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EPIRB Project Activity 2
Pilot Testing in EPIRB Project River Basins
Draft auxiliary Guidance Document
on prioritizing selected
Programme of Measures (PoMs) and
simplified Cost Effectiveness Analysis (CEA)



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One of the important concepts of the EU Water Framework Directive, required to be implemented by the EU Member Countries while developing River Basin Management Plans (RBMPs), is to incorporate economic principles and cost-effectiveness analysis (CEA) as mitigation measure of the RBMP's Programme of Measures (PoMs) section. The Article 9 (*Recovery of costs for water services*) and Annex III (*Economic analysis*) of the WFD make use of the most cost-effective combination of the measures in respect of water uses to be included in the PoMs under Article 11 that are based on estimations of the potential costs of the measures. Annex III of the Directive calls for:

- a) Relevant calculations necessary for taking into account under the **principle of recovery of the costs of water services** long term forecasts of supply and demand for water in the river basin district and, where necessary: i) estimates of the volume, prices and costs associated with water services, ii) estimates of relevant investment including forecasts of such investments;
- b) Consider the **most cost-effective combination of measures** in respect of water uses to be included in the Programme of Measures under **Article 11** based on estimates of the potential costs of such measures.

Economic Analysis that the Member States are required to conduct, includes the following purposes:

- Should ***analyse water use*** in each River Basin District (RBD) of a given state;
- Assess ***trends*** in water supply, water demand and investments;
- Identify areas designated for the protection of ***economically significant aquatic species***;
- Designate heavily modified water bodies based on assessment of ***impact (including economic impact)*** on existing uses and ***costs*** of alternatives for providing the same beneficial objective;
- Assess current levels of ***cost-recovery***;
- Support selection of programme of measures on the basis of ***cost-effectiveness*** criteria;
- Assess the potential role of ***pricing*** in programmes of measures and suggestions on cost-recovery;
- Estimate the need for potential derogation from the Directive's environmental objectives based on assessment of ***costs and benefits*** and of ***costs of alternatives*** for providing the same beneficial objective;
- Assess possible derogation resulting from new activities/modifications, based on assessment of ***costs and benefits*** and ***costs of alternatives*** for providing the same beneficial objective;
- Evaluate ***costs*** of measures to identify ***cost-effective*** way to control priority substances.

The Guidance Document N1 of the WFD CIS - the Economics and Environment (WATECO) is a key document for Economic Analysis that highlights the following three implementation steps:

- **Step-1: Characterizing the river basin** in terms of the economics of water uses, trends in water supply and demand and current levels of recovery of the costs of water services;
- **Step-2:** Identifying water bodies or group of water bodies not achieving the environmental objective of the Directive (i.e. **identifying gaps or risks of failure** in achieving objectives);
- **Step-3:** Supporting the development of the **Programme of Measures** to be integrated in river basin management plans through **Cost Effectiveness Analysis** and justifying from an economic point of view possible (time, objective) derogation.

However, in this guidance document we will focus only to the second part of the **Step-3 - Cost Effectiveness Analysis**, as for the moment the EPIRB has already accomplished with the first two steps and is in a process of developing Programme of Measures. Main approach of the cost-effectiveness analysis (CEA) is to compare costs and outcomes of some certain measures, which are required to be as effective as possible. CEA is aimed for selecting the least costly options while achieving specific environmental objectives. CEA is a complex and multistep procedure, requiring large volume of data,

methodology of which may vary from standard calculations and regression analysis to complex mathematical programming and economic modelling. Selection of the methodology depends on the available data, skills and objectives to be achieved.

As mentioned above, in establishing the Programme of Measures the RBMP national teams must undertake an economic analysis of the measures in order to:

- Establish the intervention costs and budgets (both capital, and Maintenance and operational);
- Draw up realistic timetables for their implementation over the first two planning periods;
- Through cost/benefit analysis establish cost effectiveness of the measures across a range of different measure types;
- Prioritise implementation of the measures, reflecting the linkages and budget availability, and identifying win-win combinations.

The project does not expect the contractors to comply fully with the WFD requirements, but instead to adapt the analysis to best meet the minimum planning needs within the information and time constraints. The minimum planning requirements are the costings and timing of the measures and their prioritisation. However, systematic prioritisation of measures is a difficult exercise and at this stage perhaps may only be done as part of an expert evaluation and textual analysis.

As a basic approach we propose that for the first **Six-Year Cycle** (2015-2021) the EPIRB RBMPs will focus on prioritization of the selected Programme of Measures and brief cost-estimation of these measures to allow the national governments and designated basin management authorities realistically plan the budget. However, for those RBMP national teams and contractors who have the required data and are interested, the project has identified a simplified methodology presented below, which they may wish to, apply.

This methodology is derived from a customised procedures of the Handbook published by Federal Environmental Agency (Umweltbundesamt) of German Ministry of the Environment, Nature Conservation and Nuclear Safety: ***“Basic principles for selecting the most cost-effective combinations of measures for inclusion in the programme of measures as described in Article 11 of the Water Framework Directive”*** (ISSN 0722-186X).

Main idea of the “Handbook” is to help designated basin management authorities to select most cost-effective measures, or combinations of measures, with due regard for the requirements of the Water Framework Directive. The Handbook is aimed at decision makers and planning personnel. One simple definition before using this methodology, however is to distinguished between the ‘measures’ and ‘instruments’ quoted as follows:

*“..The term ‘measure’ refers to a concrete technical precaution which tends to have a local effect, such as a structural precaution, whilst **instruments** are of an administrative, economic or advisory nature... instruments have a more long-term, more widespread effect than measures, and require coordination at a higher administrative level. However, both measures and instruments should be seen as ‘measures’ within the meaning of Article 11 of the Water Framework Directive”.*

In reliance of the WFD, the **Instruments** can be assigned as the **Supplementary Measures**. The *instruments* in the handbook are classified to the following groups: a) charges/financial incentives, b) cooperation arrangements, c) advisory approaches, and d) statutory instruments; that on the other hand, are specified further to smaller and more concrete categories:

- A. Charges/financial incentives:
 - A.1. Financial subsidising of organic farming
 - A.2. Charge on organic fertilisers from non-free range farming
 - A.3. Charge on mineral nitrogen fertilisers

- A.4. Charge on pesticides
- A.5. Greater use of environmental charges, e.g. water abstraction charges
- A.6. Restructuring of the nature conservation and fishing charge
- B. Cooperation arrangements
 - B.1. Creation of effective cooperation structures between farmers and the water industry
- C. Advisory approaches
 - C.1. Advice to farmers on optimum operation from the viewpoint of water pollution control
 - C.2. Advice to the competent authorities to optimise water body maintenance
- D. Statutory instruments
 - D.1. Reinforcement of the synergy effects between the IPPC Directive and the Water Framework Directive*
 - *this could be not directly related to the EPIRB pilot basins.

The table from the “Handbook” below gives an example of defining priority measures by breaking and categorising **Pressures**, **Polluter Categories** and **Pressure Types** on point sources, diffuse sources, water abstractions, flow control and morphological changes.

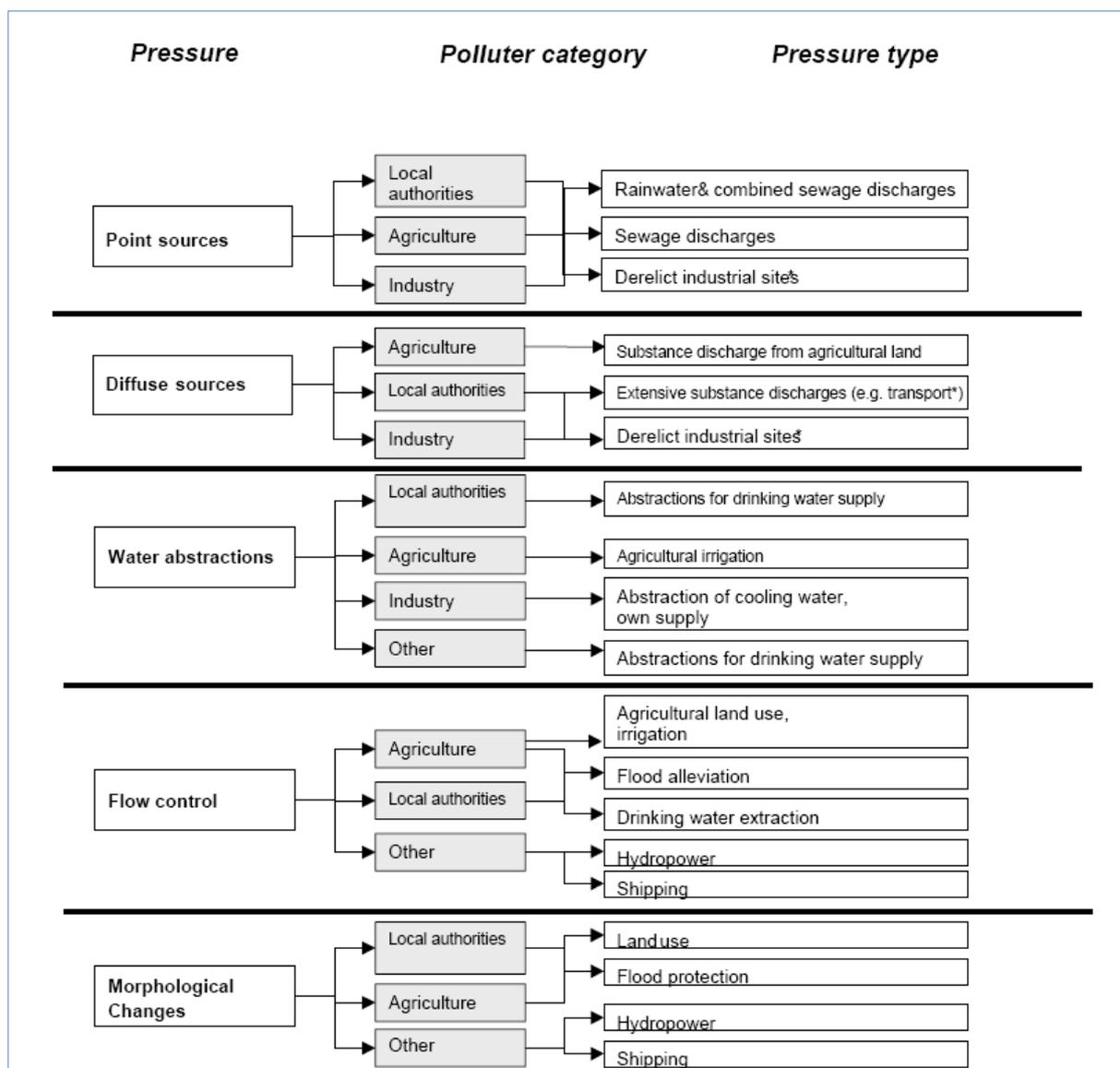
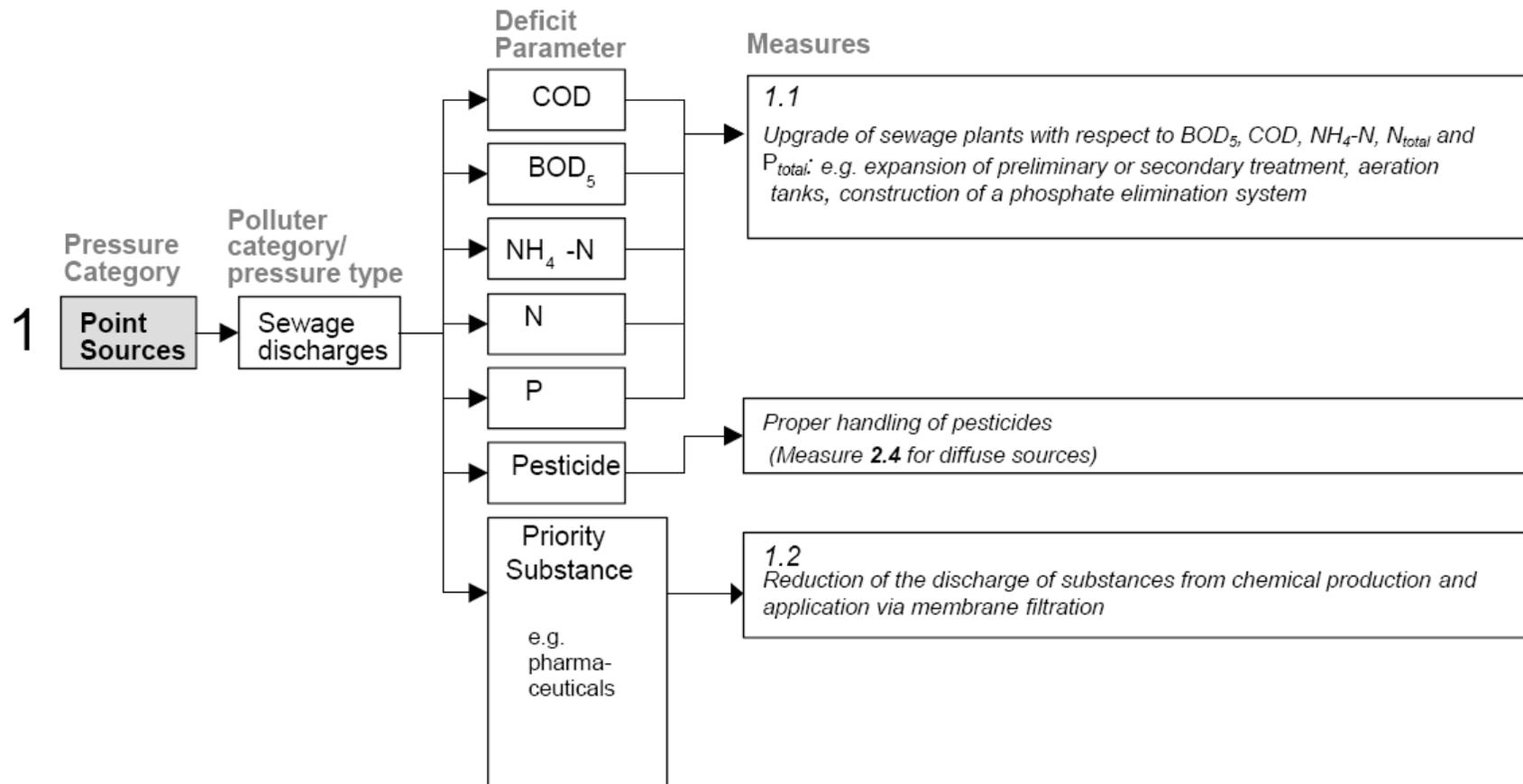


Figure 1: System of pressures: Pressure categories (column 1), polluter categories (column 2) and pressure types (column 3)

The tables below list environmentally relevant impacts for each pressure category and the corresponding pressure types, as well as assigned suitable measures to them. In this way, based on the pressure category / pressure source and via the polluter category / pressure type, it is possible to identify the deficit parameters and then propose the corresponding measures. However, these measure categories are for a demonstration purpose and shall be customised further considering specific conditions in each pilot basin.

Figure 2: System of measures for the pressure category “point sources”



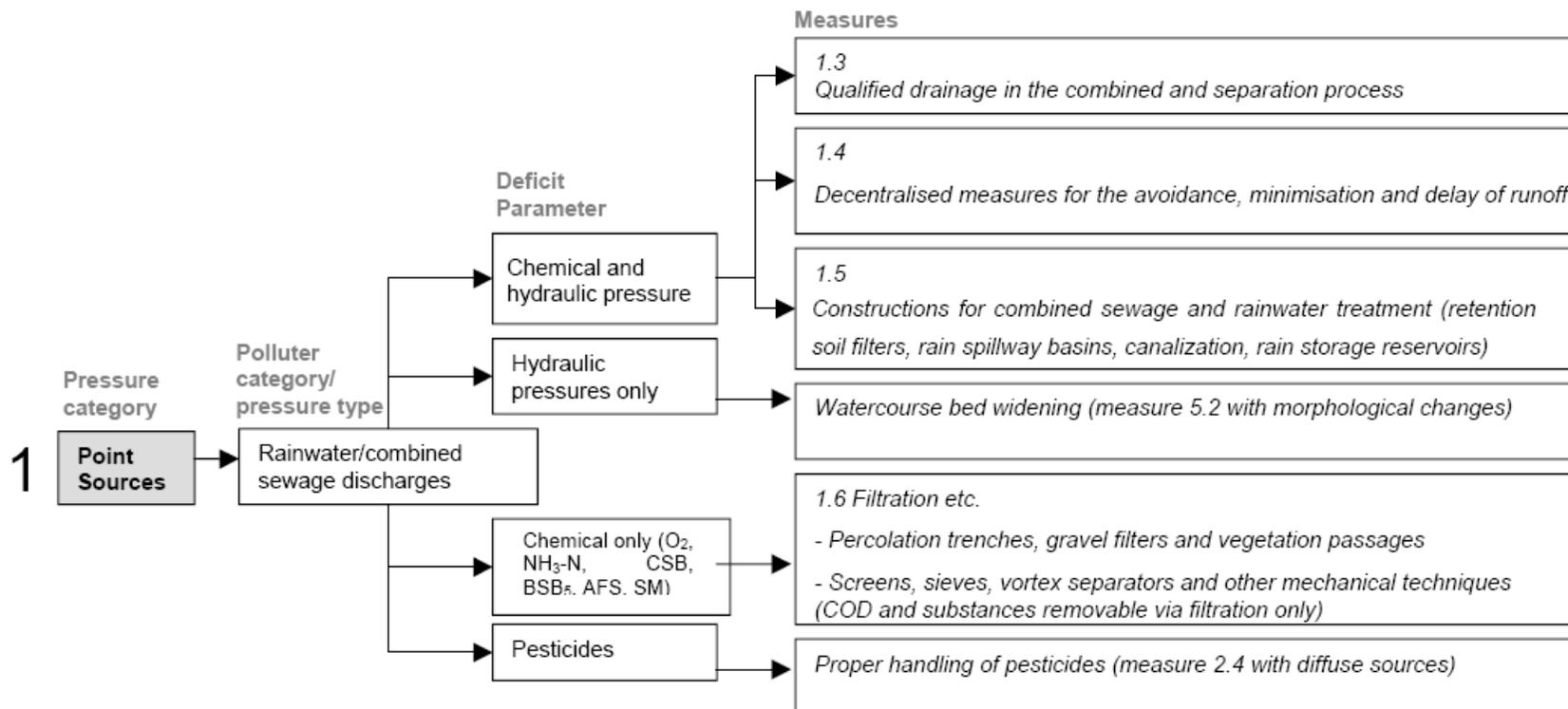


Figure 3: System of measures for the pressure category “diffuse sources”

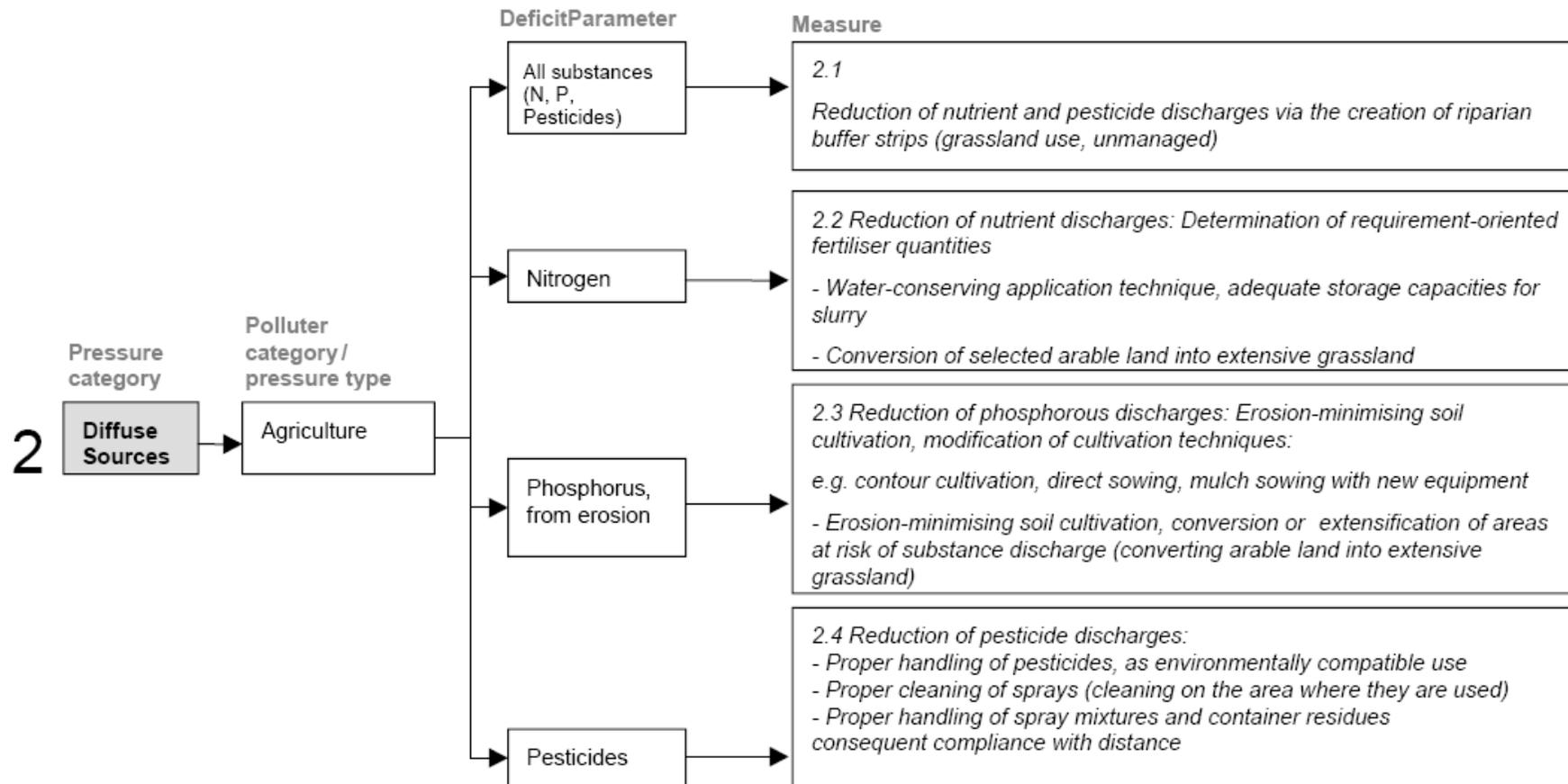


Figure 4: System of measures for the pressure category “water abstractions”

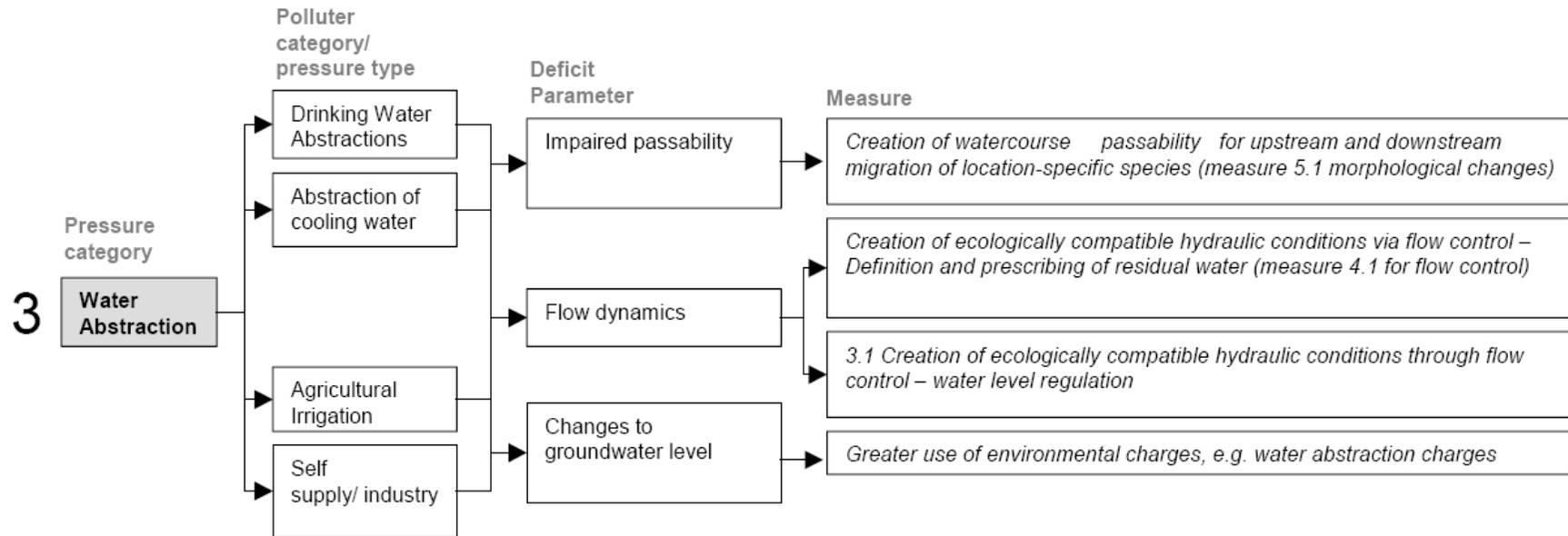


Figure 5: System of measures for the pressure category “flow control”

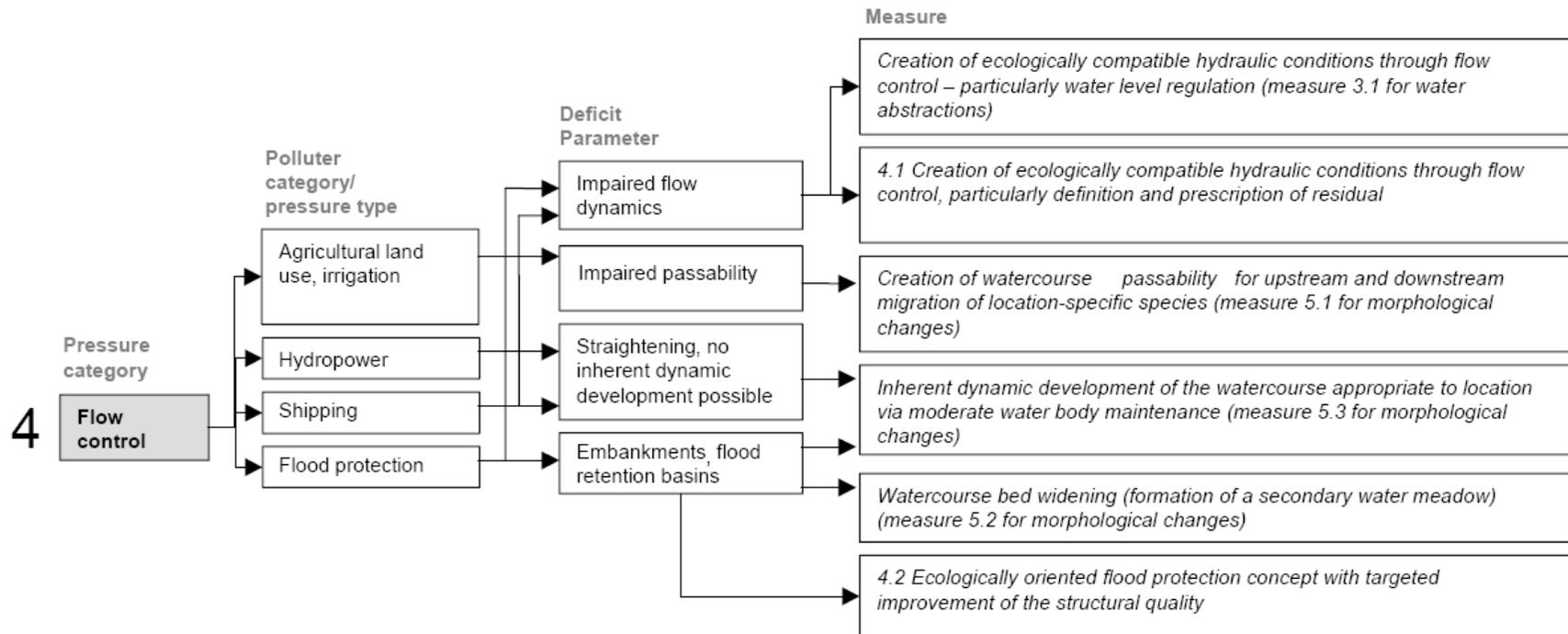
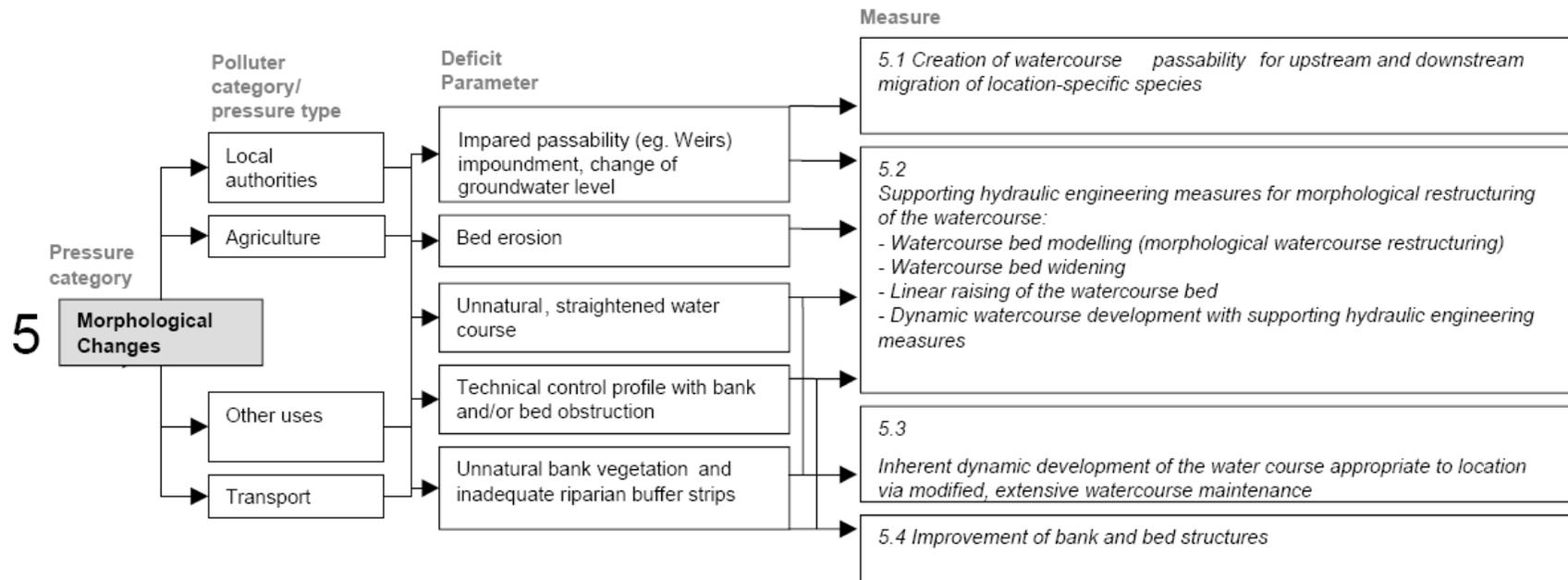


Figure 6: System of measures for the pressure category “morphological changes”



Further determination and selection of the most cost-effective measures, or combination of measures, requires additional multi-stage analysis by using causal/effect matrixes. This might be too time-consuming in our case and the team would rather consider easier way based on a simple Expert Evaluation. The model example below shows a possible cause/effect matrix in a pressure situation comprised of deficits in the areas of point sources, diffuse sources and morphology. For the six measures previously selected via the system of measures, the ecological effectiveness on Water Framework Directive indicators has been entered in the matrix by way of an example. In the column “Sum total of individual evaluations”, the number of “x” entries for this measure have been added together. For measure 1.1 “upgrading of the sewage treatment plant” with a low level of effectiveness (x) on the indicator “macro-zoo-benthos” and the indicator “fish fauna”, therefore, the sum total is calculated with a value of 2. Classification of the priority was subsequently derived with the aid of the linear classification key shown here by way of an example (Table 5-3), which may differ for other water bodies. As measure 1.1 falls within the value range with a low level of ecological effectiveness, the classification “1” for “low ecological effectiveness” was entered in the final column.

Table 1: Example of a cause/effect matrix with classification of priority

Measure	Indicators of ecological deficits (Water Framework Directive, Annex V)				Sum total of individual evaluations	Classification of priority
	Macrophytes	Algae	Benthic invertebrate fauna	Fish fauna		
1.1			x	x	2	1
1.3				x	1	1
2.1	xx	x	xxx	xxx	9	3
4.2	x		xx	xx	5	2
5.1			x	xxx	4	1
5.3	xx		xx	xx	6	2

Table 2: Assumed classification key

Sum total of individual evaluations	Description of effectiveness	Classification
12 - 9	High level of ecological effectiveness	3
8 - 5	Medium ecological effectiveness	2
4 - 1	Low level of ecological effectiveness	1
0	No ecological effectiveness	0

Extracts from the “Handbook” below is aimed to assist in identifying the most cost-effective measures when combinations of measures are proposed for individual water bodies. As a general principle, distinction should be made between operational, or **direct** and economic, or **indirect** costs.

Direct costs are payable for the implementation of specific measures, such as the cost of structural measures in water protection, or administrative costs for collection of taxes. As a general rule, direct costs can be reliably estimated on the basis of experimental values. For the selection of measures on site, direct costs ascertained within the context of a comparative operational analysis are decisive in the majority of cases.

Indirect or **economic costs** are incurred by measures and instruments in the sense that the measures restrict or change the uses of a water body, or necessitate adaptation measures. In contrast to direct costs, a significant proportion of economic costs are comprised of lost revenue. This makes the calculation of economic costs fairly complex.”

Estimating the cost of measures

When considering the cost of a measure combination, initially, the direct costs arising for the implementation of specific combinations of measures are ascertained. These costs may be estimated using the results of the initial characterisation, information from the measure sheets, and own experimental values. The data from the measure sheets will only facilitate a rough estimate of the cost of the measure combinations on the basis of bandwidths. In order to limit these bandwidths when estimating costs, where possible, location-specific cost information and experience from the implementation of measures should also be incorporated. By contrast, the indirect or economic costs of a combination of measures are only estimated in a separate calculation in cases where they could potentially influence the result of a selection of measures (see excursus below on the calculation of economic costs).

Additionally, it is important to bear in mind that measures are not applied to the entire stretch of water, but only to those areas that are subject to significant pressures. For example, if the water body structure is valued at worse than class 6 or 7 on 70 % of its length, this does not mean that 70 % of the stretch is actually in need of renaturation in order to attain good ecological status in the water body. The reasons for this are explained in the approach for structural mapping of the water body (on-site mapping records 100 m sections, which are evaluated as class 6 or 7 in their entirety if a certain percentage of the section is affected). Moreover, the significance limits in the CIS documents should not be interpreted as environmental quality targets. Ultimately, the decisive factor for the intensity or extent of the measure is the water body’s classification based on its biological indicators to Annex V and the chemical parameters outlined in Annexes VIII, IX and X of the WFD.

Estimating the costs of the instruments

In many cases, the costs incurred as a result of application of the instruments may only be roughly estimated to begin with. This is true of administrative costs as well as the burdens incurred to third parties as a result of application of the instruments. Where quantitative estimates are available, these have been listed in the instrument sheets. Where possible, a distinction should be made based on the costs for various user groups (e.g. agriculture, water industry, shipping and consumers). From a societal viewpoint, it is conceivable that the additional costs for one user group are cancelled out by the savings of another. Furthermore, the additional costs for instruments are often offset by savings with measures. For example, the use of instruments may tend to reduce the cost of corrective intervention, and instead, a greater burden will be placed on the polluters. At the same time, the efficiency of the procedure is increased, because instruments address the root of the problem. When

calculating the costs arising from the application of instruments, a variety of demarcation problems should be taken into account. The direct costs of instruments are primarily comprised of the administrative costs. Unlike the cost of measures, these costs incurred to the executing authority tend to be low. Additionally, the direct costs arising from administrative expenditure are calculated differently from structural measures: as a general principle, the costs over time should be taken into account in both cases. However, administrative work cannot be depreciated.

In addition, the direct costs of instruments are often exceeded by the indirect (economic) costs incurred to the affected economic players. This is illustrated, for example, by the introduction of a tax on fertilisers or pesticides: only administrative costs are incurred to the implementing authority, whilst the bulk of the costs are apportionable to the farmers required to pay the tax. For the farmers, in turn, opportunity costs make up a significant part of the burden. Such costs are incurred, for example, when farmers switch to alternative crops or cultivation methods in order to avoid the tax, and generate lower profits as a result. For this reason, calculating of the cost of instruments is by nature more complex than calculating the cost of measures, and entails greater uncertainties.

Representation of costs

The calculated costs may be represented in a variety of ways. As a general principle, mean averages and bandwidths should be given for the cost, provided the available cost information permits this. Various reference variables are conceivable and expedient, depending on the intended objective:

- Overall costs, e.g. in the form of the cash value of project costs
- Specific costs:
 - per inhabitant
 - per household
 - per river kilometre
 - in relation to real net output in the river basin
 - in the form of annual costs (annuity)

The most appropriate form depends on the intended purpose and should be decided in each individual case. For example, when considering which pressures are deemed reasonable for the citizen, the costs per inhabitant are decisive. However, it should be noted that the costs given must remain comparable and compatible between the various sub-basins. Hence, it is also necessary to document the assessment basis (number of river kilometres, number of households or inhabitants) and, where applicable, the scope, together with any demarcation issues.