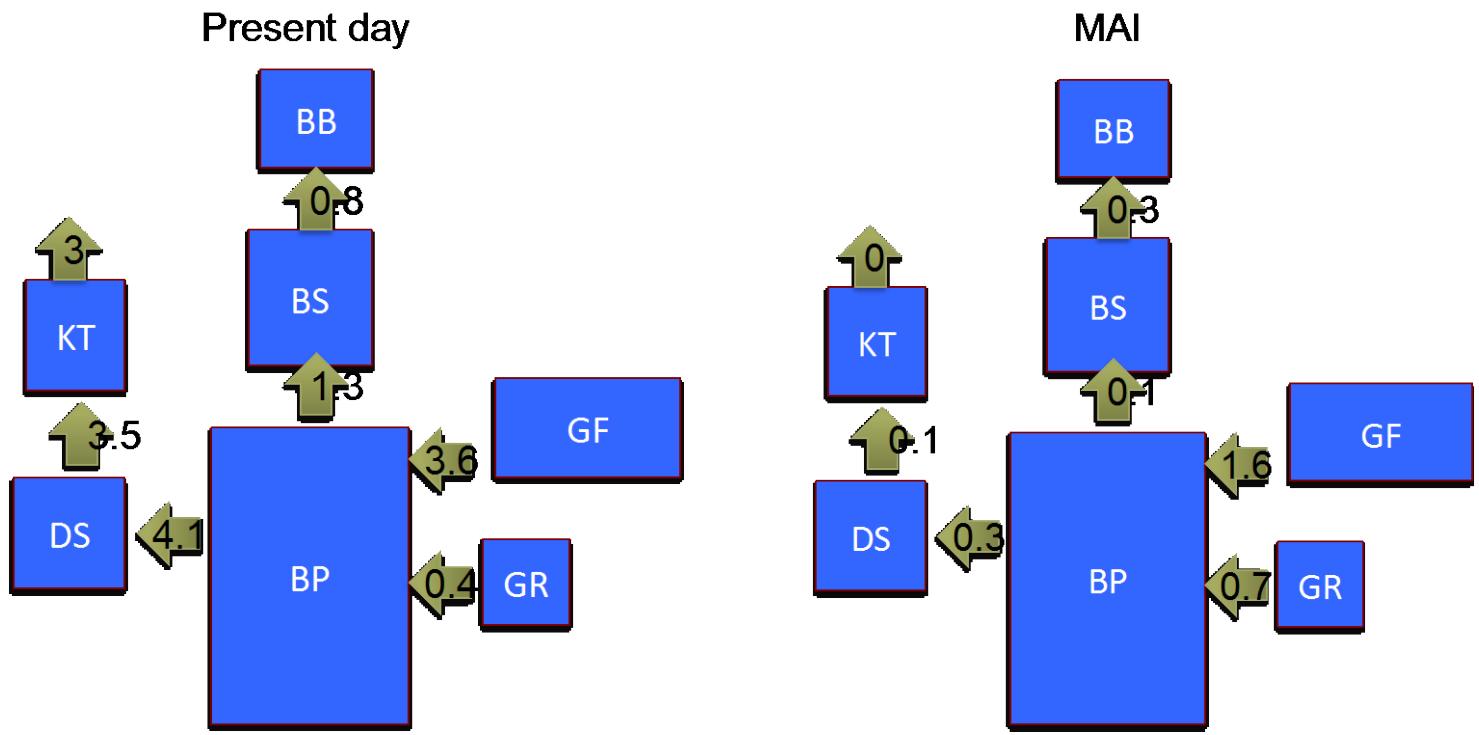
How MAI was determined!

- Maximize the load of nitrogen (N_n) and phosphorus (P_n) given the constraint that the targets are fulfilled everywhere
- Limitations:
  - N_n and P_n should not be larger than reference inputs
- Calculations were done taking into account nutrient fluxes between basins

Phosphorus fluxes between basins (in kton/yr)



Definitions 1

Extra reduction is the margin to CART (or input ceiling) including the statistical uncertainty for a given country and basin combination.

Missing reduction is defined additional input reduction needed to reach CART including the statistical uncertainty for a given country and basin combination.

Phosphorus fluxes between basins

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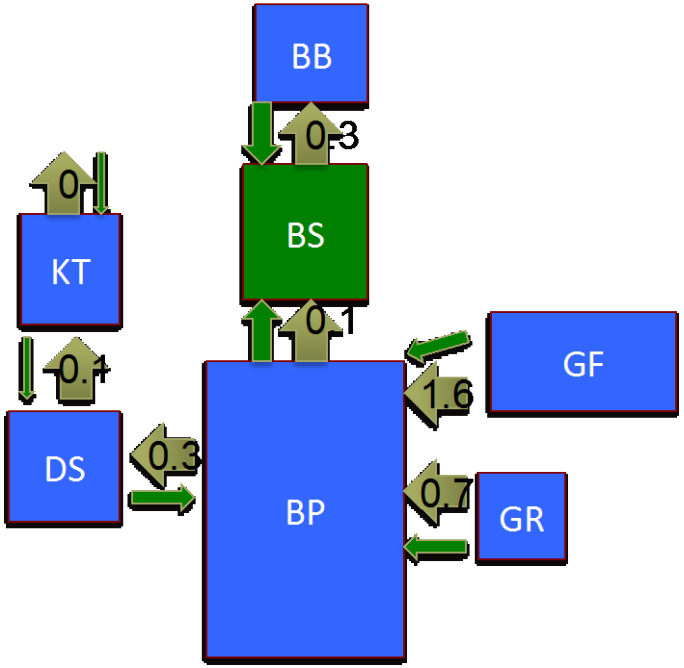
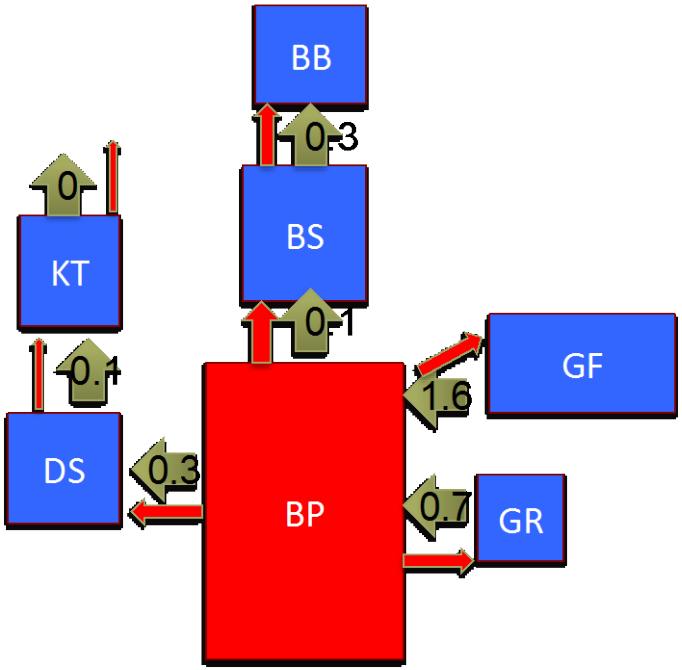
Extra reduction to BS



Missing reduction BP



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So

- Extra reductions give improvement to the other basins
- Missing reductions give deterioration to the other basins

Thus, the sum of the two effects need to be considered

Definitions 2

Equivalent reduction is input reduction to basin A that leads to the equivalent environmental benefit in basin B as 1ton reduction to basin B. **NB!** prerequisite is that inputs to all other basins fulfill MAI.

Effective reduction is the apparent input reduction in a basin resulting from extra reductions in another basin, in practice: the **extra reduction** divided by **equivalent reduction. NB!** Missing reductions will lead to “negative” effective reductions because lateral nutrient transports were taken into account when MAI-CART was calculated.

Principles

1. **Accounting should be based on countries individually**

   This implies that countries can plan and implement measures across basins at their own discretion as long as it results in conforming to CART after accounting of extra reduction is performed.

2. **Countries could claim accounting for missing reductions even if MAI is exceeded due to inputs from other countries**

   No country should need to wait for any other country before claiming themselves fulfilment of CART.

3. **Any relocation of measures should lead to at least the same environmental improvement as if CART were implemented**

   This is imperative for the GES to be achieved eventually. Inevitably, using extra reductions will lead to less inputs than MAI as seen as a total for the Baltic Sea, but its distribution need to be such that GES will be achieved everywhere.

4. **The effect of extra reductions on neighboring basins with missing reductions should be estimated given that these are minor deviations from MAI**

   The Baltic Sea is a strongly perturbed system and hence, functioning quite different today compared to how it will function when measures been implemented and status approach GES. The whole calculation of MAI is taking this into account and when deviations to MAI are to be analysed, it should be done assuming that we are close to GES.

Principles

5. **Accounting for extra reductions in connection with CART follow-up assessments are to be performed in a uniform way supervised by RedCore DG**

Accounting for extra reductions should be included in the regular CART assessment using a common and harmonized methodology. RedCore DG is the forum that supervises development of methodology and, after appropriate approval, implementation of this in the assessment.

6. **The Archipelago Sea phosphorus input reductions should be accounted in the Finnish CART for Gulf of Finland (cf. BSAP 2007)**

In BSAP 2007 and 2013, Finland pointed out that models failed to separate the Archipelago Sea from Bothnian Sea and that this should be taken into account at a later stage and within the context of accounting for extra reduction can be an opportunity to take into account separately the nutrient inputs to Archipelago Sea from the remaining Bothnian Sea inputs.

7. **In the context of extra reduction accounting, reductions of phosphorus to Baltic Proper could be accounted as input reduction in Gulf of Finland**

The obtained MAI results in conforming to phosphorus target in Baltic Proper, but in Gulf of Finland the resulting phosphorus concentrations will be significantly less than target. In line with this, it could be argued for states having phosphorus inputs both to Baltic Proper and Gulf of Finland, that extra reductions to Baltic Proper could be deducted from missing reductions in Gulf of Finland with 100% efficiency. However, one should bear in mind that the MAI for nitrogen to Gulf of Finland was determined from applying the HEAT approach, balancing nitrogen and phosphorus concentrations, so if MAI for phosphorus to Gulf of Finland is not achieved fully additional reductions on nitrogen inputs might be necessary.

Principles

8. **Following the precautionary principle, extra reduction accounting cannot be used to purposely increase inputs to a basin**

   Although accounting of extra reductions is based current scientific knowledge and modelling, it comes with significant uncertainty and will sooner or later be subject of improvement. Therefore, it would be a risk for the environment to increase inputs to basins based on this methodology. In addition, a prerequisite for the calculations here is an environment close to GES and additional inputs today may cause significant deterioration of the present state.

Equivalent reductions of phosphorus

	KT	DS	BP	BS	BB	GR	GF
KT	1	4.0	–	–	–	–	–
DS	0.8	1	3.2	–	–	–	–
BP	2.4	2.8	1	3.3	7.7	–	3.8
BS	3.8	4.6	1.5	1	2.6	–	5.8
BB	–	–	9.0	8.3	1	–	–
GR	3.6	4.3	1.6	4.8	–	1	6.5
GF	3.6	4.2	1.3	4.1	–	–	1

Equivalent reductions on Nitrogen

	KT	DS	BP	BS	BB	GR	GF
KT	1	7.3	–	–	–	–	–
DS	1.7	1	4.6	–	–	–	–
BP	–	–	1	–	–	–	–
BS	–	–	–	1	7.8	–	–
BB	–	–	–	1.1	1	–	–
GR	–	–	1.3	–	–	1	–
GF	–	–	4.0	–	–	–	1

Example, Sweden

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Table 3: The extra and missing reductions of phosphorus from Sweden according to the latest CART assessment. Sweden has no reduction requirements on phosphorus to Gulf of Riga and Gulf of Finland.

Basin	Extra reduction	Missing reduction
KT		67
DS	16	
BP		430
BS	176	
BB		100

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Focus on the Bothnian Sea extra reduction

Table 4: Calculation of effective reductions for the extra reduction from Sweden to Bothnian Sea.

Basin	Equivalent reduction	Calculation	Effective reduction
KT	3.8	176/3.8	46
DS	4.6	176/4.6	38
BP	1.5	176/1.5	117
BB	2.6	176/2.6	68

Focus on using the 117 tons for the Baltic Proper

This means that it remains 430 – 117 = 313 tons for Sweden to reduce to BP

How about the other basins?

- In this case, the Extra reduction in BS can not be used in DS and KT, because the effect is “removed” by the missing reduction in BP
- For Bothnian Bay there will be:
  - Improvement because of the extra reduction in Bothnian Sea although than given in the table because Baltic Proper loads are higher than MAI and compensated by flux of nutrients to Gulf of Bothnia

  68 tons from BS extra reduction – (117/7.7 =) 15 tons = 53 tons

Concluding remarks

- It is not so straightforward to do the calculations in practice
- When evaluating remaining reductions needed one have to make a selection on what basins that extra reductions should be used on in order to complete the calculation
- The analysis will be done as examples for all relevant countries following the principles