

## Summary

### **Premises for the development of the Catalog**

The development of "Good Practices Catalog in River Maintenance and Hydrotechnical Investments" (GPC) is an action required by the update of the National Water-Environmental Program (NWEP), to fulfill the provisions of the art. 11. p. 4. of the Water Framework Directive (WFD). The NWEP remains an integral part of the existing River Basin Management Plans, which means that the development and implementation of this catalog is in line with the objectives of the WFD.

It is assumed that the activities implemented under the developed „good practices” will become important elements supporting the sustainable development, whose goals and principles are defined by specific Polish and EU documents.

The introduction of "good practices", including the use of nature-friendly methods in the implementation of projects on watercourses and in their vicinities will allow to improve degraded ecosystems, improve the quantity and quality of water resources and mitigate the effects of climate change referred to as more frequent extreme events (floods and droughts). By indicating the decision algorithm and the list of criteria relevant for determining the legitimacy and cost-effectiveness of planned watercourses' maintenance measures and hydrotechnical works, the GPC will also contribute to increasing the efficiency of public funds allocation and spendings.

### **The structure of the GPC**

The study consists of two elements: the main document and attachments.

The main document consists of the following elements:

1. Introduction.
2. Catalog of hydrotechnical works.
3. Catalog of maintenance measures.
4. Characteristics of the impact of maintenance measures and hydrotechnical works on waters' state and condition.
5. Characteristics of the impact of maintenance measures and hydrotechnical works on selected goals of environmental conservation in protected areas.
6. Project planning, including the development of a list of criteria relevant for determining the appropriateness and economic efficiency of planned maintenance measures and hydrotechnical works.
7. Good practices of maintenance of water bodies and methods of minimization of their negative impacts.
8. Summary and conclusions.

### **The following attachments remain an integral part of the main document:**

- A. Matrices of influence.
- B. Planning of projects.
  - B1. Hydromorphological assessment of watercourses - description of the social initiative „The most valuable rivers and streams in Poland”.
  - B2. Cost-effectiveness evaluation of project planning - case studies.
- C. List of good practices for contractors responsible for works in water courses.

- D. Elements of good practice in maintenance and hydrotechnical works completed and planned for implementation.
- E. Proposals for the implementation of recommendations set out in the GPC along with proposals for possible legislative changes.
- F. Photos and Figures.
- G. Literature.

### **The content of the main document**

In view of the above-mentioned premises, the GPC in the introduction defines "good practices", referring to 4 decision-making steps: (1) Analysis and diagnosis of the problem and consideration of possible solutions; (2) Analysis of legal and environmental restrictions; (3) Analysis of cost-effectiveness of the intervention planned to be implemented; (4) Selection of the optimal solution. The idea of 4 steps allows one to understand the purpose of the GPC and the relevance of implementation of the guidelines presented in the document.

The first part of the main document refers to the cataloging of hydrotechnical works and maintenance measures. The catalog of hydrotechnical works (Chapter 2) includes the most frequently performed works related to the construction, reconstruction or dismantling of the water bodies' hydrotechnical structures and dykes. The catalog of maintenance measures (Chapter 3) focuses on the works referred to in the art. 227. p. 3 of the Water Law Act of Poland, where sub-categories of certain activities necessary to standardize the way of their implementation have been separated, or due to ecological or hydromorphological consequences associated with their implementation. This catalog also includes additional activities required to achieve the objectives of water bodies' maintenance, subject to the achievement of environmental objectives, i.e., the measures needed to implement the obligation to maintain waters resulting from the art. 226. p. 1. of the Water Law Act.

The structure of both catalogs is similar. A general description of particular project was introduced, its **main features** of the project and design conditions in the case of hydrotechnical works and maintenance measures, including information about the requirements for submitting particular works in the mode of the art. 118. of the Nature Conservation Act of Poland. The **purpose** of particular work's application refers to the function of a hydrotechnical construction (the role of maintenance measure) and the reasons for their implementation. The **extent** of the work's application indicates the types of watercourses on which the project is planned to be applied and the conditions that must be met in order to be able to carry the project out. Described **effects** remain an overall assessment of the project's efficiency with regard to the morphological, hydraulic and ecological conditions of the watercourse. The catalog of maintenance activities also defined **relationships** with other activities, indicating the relations between activities defined by the Water Law Act of Poland and additional measures.

The descriptions of individual projects are supplemented with examples – figures describing basic elements of hydrotechnical constructions and pictures of maintenance measures included in Appendix F to the main document.

The types of hydrotechnical works and maintenance works in the next two chapters refer to the environmental effects associated with their implementation. In the Chapter 4. entitled "Characteristics of the impacts of maintenance works and hydrotechnical works on the condition of waters", the **sensitivity categories for watercourses** were determined referring to the existing typologies (both to the typology applicable at the time of catalog development as well as typologies to be used in the third planning cycle of the Water Framework Directive which is planned to be started in December 2021). The categories of sensitivity of watercourses are presented in the Annex A., containing the developed

matrices of potential impacts of hydrotechnical works and maintenance measures on waters' status. The matrices were constructed in such a way that for each project the potential risk of adverse impact on individual elements of the assessment of the ecological status (ecological potential) of rivers was determined, referring, among the others, to the maximum level of reduction of this risk through the application of "good practices".

Chapter 4. refers also to the issue of natural diversity of watercourses in relation to their "hydromorphological quality", expressed as so-called Hydromorphological River Index (HIR) - an indicator used in monitoring of status of watercourses in Poland. The chapter refers to the Annex B1. and indicates a potential source of data for the hydromorphological assessment of watercourses related to the project "The most valuable rivers and streams in Poland".

The chapter describes in general terms the influence of maintenance measures and hydrotechnical works on the geo-ecosystems of rivers and their valleys in relation to: (1) water status, (2) river erosion and accumulation processes, (3) groundwater-surface water interactions and peat forming processes and soil processes in the valleys, (4) processes of eutrophication and self-purification of watercourses, (5) restoration processes of transformed and degraded rivers. The consequences of these impacts for flood and drought management as well as the use of water have been highlighted. The impact of project implementation on water quality elements is described in more detail with respect to (1) hydromorphological, (2) physicochemical, (3) biological components of the environment. As a part of the description of the latter, it was emphasized that they are assessed using quality indicators defined in the Decree of the Minister of the Environment of 21 July 2016., on the method of classifying the status of uniform surface water bodies and environmental quality standards for priority substances (Journal of Laws of 2016 , item 1187).

Chapter 5 is oriented at the determination of the impact of projects on selected protection objects in protected areas, referring to:

- natural habitats: riverside stones (3220, 3230, 3240); flooded, muddy banks (3270); lowland and upland rivers with *Batrachium* sp. (3260); oxbow lakes (3150); riverside herbaceous plants (6430); willow, poplar, alder and ash forests (91E0), alluvial oak-elm-ash forests (91F0),
- peatland and mire habitats of Natura 2000 in natural habitats in rivers and Floodplains,
- valuable animal species: beaver; otter; kingfisher; skylark; white-throated dipper; white wagtail; birds dependent on: trees in the vicinity of waters, meadows and mudslides on rivers of water spills in the agricultural landscape; amphibians; lamprey and fish; mollusc; insects inhabiting coastal trees; dragonflies,
- other species of valuable animals and plants associated with undercut banks,
- biodiversity,
- ecological corridors,
- the natural character of watercourses and their valleys,
- landscape values.

As emphasized in the introduction of this chapter, it is the basic information in this regard, directing the reader to the detailed literature related to this topic.

The idea of 4 decision-making steps included in the introduction to the GPC has been developed by the content of Chapter 6. In logical follow-up of decision making in hydrotechnical works and maintenance measures, the chapter focuses on indicating the methodology to verify the legitimacy and cost-effectiveness of actions. The basic economic criteria are the costs and benefits resulting from (not) carrying out hydrotechnical works or maintenance measures. Therefore, the method of calculating the

benefits/costs ratio (BCR) and the NPV indicator: FNPV (taking into account the costs and benefits of the investor) and ENPV (taking into account the costs and benefits of all stakeholders) was indicated.

In this chapter:

- data sources for calculations are indicated;
- the following values were proposed: (1) an indicator showing the degree of reduction of an adverse event after carrying out maintenance works in relation to losses and benefits related to floods and droughts (R); (2) an indicator illustrating the degree of impairment of ecosystem services to determine external environmental costs and benefits (G).

Chapter 6. is supplemented by two annexes. Annex B1. remains a proposed data source for the hydromorphological assessment of watercourses referring to "The most valuable rivers and streams project in Poland". Annex B2. contains theoretical examples of conducting cost-effectiveness assessments of exemplary maintenance works based on the criteria discussed in the chapter.

The catalog of good practices and measures minimizing negative impacts (Chapter 7) has been developed by individual categories of maintenance measures and hydrotechnical works. Specific recommendations for good practices have been formulated for specific categories of work. Recommendations in the scope of water maintenance and hydrotechnical works include:

- technical tips,
- temporal constraints,
- spatial restrictions.

In addition, in the section related to hydrotechnical works, the basic and detailed principles referring to the shaping of the regulatory route, the longitudinal profile and the cross-sections of the river channels are indicated.

The third part of chapter 6 presents possibilities of compensating the negative impacts of the undertakings devoted to the Catalog. The general good practices of environmental compensation are discussed and typical ways of compensating the negative effects of maintenance measures are presented. Typical compensation methods for hydrotechnical works are not presented, emphasizing the fact that due to the diversity of types of hydrotechnical constructions and the large diversity of their impact on the environment, possible compensation must be designed individually for each project, which usually takes place in appropriate procedures related to obtaining consent for implementation of hydrotechnical works.

**The supplement to this chapter are:**

Annex C. List of good practices for contractors responsible for works in waters,

Annex D. Elements of good practices in maintenance measures and hydrotechnical works completed and planned for implementation,

Annex F Pictures and figures,

The main document is completed with a short chapter of the summary document and related annexes which are discussed below.

**Attachments forming an integral part of the whole of the study.**

**Annex A. Matrices of influence**

This Annex completes the Chapter 4. of the main document. For each of the categories and subcategories of maintenance measures and hydrotechnical works it indicates the potential risk of unfavorable impact on individual elements on status/potential of waters including phytoplankton or phytobenthos,

macrophytes, macroinvertebrates, fish, physicochemical parameters and hydromorphological conditions, as well as the level to which this risk can usually be minimized by the application of good practices. Similarly, a synthetic risk of impact on the condition and ecological potential of waters is shown.

**Annex B.** Project planning. The annex consists of two parts.

B1. Hydromorphological assessment of watercourses - description of the social initiative "The most valuable rivers and streams in Poland".

B2. Cost-effectiveness evaluation of project planning – case studies.

Annexes B1 and B2 complete the main document in the chapters described above, i.e. Chapter 4 and Chapter 6.

**Annex C.** List of good practices for contractors working in waters

The annex contains an excerpt from the Catalog, containing instructions addressed to the contractor (and not to the designer) works in the waters. It can be used, for example, as an attachment to the terms of the contract for the execution of works.

**Annex D.** Elements of "good practices" in maintenance and hydrotechnical works completed and planned for implementation.

Realizing the feasibility of introducing new standards for the implementation of projects in the field of maintenance measures of waters and hydrotechnical works in general, the purpose of this annex is to indicate the use of "good practices" in practice referring to projects implemented in Poland.

The projects presented in the appendix have been selected based on, among others, from:

- a study conducted among water administrators (regional water management boards and liquidated drainage and water management boards) - currently the Polish Waters, and regional directorates of environmental protection - which was also aimed at determining the scale and to what extent good practices are applied by water administrators,
- established cooperation with State Forests in the implementation of projects within the framework of small retention programs and non-governmental organizations such as Ab Ovo and WWF Polska,
- the experience of the GPC authors and consultants.

Each of the examples cited includes a description of the characteristics of the implemented projects, an indication of the elements that constitute good practices and the indication of those elements that could be improved, so that the solutions applied are even better – thus indicating preferred solutions.

**Annex E.** Proposals for the implementation of the recommendations set out in the catalog along with proposals for possible legislative changes.

A proposal for a mode of implementation of the recommendations set out in the GPC has been presented, including rules for its implementation, and proposals for legislative changes to effectively implement the recommendations contained therein to practice.

**Annex F.** Photos and figures.

The annex contains drawings, diagrams and photos correlating with the content of the main document.

**Annex G.** Literature.

The annex contains an alphabetical list of literature that was used in the development of the GPC.