# Delineation of key zones for water retention enhancement in the Polish part of the Oder catchment

# Analysis of potential water retention in land reclamation systems and its possible role in mitigating winter low flows of Oder

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Delineation of key zones for water retention enhancement in the Polish part of the Oder catchment. Analysis of potential water retention capacities of land reclamation systems

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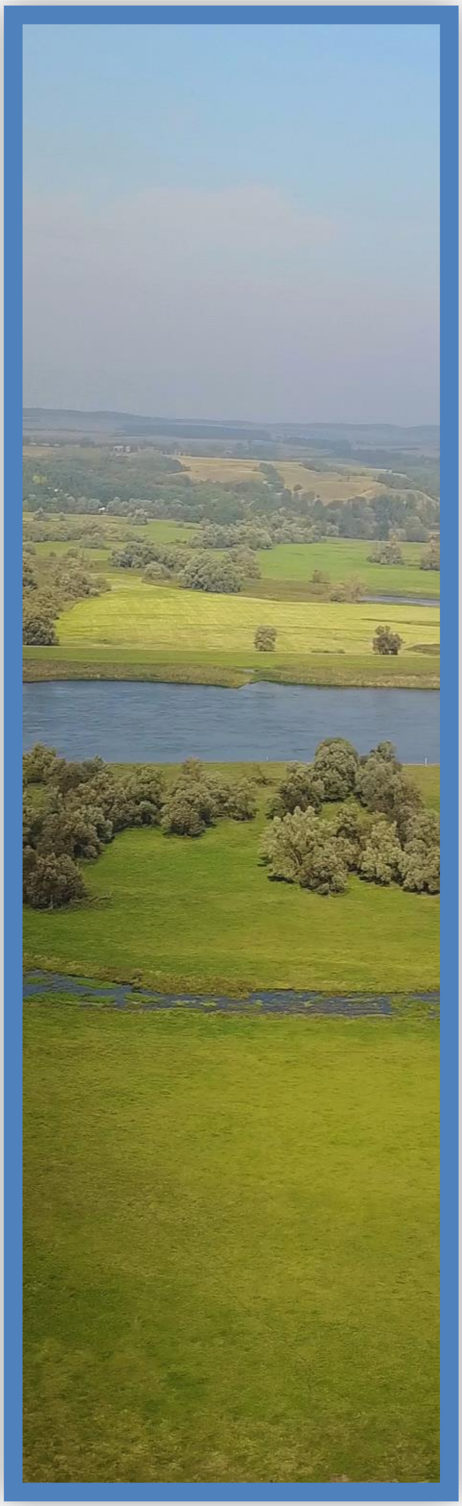
## Summary

In this report an evidence-based delineation of flood-generation areas in the catchment of Oder has been performed. The CN-SCS methodology was applied to delineate zones of different levels of initial maximum water retention basing upon the CN parameter value averaged over the area of communes and Integrated Surface Water Bodies. Average CN parameter for the Oder catchment reached 67 and varied from 37 up to 96. Analysis of density of drainage ditches and certain hydrological assumptions allowed for calculation of water retention volume in land reclamation systems that reached average 165 mln $m^3$ of water (from 36 up to 373 mln $m^3$) which allows to state that water retention in wisely managed land reclamation systems remains at least of the equal importance to technical measures applied for water retention enhancement or flood mitigation purposes. Volume of water that might potentially be stored in different scenarios of water retention in land reclamation systems is high enough to mitigate majority of the discharge deficit required for navigation, especially in winter, since winter droughts last up to maximum few weeks, and since 22 cm increase of average water depth would mitigate most of the shallow parts of Border Oder. The most conservative water storage scenario of 36 mln $m^3$ can increase the water level by 25 cm and the related average water depth by 22 cm for around 8-9 days. The average water storage scenario of 165 mln $m^3$ can increase the water level by 25 cm and the related average water depth by 22 cm for around 36 days. The maximum water storage scenario of 373 mln $m^3$ can increase the water level by 25 cm and the related average water depth by 22 cm for around 83 days. The proposed wise water management in land reclamation systems is most likely an efficient measure to be applied when increased navigational capacity of Oder is required, especially in the winter periods.



## 1. Introduction

Due to geographical and geological reasons, catchment of Oder remains one of the most complex hydrological systems to be managed in European lowlands. Having trans-national catchment (89% of its area is located in Poland, 6.5% is located in Germany and 4.5% in Czech Republic) which consists of mountainous, upland, lowland and coastal landscapes of various pressures originating from agriculture, urbanization, aquaculture, hydropower, the basin of Oder challenges traditional approaches to water management (Kundzewicz, 2007). Recurrent vast floods that particular parts of the catchment have been exposed to in 1997, 2006 and 2010, induced changes in national and local flood risk management (e.g., LFWSKR, 2018) and multiple initiatives have been designed and implemented to mitigate the risk of flood (MKOO, 1999; Rozporządzenie Rady Ministrów z dnia 18 października 2016 r. w sprawie przyjęcia Planu zarządzania ryzykiem powodziowym dla obszaru dorzecza Odry (Dz. U. z 2016 r. poz. 1938). However, regardless recent advances in flood risk management in Oder catchment, it is expected that facing climatic changes, exposure of Oder river valley to decent floods will rise (Klimada, 2013).

It was concluded that, on top of the economic losses, the broadly considered environment of Oder Valley and Pomeranian Bight have been strongly affected by floods in terms of environmental stress (Mohrholz et al., 1998; Witt and Grundel, 2005; Witt and Siegel, 2000). Surprisingly, not many studies related to the catchment of Oder considered modern approaches to water management such as quantification of natural and semi-natural measures of flood and drought risk management that may successfully reduce the exposure of river valley's environment to stress, allowing successful mitigation of floods and droughts (Stratford et al., 2015). Contradictory, some new ideas such as enhancement of channelization of Oder for inland navigation and designation of downstream-located polders (such as Międzyodrze) as important elements of flood risk management have been promoted, in spite of the fact that these both ideas have a very doubtful impact on flood protection (Schnauder and Domagalski, 2018). However, analyzing efficiency of such projects and observing progress in international systematic approaches to flood and drought risk management, it is likely that these nature-based measures should be considered when thinking of putting priorities on water management actions.

The following report was prepared as a response to vital discussions between Polish and German NGOs that pointed out the need for systematic approach to flood and drought risk management in the Oder catchment including nature-based solutions for flood and drought risk management. The main intention of this report is to highlight the quantified role of areas being responsible for flood generation (high outflow potential) and areas that – when appropriately managed – could contribute to enhancement of water storage and outflow regulation.

In the report we attempt to delineate areas that contribute to flooding and areas that are likely to enhance water storage in the catchment scale when appropriate management tools and directives are implemented.

## 2. Main goals of the report

This report is oriented at providing evidence-based data for decision support in water management in the catchment of Oder. It attempts answering the following research questions:

1) Is flood-generating potential, referred to as defined set of features allowing for rapid outflow of water from particular units of space in Oder catchment, variable in space?
2) Which areas of Oder catchment contribute the most to flood wave generation?
3) What is the possible theoretical volume of water storage in land reclamation systems?
4) Could water stored in land reclamation systems mitigate low winter flows of Oder?
5) Which areas of the Oder catchment should be assigned with high priority and high potential of water retention capacity?

## 3. Materials and methods

### 3.1 Study area

The subject of this study is the Oder River basin (Fig. 3.1), the area of which is 124 049 km$^2$ (around 107 169 km$^2$ in Poland); (http://mkoo.pl/index.php?mid=2&lang=EN). Oder has its source in the Oder Mountains near Kozlov and flows through the territory of three countries: the Czech Republic, Poland and Germany. The Oder River is the second longest river in Poland – its total length is 841.2 km (of which about 742 km within Poland) and belongs to the Baltic Sea basin. The extensive drainage system of Oder catchment was shown on Fig. 3.2. In the lowermost reach of Lower Oder, downstream from the Gozdowice water gauge, the influence of wind-induced backwater on water level-discharge relation was observed. Water levels were observed to increase from 0.4 m to 0.9 m comparing to the average conditions for particular discharge values (700 and 200 m$^3$/s respectively) (Coufal et al., 2007). Remaining part of Oder, upstream from Gozdowice, remains free flowing. The average discharge of Oder at the estuary is 565 m$^3$/s (https://encyklopedia.pwn.pl) and in Gozdowice – 535 m$^3$/s (varying from the lowest values ever noted reaching 134 m$^3$/s up to the highest river discharge recorded there during the flood in 1997 that reached as high as 3180 m$^3$/s; Coufal et al., 2007).

Climatic conditions of the Oder basin are similar to average for western Poland and eastern Germany. Average annual sum of precipitation reaches from 500 to 700 mm. Slightly higher precipitation is observed in upland parts of the catchment. Average annual air temperature varies between some 7.4°C in Jelenia Góra station to more than 8.0°C in the region of Piła (Prezes Rady Ministrów, 2011).

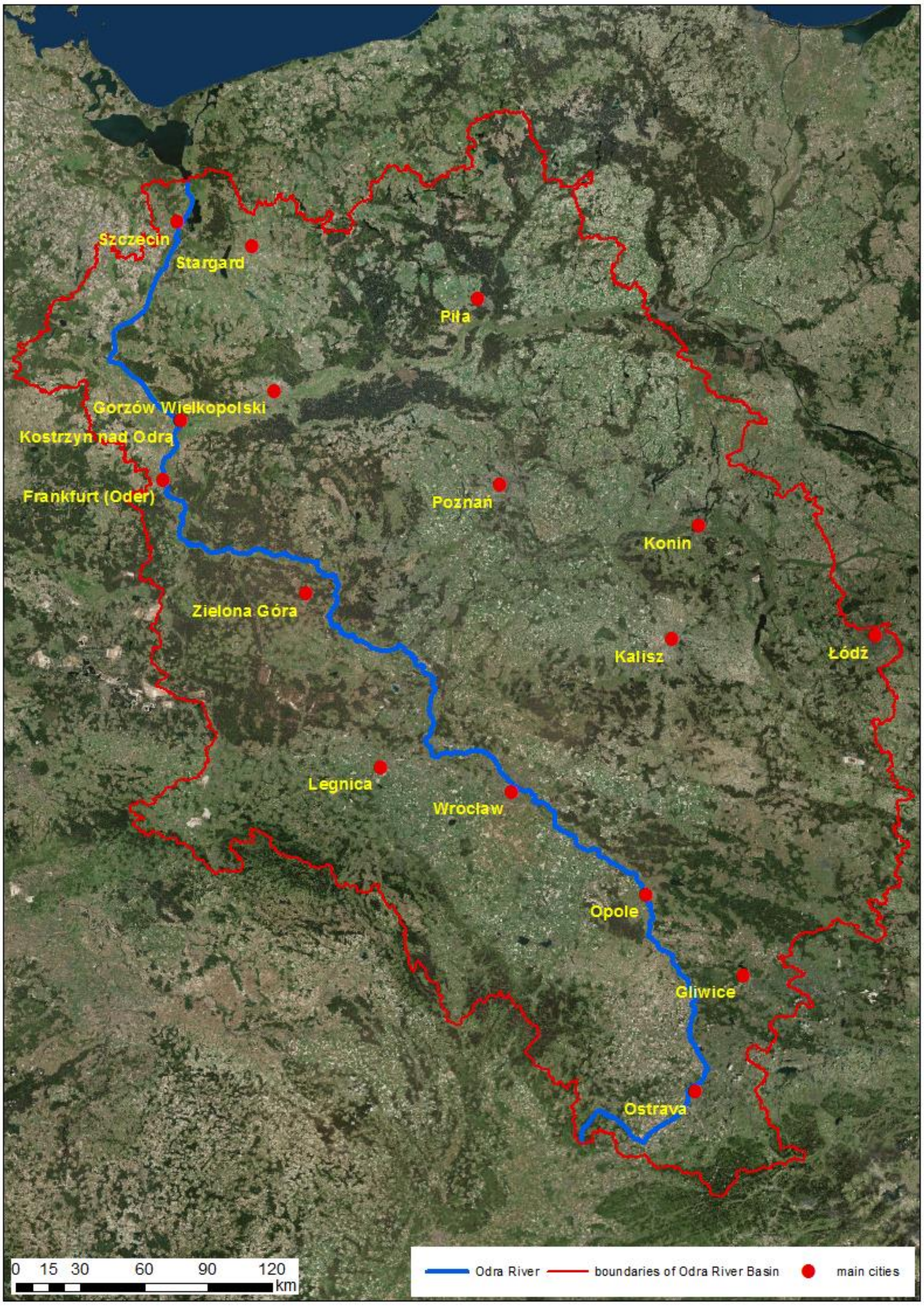


Fig. 3.1 General map of the catchment of Oder.

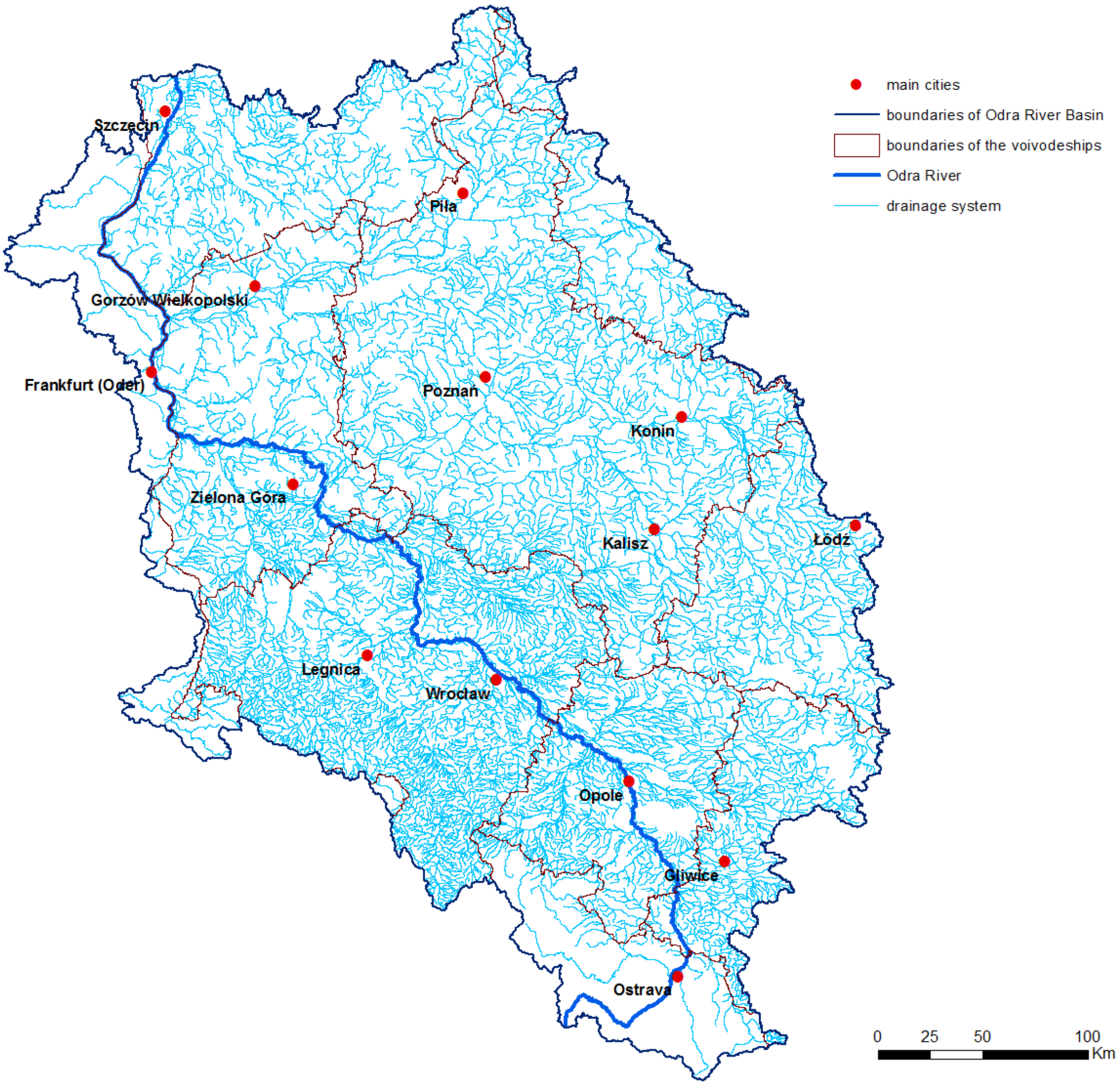


Fig. 3.2 Drainage system of Oder catchment

## 3.2 Flood-generation potential – assumptions and calculation methodology

A complex attempt for flood potential assessment and – indirectly – catchment's water storage capacity potential was described, among the others, by SCS methodology (Soil Conservation Survey; Hawkins, 1979; United States Dept. of Agriculture, 1986). This approach attempts quantification of surface runoff generated by effective precipitation as a function of various land use/land cover types, permeability of soils and – indirectly – slopes. Variability of these physiographic aspects in space is integrated by the CN parameter (CN – curve number).

The CN parameter may have the values from 0 to 100 and can be quantified on the basis of spatial variability of land cover and types of soils (superficial strata). Low values of CN (40-50) are typical for areas of permeable soils (e.g., formed on sands) allowing for efficient rainfall infiltration and for land cover types that enhance accumulation of water and decrease surface runoff (meadows and pastures, parks, forests etc.). High values of CN (80-100) are typical for areas of low permeable soils (e.g., formed on tills, clayey soils) or impermeable areas (e.g., concrete) and land use allows for quick surface runoff (concentrated settlements, roads, railways, industry). The SCS methodology and CN parameter, as a classic hydrological approach allowing for rainfall-runoff modelling (Mishra and Singh, 2003), have been considered useful in terms of delineation of flood-generating areas and classification of catchments/integrated surface water bodies ISWB (SCWP, pol: scalne części wód powierzchniowych) and as such have already been used in flood-risk-management in numerous areas (e.g., in the Middle Vistula Water Region, Wałdykowski et al., 2012). Classification of elementary catchments, that catchment of Oder consists of, in terms of their flood-generation and water storage potential provides important information for decision making, when actions oriented at efficient water storage and systematic flood mitigation measures are considered.

In this report we assumed that different flood-generation potential may be described by quantified values of water retention (S) in particular catchments, which in the SCS methodology is described as maximum initial water retention capacity. The value of this parameter describes the speed of surface runoff response (surface runoff initiation) to particular, unit amount of precipitation. S is expressed in millimeters, and according to the SCS-CN assumptions may be done on the basis of spatially averaged value of CN parameter calculated for particular spatial units (catchments, regions, grids, etc. Eq. 1); Hawkins, 1973)

$$S = \frac{25400}{CN} - 254 \, [\text{mm}] \qquad \text{(Eq. 1)}$$

CN values were assigned to particular unit fields (grid cells of the space of Oder Catchment) basing upon homogeneous types of land use, according to the methodology provided by United States Department of Agriculture (1986). Spatial analysis tools were used to provide gridded map of land cover. It was assumed that for the scale of analysis that covers whole Polish part of the catchment of Oder, the data from Corine Land Cover (2006) are representative (Fig. 3.3). Selection of land cover classes addressed the requirements of CN parameter assessment. Using data from Corine Land Cover sources have already been defined as appropriate for CN parameter calculation in large catchments (e.g., Banach, 2012). Typology of soils for CN parameter calculation was done on the basis of Geological Map of Poland in the scale of 1:500 000, which was considered a balanced compromise between the quality of data and its spatial variability in Oder catchment. Selected types of surface sediments were classified into hydrologic groups of soils (Fig. 3.4), following the SCS-CN methodology manual instructions (United States Department of Agriculture, 1986). Classes of soils (from A to D) represent gradually changing permeability conditions from the highest (A) through the intermediate (B-C) to the lowest (D) permeability.

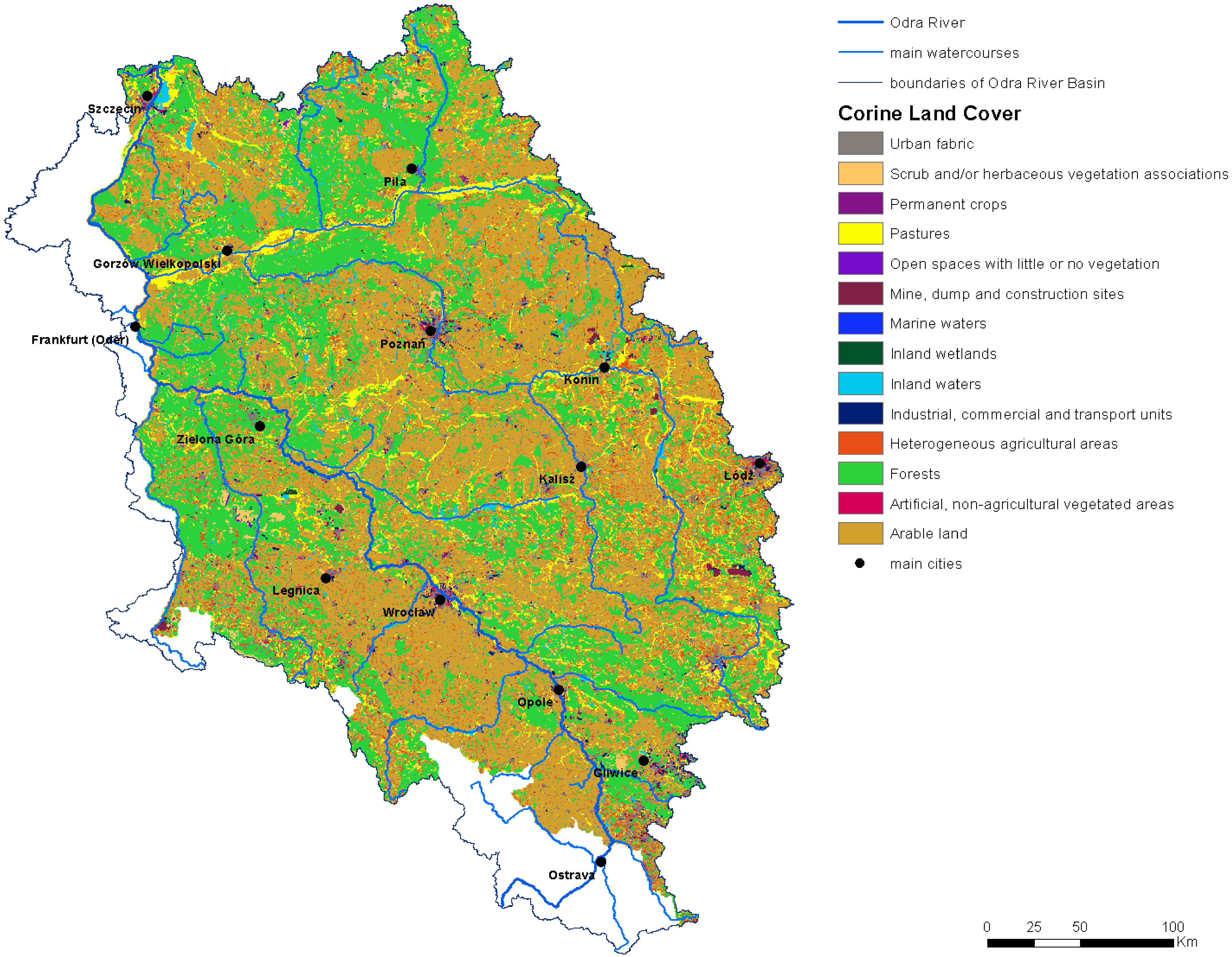


Fig. 3.3 Land cover in the catchment of Oder

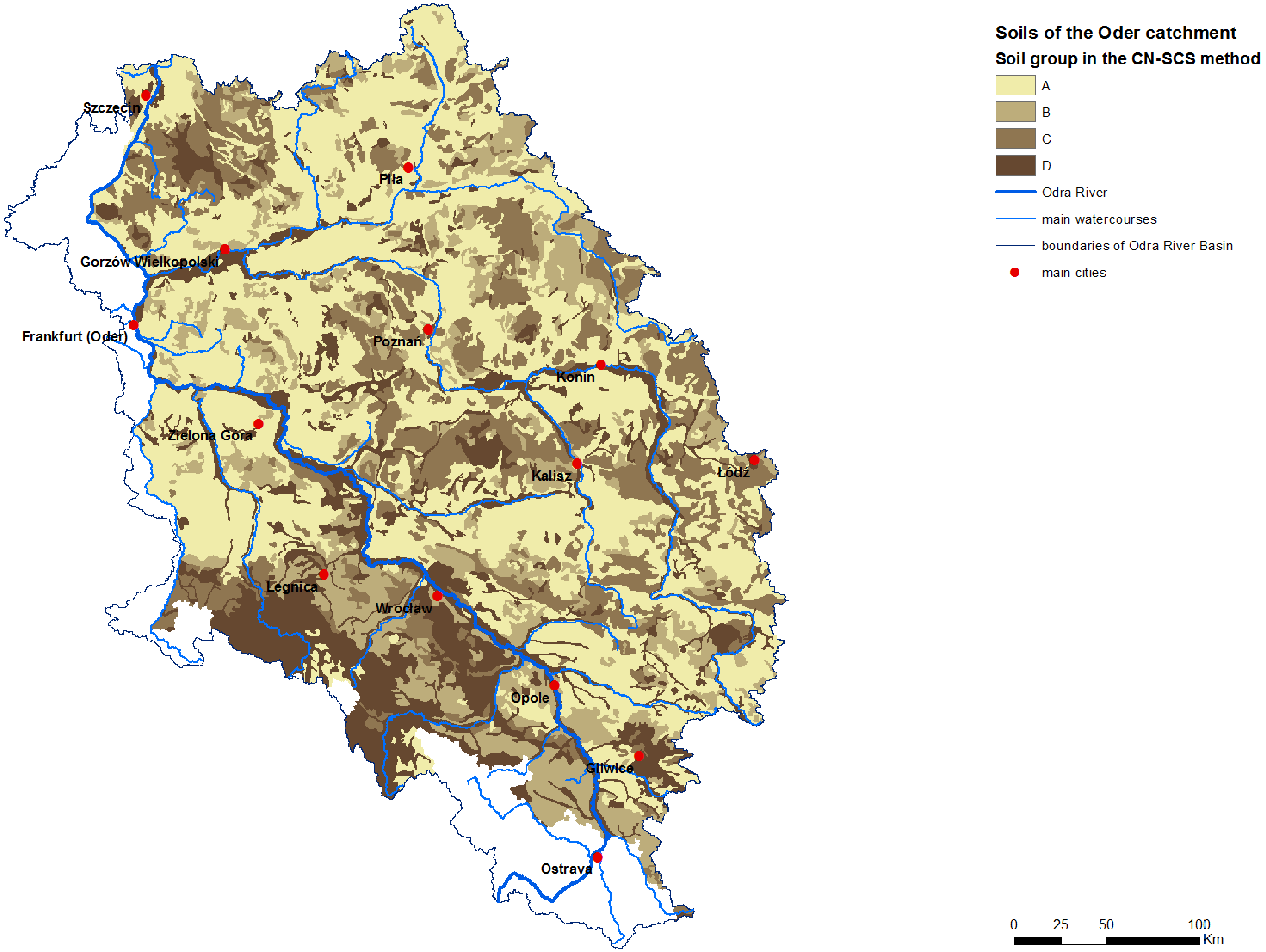


Fig. 3.4 Soils of the Oder catchment (based upon classification of Geological Map of Poland in the scale of 1:500 000.

In the last step of the CN analysis, values of CN parameter were calculated in the space of Oder catchment.

Tab. 3.1 Soil classes and land use classes used to calculate CN values

| No. | Corine Land Cover code | Land use classes | CN Parameter for soil group in the SCS-CN method | | | |
|---|---|---|---|---|---|---|
| | | | A | B | C | D |
| 1 | 242 | Heterogeneous agricultural areas | 62 | 73 | 81 | 85 |
| 2 | 231 | Pastures | 49 | 69 | 78 | 84 |
| 3 | 313 | Forests | 36 | 60 | 73 | 79 |
| 4 | 243 | Heterogeneous agricultural areas | 62 | 73 | 81 | 85 |
| 5 | 211 | Arable land | 67 | 77 | 83 | 87 |
| 6 | 121 | Industrial, commercial and transport units | 89 | 92 | 94 | 95 |
| 7 | 132 | Mine, dump and construction sites | 89 | 92 | 94 | 95 |
| 8 | 312 | Forests | 36 | 60 | 73 | 79 |
| 9 | 112 | Urban fabric | 98 | 98 | 98 | 98 |
| 10 | 324 | Scrub and/or herbaceous vegetation associations | 62 | 73 | 81 | 85 |
| 11 | 111 | Urban fabric | 98 | 98 | 98 | 98 |
| 12 | 311 | Forests | 36 | 60 | 73 | 79 |
| 13 | 142 | Artificial, non-agricultural vegetated areas | 68 | 79 | 86 | 89 |
| 14 | 122 | Industrial, commercial and transport units | 89 | 92 | 94 | 95 |
| 15 | 511 | Inland waters | 100 | 100 | 100 | 100 |
| 16 | 131 | Mine, dump and construction sites | 89 | 92 | 94 | 95 |
| 17 | 321 | Scrub and/or herbaceous vegetation associations | 62 | 73 | 81 | 85 |
| 18 | 512 | Inland waters | 100 | 100 | 100 | 100 |
| 19 | 141 | Artificial, non-agricultural vegetated areas | 68 | 79 | 86 | 89 |
| 20 | 411 | Inland wetlands | 45 | 66 | 77 | 83 |
| 21 | 124 | Industrial, commercial and transport units | 89 | 92 | 94 | 95 |
| 22 | 133 | Mine, dump and construction sites | 89 | 92 | 94 | 95 |
| 23 | 222 | Permanent crops | 45 | 66 | 77 | 83 |
| 24 | 412 | Inland wetlands | 45 | 66 | 77 | 83 |
| 25 | 123 | Industrial, commercial and transport units | 89 | 92 | 94 | 95 |
| 26 | 322 | Scrub and/or herbaceous vegetation associations | 45 | 66 | 77 | 83 |
| 27 | 333 | Open spaces with little or no vegetation | 68 | 79 | 86 | 89 |
| 28 | 332 | Open spaces with little or no vegetation | 68 | 79 | 86 | 89 |
| 29 | 331 | Open spaces with little or no vegetation | 68 | 79 | 86 | 89 |
| 30 | 521 | Marine waters | 100 | 100 | 100 | 100 |

Calculations were done in GIS-based procedure, with the use of classification of CN values for particular types of soils and land cover types (Tab. 3.1), in a 20 m grid. CN values were classified into 4 classes representing low, medium, high and very high flood-generation, and – respectively – 4 classes of initial water storage capacity (S) providing classification of Oder catchment into sub-basins of high, medium, low and very low water retention. Classification of CN and S was done by averaging for particular spatial units in the Oder catchment.

## 3.3 Land reclamation systems potential for water retention

### *3.3.1 Methodology and assumptions for water storage calculation*

Land reclamation systems become functional elements of water management that allow for controlling water levels and discharges. It was observed that systems of land reclamation that consist of ditches, weirs, dams and spillways, remain efficient as flood risk management tools (Pierzgalski et al., 2012; Stratford et al., 2015). Appropriate management in agricultural land reclamation systems by storing water in wetter periods and releasing it along with decreasing water levels to adjacent rivers and lakes, although demanding in terms of its interconnection between sites and momentary meteorological conditions, tends to provide efficient water storage. Moreover, number of reclaimed areas in Oder catchment remains much higher than the area (and volume) of water storage that could be achieved in any reservoirs. Shape of ditches in the catchment of Oder was based upon the elements of hydrographic map of Poland in the scale of 1:50 000[1] (Fig. 3.5). We assumed that every land reclamation system consists of ditches and related hydrotechnical units (weirs and dams) allowing for changing the role of system from draining (when wet) to irrigating (when dry). This assumption was verified in detailed studies on maps of selected land reclamation systems, where the presence of dams was confirmed (Fig. 3.7 A/B). Applying certain assumptions and simplifications, one can calculate the water volume that can be stored in land reclamation systems and soils with the wise use of the existing drainage network and hydrotechnical structures. This volume can be calculated for each ditch with a damming device and summarized for all relevant trenches for the area of research (subcatchment or the communes located in the Oder catchment). The operation of drainage-irrigation systems is based on damming water to a certain level (h) in the drainage ditch (Fig. 3.6). Damming water in a ditch causes increase of water storage in a ditch of a certain width (b) and a specific range of ditch function (l) with related water storage volume (Vd). In addition, dammed water in the ditch causes the groundwater table to rise up in areas adjacent to the ditch, increasing soil retention (Vs). The range (r) of the impact varies depending on the arrangement of the groundwater table, the type of soil and the slope.

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[1] www.danepubliczne.gov.pl/dataset/komputerowa-mapa-podzialu-hydrograficznego-polski (accessed on 12.12.2017)

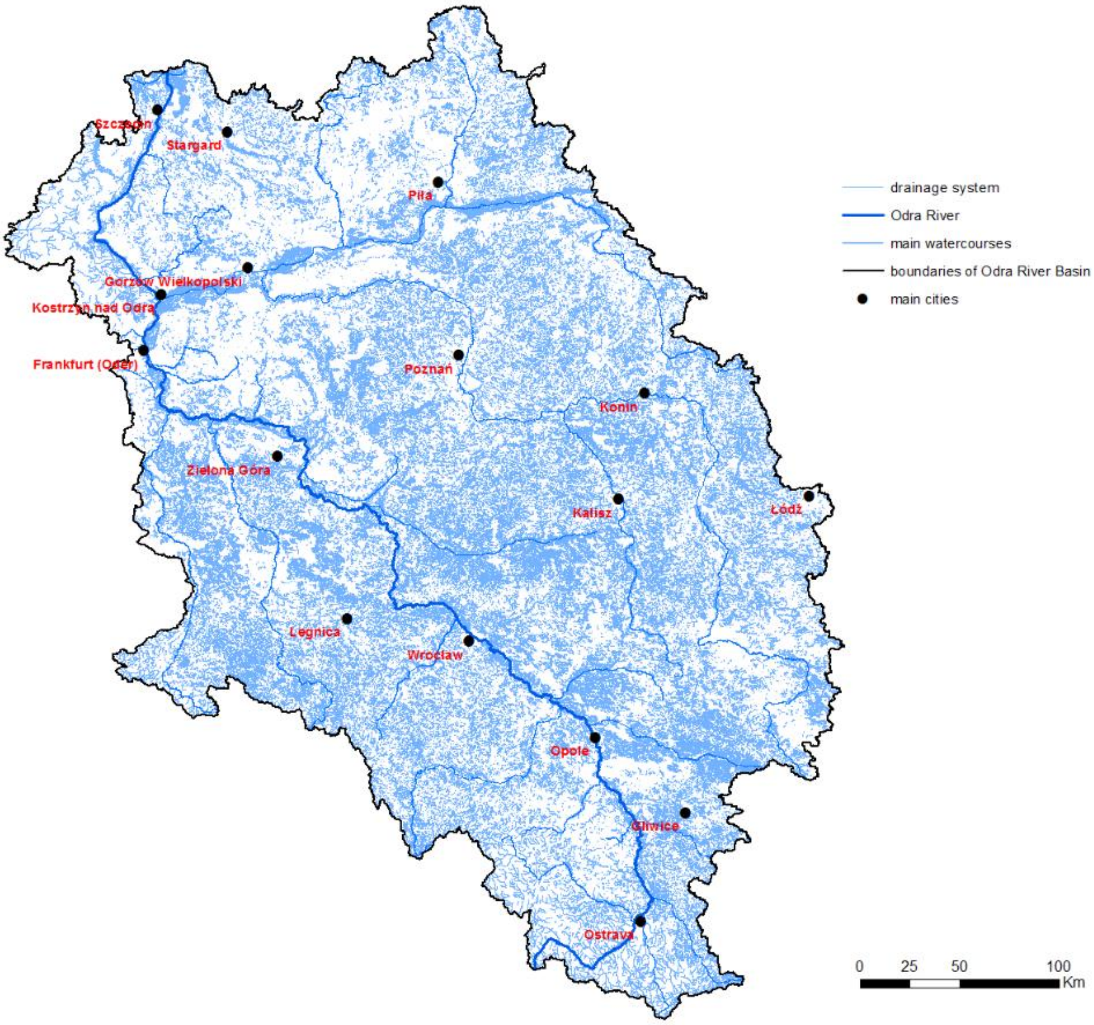

Fig. 3.5 Drainage system of Oder catchment

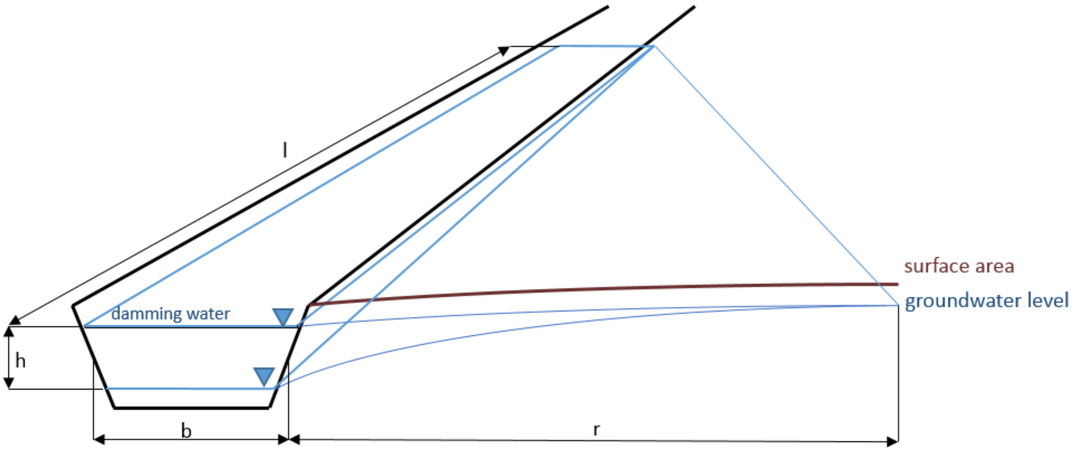

Fig. 3.6 Pictorial drawing of water conditions for damming the trenches/ditches

Fig. 3.7 A/B Exemplary location of dams on drainage ditches with different density of land reclamation systems. Source: Topographic map of Poland 1:10000 in the 1965 National Geodetic Coordinate System.

The volume of water retained due to damming can therefore be reduced to the formula:

$$V = V_d + V_s \qquad \text{(Eq. 2)},$$

where V - total volume of water retained due to damming, Vd - volume of water retained in ditch, Vs - volume of water retained as soil retention.

Assuming that the diameter of the ditch does not change significantly with the amount of damming and the length of the ditch, the volume of water stored in the soil can be calculated using the linear approximation of the curves of unconfined groundwater table, using the effective porosity coefficient p (the ratio of storable water in the unit soil volume). Piling in the ditch has a limited range due to the occurring longitudinal slope of the ditch. Because the rules for the construction of damming devices assume the construction of cascade (so that at the end of the range of impact of one damming device, the next one if placed) it is assumed that there is a possibility of damming up along the entire length of the ditches. Hence, the value of *l* can be taken as the length of all significant ditches.

Taking into account the above-listed assumptions and introducing additionally the coefficient a – taking into account that not every dam can have a damming device or may be inefficient (or destroyed), the formula for the volume of water retained due to damming up on ditches can be saved in the form of:

$$V = a \cdot h \cdot l \cdot \left(\frac{b}{2} + \frac{r}{3} \cdot p\right) \qquad \text{(Eq. 3)}$$

Where:

*V* - water retained due to damming up on ditches [m$^3$],

*a* - coefficient correcting the actual damming capacity on the ditch [-],

*h* - stacking height [m],

*l* - stacking range [m],

*b* - average width of the ditch [m],

*r* - the average radius of water level rise in a cross-sectional view [in meters from the ditch],

*p* - average soil porosity [-].

The following values were adopted in the calculations:

*a* - 0.8;

*h* - damming height :

*l* - length of trenches significant in a given area (communes, ISWB);

*b* - 2m,

*r* - two impact scenarios of the maximum trench influence were introduced:

*p* – 0.4.

In order to provide a comprehensive set of calculations of water storage in land reclamation systems in the Oder catchment, we introduced 6 scenarios in calculations, representing different values of *h* (minimum - 0.1 m, moderate - 0.3 m and high - 0.5 m) and *r* (wide variant: light soils, small topographic slope – r = 50 m; and narrow variant: heavy soils, large topographic slope) – r = 20 m). These different *h* and *r* assumptions in different combinations give 6 different scenarios (Tab. 3.2).

Tab. 3.2 List of parameters and scenarios used to determine the volume of retained water in drainage ditches

| Parameter | | Value | | | | | |
|---|---|---|---|---|---|---|---|
| a | Correction coefficient | 0,8 | [-] | | | | |
| b | Width | 2 | [m] | | | | |
| p | Porosity | 0,4 | [-] | | | | |
| | **Scenarios:** | **S1** | **S2** | **S3** | **S4** | **S5** | **S6** |
| h | Damming height | 0,1 | 0,3 | 0,5 | 0,1 | 0,3 | 0,5 |
| r | Range | 50 | 50 | 50 | 20 | 20 | 20 |

### *3.3.2 Delineation of density of ditches in reclamation systems*

Land reclamation systems were analyzed in terms of their length and density in grid cells of 1 km x 1 km in standard GIS procedure. A map of the density of the drainage system was created (Fig. 3.9) using a package of appropriate spatial analysis tools on the basis of land reclamation systems map from MPHP 1:50000. In the next step, areas (grid) were selected in terms of density of the drainage network – areas where the total density of drainage ditches was less than 1 km in a given grid were discarded (Fig. 3.10s). Therefore, for the further analysis, areas have been adopted whose potential and possibilities to increase the amount of water stored are the largest (significant clusters of reclaimed areas). The map of the drainage network density after selecting the ditches according to the above criterion is presented in Fig. 3.11. The largest total compaction of the drainage network in the grid with the side of 1 km is about 36.5 km (Fig. 3.8 A). An example of the smallest significant drainage network density of 1 km in a grid of 1 km$^2$ is shown on the Fig. 3.8 B. On the basis of grid map of significant densities of ditches (over 1 km / 1 km$^2$), the total length of ditches in communes and ISWB was determined.

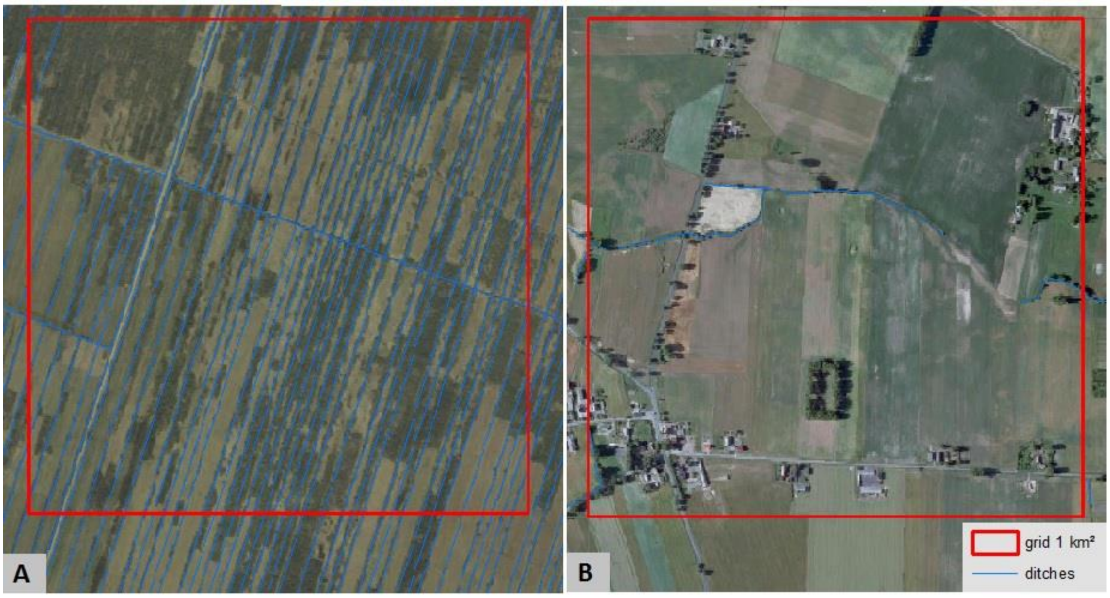

Fig. 3.8 A/B Total compaction of the drainage system in the grid with the side of 1 km

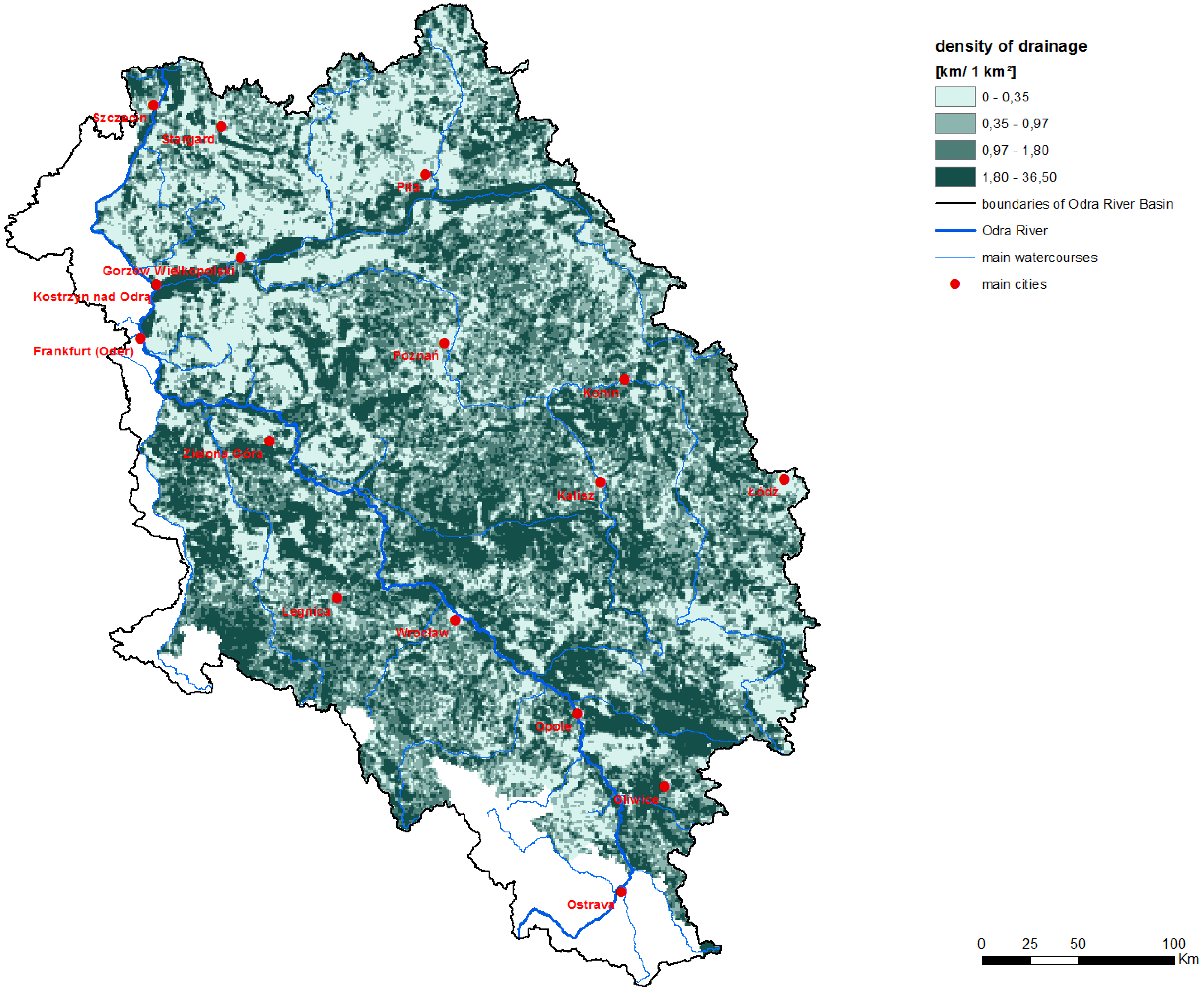

Fig. 3.9 Density of drainage systems expressed in kms of ditches in grid cells of 1 km².

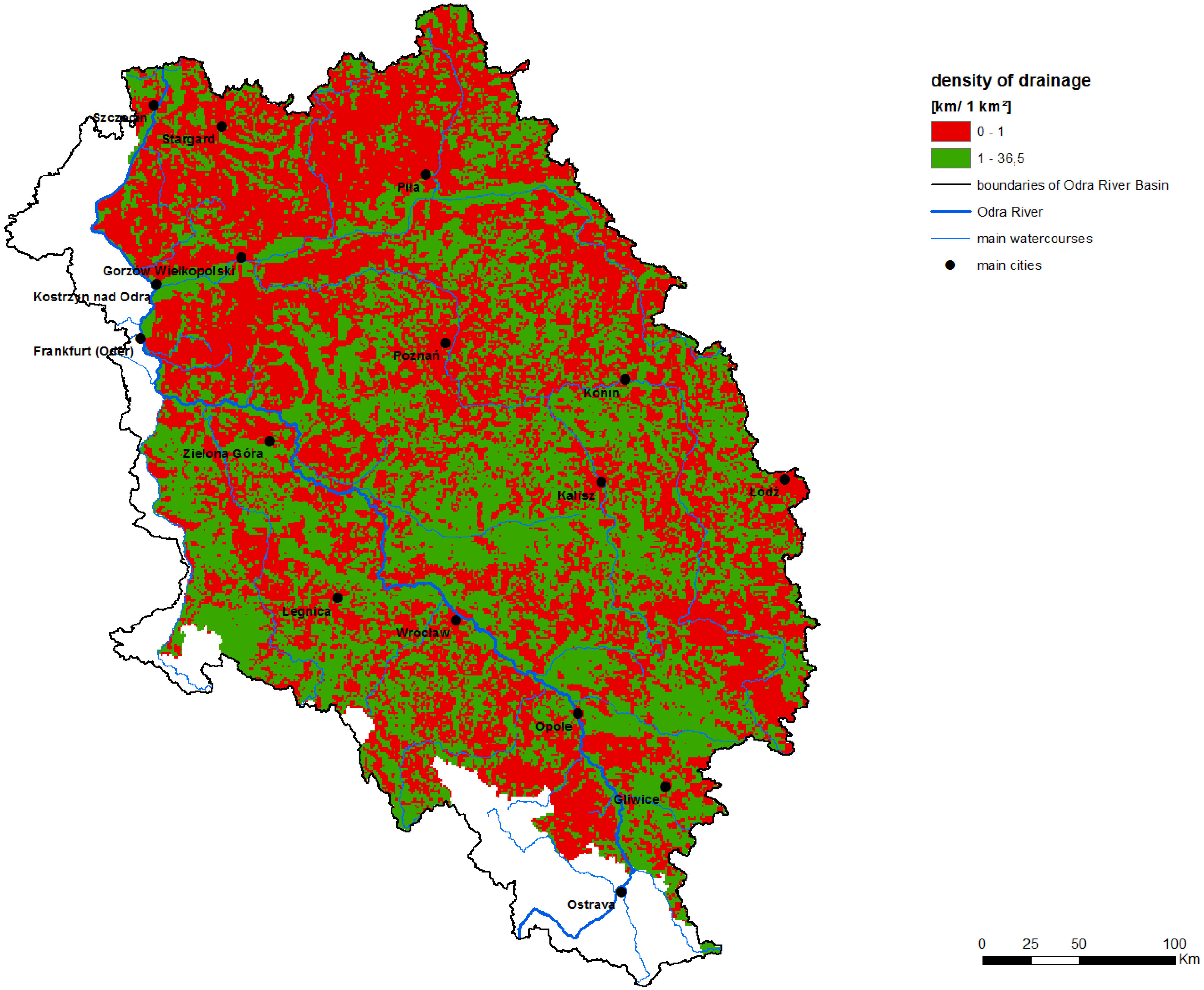

Fig. 3.10 Density of drainage – discarded cells (red color)

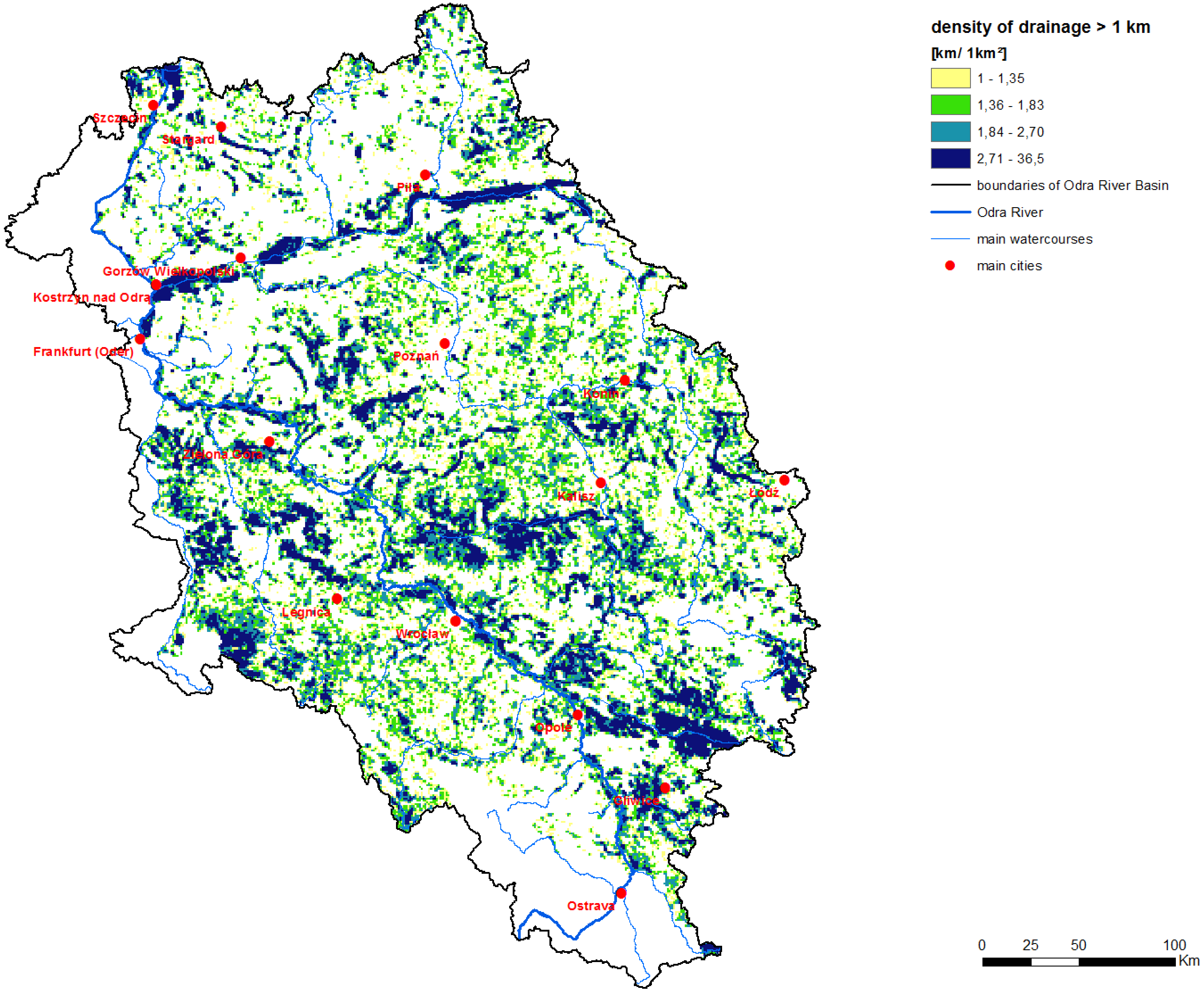

Fig. 3.11 Processed map of drainage ditches density of after selection and reclassification of areas.

## 3.4 Classification of the indication for action for communes and ISWB

Both in the case of the CN parameter and the length of ditches, classes have been assigned to selected thresholds of values that determine the importance of a given area in the context of carrying out activities that allow (require) for increasing water retention. The division into significance classes for the CN parameter and the length of ditches for communes and ISWB are presented in Tab. 3.3, Tab. 3.4 and Tab. 3.5. High values of the CN parameter averaged over areal units (ISWB or communes) indicate the need for slowing surface runoff by enhancing catchment retention. Low values of CN are typical for catchments of high water retention, where large amounts of precipitation can naturally be stored. High density of ditches presents high potential for using them as a measure for water retention increase whist low densities of ditches present low potential in water storage capacity enhancement. These two criteria were used in the analysis by the integration of two parameters done by summarizing parameters values (Tab 3.3-3.5). On the basis of these assumptions, new set of classes was created and referred to as "Priority for Action" (Tab. 3.6). These priorities represent high, medium and low necessity for water retention enhancement (here – water retention enhancement for flood and drought protection purposes), averaged for the communes and ISWB.

Tab. 3.3 Classification of the CN parameter for communes and ISWB

| value | description | | CN range from | CN range to |
|---|---|---|---|---|
| 1 | H | High | 85 | 100 |
| 2 | Med. | Medium | 70 | 85 |
| 3 | L | Low | 60 | 70 |
| 4 | Min | Minimum | 0 | 60 |

Tab. 3.4 Classification of the total length of relevant ditches L [km] – communes.

| value | description | | L [km] range from | L [km] range to |
|---|---|---|---|---|
| 1 | H | High | 200 | |
| 2 | Med. | Medium | 100 | 200 |
| 3 | L | Low | 50 | 100 |
| 4 | Min | Minimum | 0 | 50 |

Tab. 3.5 Classification of the total length of relevant ditches L [km] – ISWB.

| value | description | | L [km] range from | L [km] range to |
|---|---|---|---|---|
| 1 | H | High | 500 | |
| 2 | Med. | Medium | 250 | 500 |
| 3 | L | Low | 100 | 250 |
| 4 | Min | Minimum | 0 | 100 |

Tab. 3.6 Classification of the “priority for action” index for communes and ISWB.

| value | description | | Range from | Range to |
|---|---|---|---|---|
| 1 | H | High | 2 | 3 |
| 2 | Med. | Medium | 4 | 5 |
| 3 | L | Low | 6 | 7 |
| 4 | NC | not necessary | 8 | 8 |

## 3.5 Hydrolgical analyses of possibility to mitigate low flows for ice breaking

Identification of possibilities for mitigating low water levels with systematic use of water stored in systems of ditches was done on the basis of exemplary hydrological data for watergauge Gozdowice. These calculations are based upon the results of Grygoruk et al. (2018). The data we used in the analysis were obtained from database of meteorological and hydrological data of Institue of Metolorology and Water Management – National Research Institite (IMGW-PIB)[2].

The analysis presented in this chapter was done in order to verify, whether potential release of water from previously dammed land reclamation systems may allow to keep at least the average depth of 1.8 m in this cross-section in 90 % of the year.

Navigation authorities in Poland and Germany state that this depth of 1.80 m (during 80 % of the year upstream of River Warta mouth and 90 % of the year downstream of River Warta mouth) would be necessary in order to operate ice breakers on Oder River along the joint Polish-German border. Therefore, both Polish and German shipping authorities and the Polish and German government agreed on a channelization concept for the Polish-German Border Oder. The concept is called “An update of the concept for regulation of the Border Odra watercourse“ (CfR)(Hentschel and Huesener, 2014) and is based on new groynes which shall achieve an average water depth of 1.80 m:

- at a water discharge of 250 $m^3/s$ (which is the minimum water discharge being achieved during 90 % of the year) downstream of river Warta mouth and

- at a water discharge of 160 $m^3/s$ (which is the minimum water discharge being achieved during 80 % of the year) upstream of river Warta mouth.

This CfR is on the Polish side the World Bank´s Oder-Vistula Flood Management Project´s (OVFMP) subcomponent 1B.2. The navigation (shipping) authorities stated that this CfR and this average water depth of 1.80 during 80 (90)% of the year was necessary for the successful operation of ice breakers.

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[2] http://dane.imgw.pl

It is doubtful whether this water depth of 1.80 m during 80 (90)% of the year was necessary for ice breakers, since the authorities have not proven yet that the ice breakers on Oder River were endangered due to the shallow parts of the river (Schnauder and Domagalski, 2018). Even if the ice breakers would have a problem due to the shallow parts of the river, there do exist other succesful ice breaking alternatives such as Amphibex, swimming excavators, which successfully break ice in rivers with shallow water in Canada, which can release themselves easily when they get stuck and which can operate solely or in combination with conventional ice breakers (Schnauder and Domagalski, 2018). However, since also commercial navigation would be improved anyway, if the water level could be raised to the by the authorities envisaged 1.80 m (during 80 (90)% of the year), this analysis was conducted to show the possibilities of dammed land reclamation systems in order to improve generally navigability based on nature-based solutions.

This analysis required to address several hydrological issues, namely:

- what is the value of Oder discharge in Gozdowice that has empiric exceedance frequency of 90%?

- does the value of Oder discharge in Gozdowice at empiric exceedance frequency of 90% itself provides average depth in cross section at the level 1.8 m or higher?

- what is the duration of water levels that result in average depths in Gozdowice cross-section lower than 1.8 m?

- what is the relation between average depth of cross section and water levels?

- what is the threshold value of water level allowing to keep average depth in cross-section Gozdowice at the level of 1.8 m?

- what is the equation of rating curve of Oder in Gozdowice?

- what is the volume of water required to mitigate river discharge in Gozdowice in order to increase water levels to keep the average depth of the river cross section at the level of 1.8 m?

- what should be the management procedure allowing for efficient use of water stored in land reclamation systems at the catchment scale?

In order to address the issues above, we used water level and discharge data for the watergauge Gozdowice from the period 1980-2016.

As stated above, the CfR defines that during 90 % of the year (which is related to a min. water discharge of 250 m³/s as calculated in the CfR) the goal of an average water depth of 1.80 m in Border Oder downstrean of river Warta mouth has to be achieved by the channelization. So, the CfR does not answer the question what will happen during winter periods if the water discharge will fall below these 250 m³/s. In such cases – in spite of the channelization – the average water depth will fall below 1.80 m also in the in the near future channelized Oder River. Such water discharge deficits below 250 m³/s already happened several times in winter.

Therefore we decided to use a different approach than the CfR. Based on the CfR that defined average water depth of 1.80 m, the related treshold value of the water level (calculated by the use of the cross-section of the river) and the related treshold value of the water discharge at watergauge Gozdowice, we intended to find out the real water discharge deficit and the related real water volume deficit during low water periods in winter. This deficit has to be compensated by opening the water storage in land reclamation systems in order to ensure a permanent average water depth of 1.80 m in winter.

Since we could receive sufficient data (river cross-sections, water levels, water discharges) for only one point of Oder River downstream of river Warta mouth – namely for watergauge Gozdowice – and since watergauge Gozdowice is situated at a deeper part of the Lower Oder where the by the channelization envisaged average water depth of 1.80 m at a related water discharge of 250 m³/s is achieved already now – we are fully aware of the fact that our results for watergauge Gozdowice gauge station may not be representative for the shallow points of the Lower Oder River.

However, we used the results of watergauge Gozdowice in spite of the fact that watergauge Gozdowice is by far not the shallowest point of the Border Oder in order to show two important results:

- how a similar calculation should be conducted at the shallowest point of the Border Oder in order to find out the real water deficit for the Border Oder in order to ensure an average water depth of 1.80 m during winter (which the actual CfR does not ensure, as described above).

- even though the results from watergauge Gozdowice are not directly transferable to the shallow parts of the Border Oder since at these shallow parts the rating curves are of course not the same as in Gozdowice, it is possible to show a basic trend being of high importance also for these shallow parts of the Border Oder which do actually not achieve the by the channelization envisaged 1.80 m at a related water discharge of 250 m³/s:

    Based on the developed rating curve of Oder at Gozdowice and taking into account the fact that most of the shallow parts of Border Oder have (at a related water discharge of 250 m³/s downstream Warta mouth/at a related water discharge of 160 m³/s upstream Warta mouth) an average water depth which is only 10-30 cm less than the 1.80 m which shall be achieved by the CfR, it is at least possible to show the trend that the water storage in land reclamation systems can raise at Gozdowice the average water depth of around 10-30 cm by raising the related water discharge up to a calculated amount of m³/s during a defined amount of days.

This trend is interesting because it could be a first hint that such a raise of the water discharge by the opening of the land reclamation systems could result in a similar raise of the water depth not only in Gozdowice but also along the shallow parts of the Oder, so that their insufficient water depth could be mitigated in big parts.

## 3.6 Spatial scale of the analysis

The intention of the analysis was to provide conclusions of the report for both local authorities and water management perspectives. Therefore, the results of our analyses were re-calculated to the form of average values representative for the communes (local authority level; Fig. 3.12) and Integrated Surface Water Bodies ISWB (pol: Scalone Części Wód Powierzchniowych, SCWP, Fig. 3.13). This approach allows to indicate which administrative units and which water-management-related elements of the catchment's space should have priority in implementation of actions proposed in this report. List of communes is presented in the Appendix 1. ISWBs and related results of the analyses are presented in the Appendix 2.

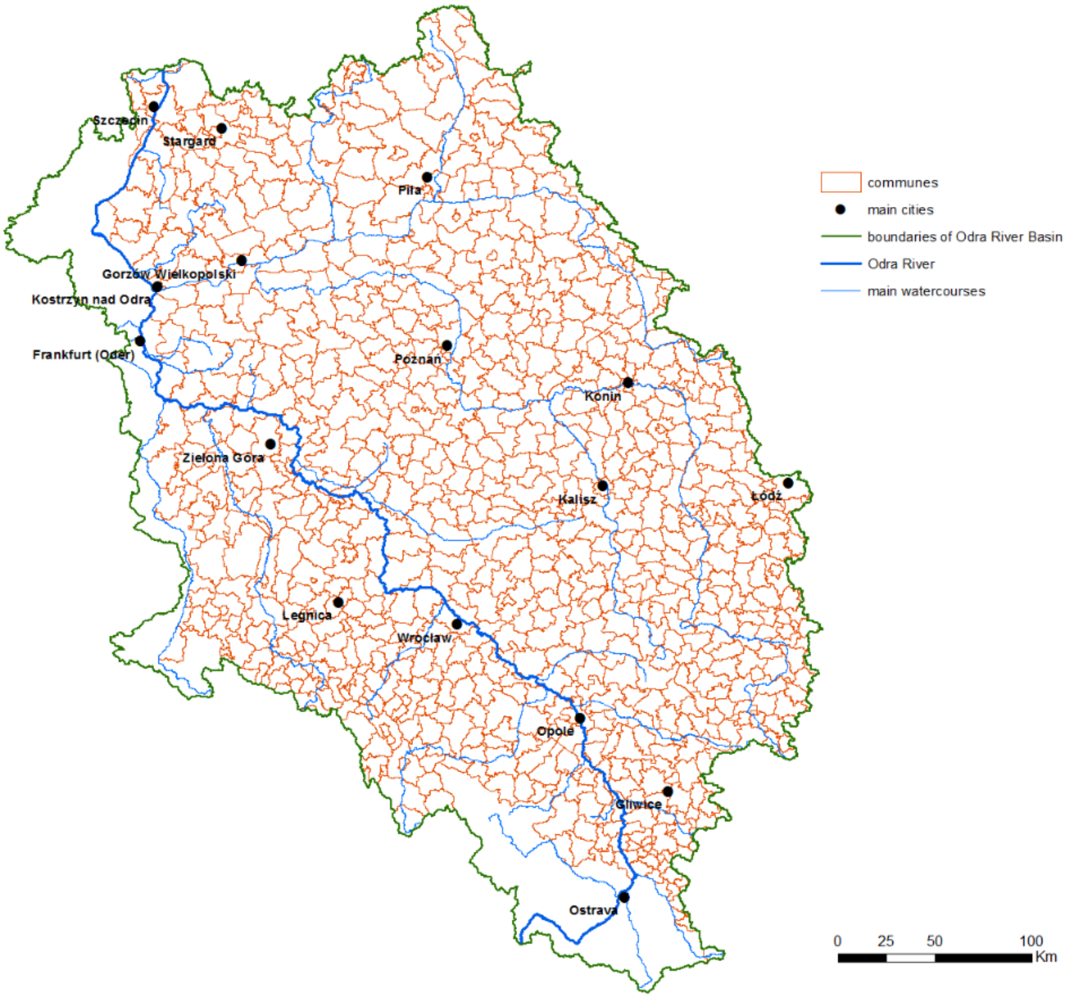

Fig. 3.12 Communes of Oder River basin. List of communes is presented in the Appendix 1.

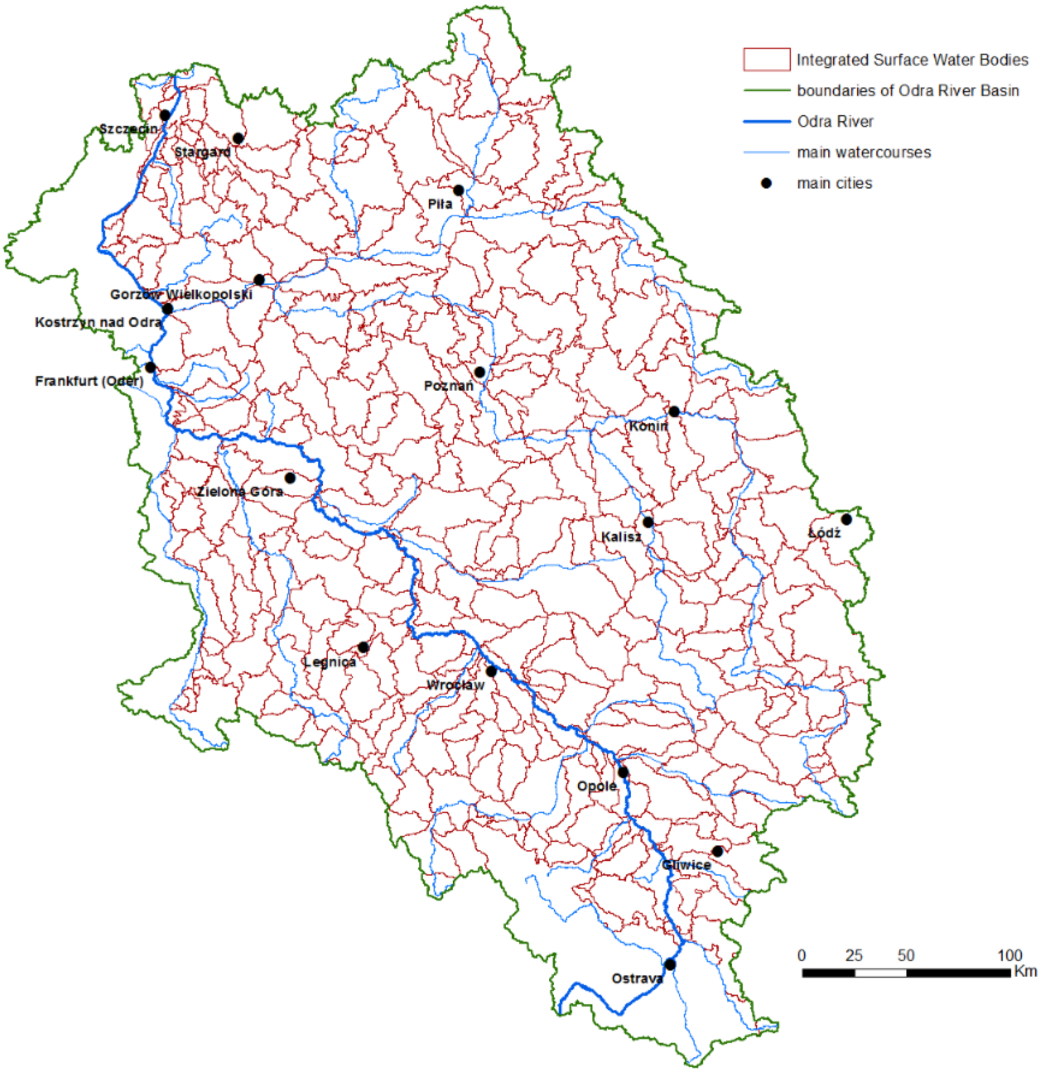

Fig. 3.13 Integrated Surface Water Bodies (ISWB) of Oder River basin

# 4. Results

## 4.1 CN parameter in the catchment of Oder

Using the methodological assumptions described in the chapter 3.2, a map of variability of the CN parameter in grid form with a resolution of 20m x 20m was created (Fig. 4.1). The given CN values were averaged in individual communes (Fig. 4.2; Appendix 1) and Integrated Surface Water Bodies (Fig. 4.3; Appendix 2). Lowest CN values equal to 36 represent areas of high initial water retention and low flood-generation potential. Areas represented by this value of CN parameter are located mainly in the northern and western parts of the catchment (e.g. forests located between Warta and Noteć rivers). Highest values of CN parameter reached as high as 98 and represent areas of big agglomeration (e.g., Gliwice, Wrocław and Łódź) and some areas located on impermeable soils (e.g., south from Wrocław).

Determination of the retention of the area in terms of the whole Oder basin was based on the indication of areas with increased potential for forming floods, which are characterized by limited retention. Such areas are commonly considered those in which the CN parameter is more than 50 (Wałdykowski, 2012). However, due to the characteristics of the basin of the analyzed area, the value of 53 was assumed.

In order to extract the values of the CN best characterizing the Oder river basin, the following ranges of CN values were created: 36-52, 53-68, 69-85 and 86-98 (93 for the averaging in particular communes). To interpret the results obtained, it was assumed that in the scale of the whole catchment, this division corresponds respectively to four retention classes: (1) high retention, (2) limited retention with increased potential for flood surges, (3) low retention with high potential for flood surges and (4) very low retention with very high potential to create flood surges. These classes are similar to the classification provided by Wałdykowski et al (2012) for the water region of the Middle Vistula river. The result shown on the maps (Fig.4.1 –Fig.4.3) presents the areas with the listed CN values, all of which (when CN> 69) should be treated as areas with limited rainfall retention potential and significant potential for increasing the flood wave within the system of the Oder water region.

CN values averaged for communes (Fig. 4.2) and ISWB (Fig. 4.3) present gradual decrease (increase of water retention, Fig. 4.4) from south-east towards the north-west. Occurrence of impermeable soils in the zone of northern part of the Oder Catchment (located south from Szczecin) again presents low retention. Analysing communes that contribute the most to flood generation in the catchment of Oder (CN >=90) there are Chojnów, Człuchów, Ksawerów, Lubań, Piekary Śląskie, Świdnica, Zgorzelec, Brzeg, Dzierżoniów, Głogów and Inowrocław. Among ISWB of the catchment of Oder, five the most significantly contributing to flood generation are (names of ISWB according to the Ministry classification): Czadeczka (CN = 94), Dopływ z wyrobiska Turoszów (CN = 90), Odra w granicach Wrocławia (CN = 90), Kanał Młyński (CN = 87) and Ślęza od Małej Ślęzy do Odry (CN = 87). Appendix 1. and Appendix 2. contain average values of the CN parameter and maximum potential water retention capacity (S) in individual communes and ISWB located within the Oder basin. Although these regions are nor characterized by the highest precipitation, which was responsible for the highest floods that occurred in the Oder catchment in the 20th century, these delineated zones (communes and ISWBs) have the least physical conditions for storing water. Theferofore, in case of the catchment-scale planning of runoff retention and water accumulation, the listed areas shoud be the first considered when actions are planned.

## 4.2 Maximum potential water retention capacity

Spatial differentiation of the potential maximum retention (S) expressed in mm is shown on map – Fig. 4.4 at a resolution of 20m x 20m. Potential retention values were determined in spatial information systems, in accordance with the SCS-CN assumptions described in Chapter 2 based on previously calculated values of the CN parameter for the Oder river basin district. In order to best illustrate the spatial variability of potential retention in the area of the Oder basin, presented values are in 9 equal intervals, with a step of 50 mm in the range from 0 to 452 mm.

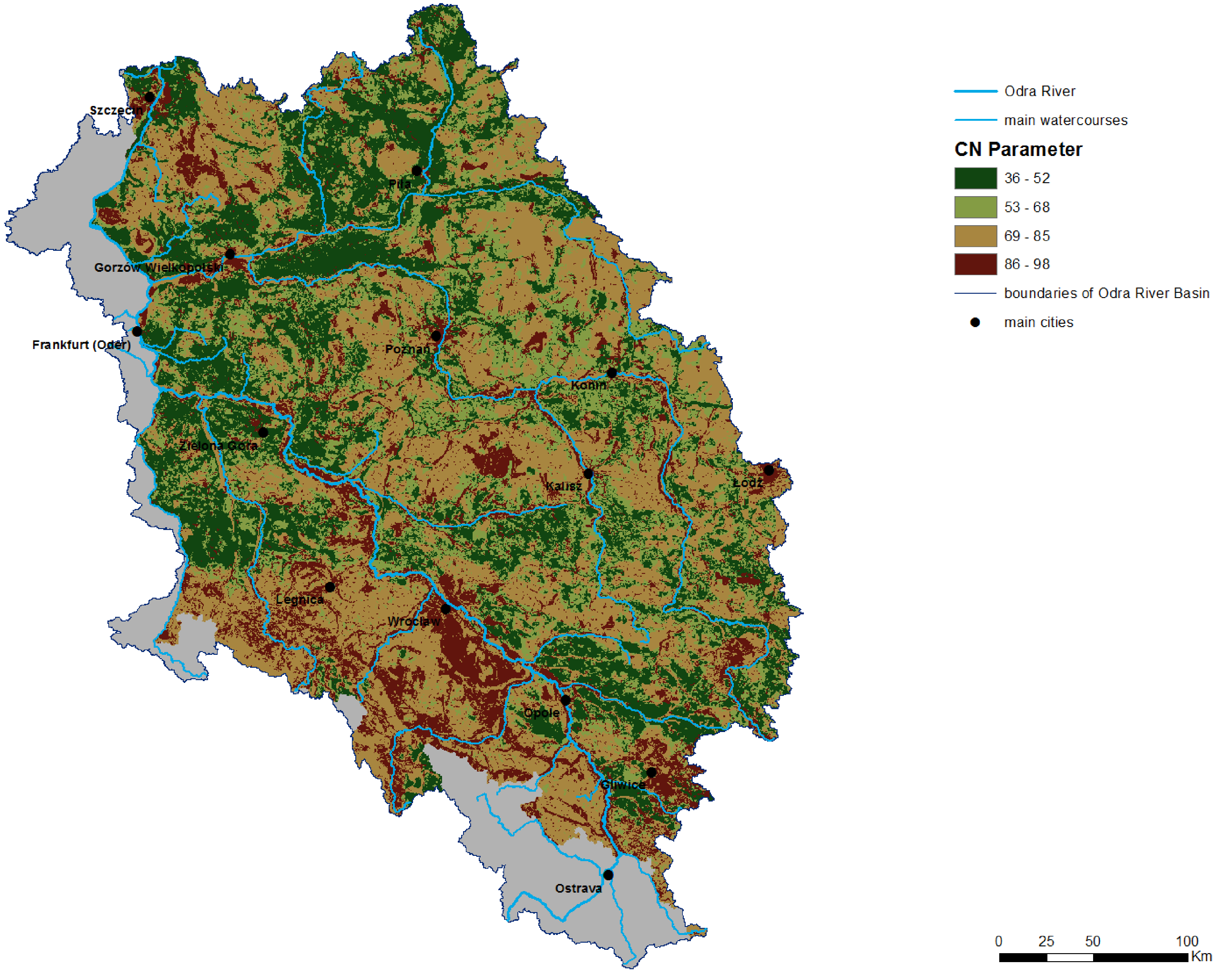

Fig. 4.1 CN parameter in Oder catchment

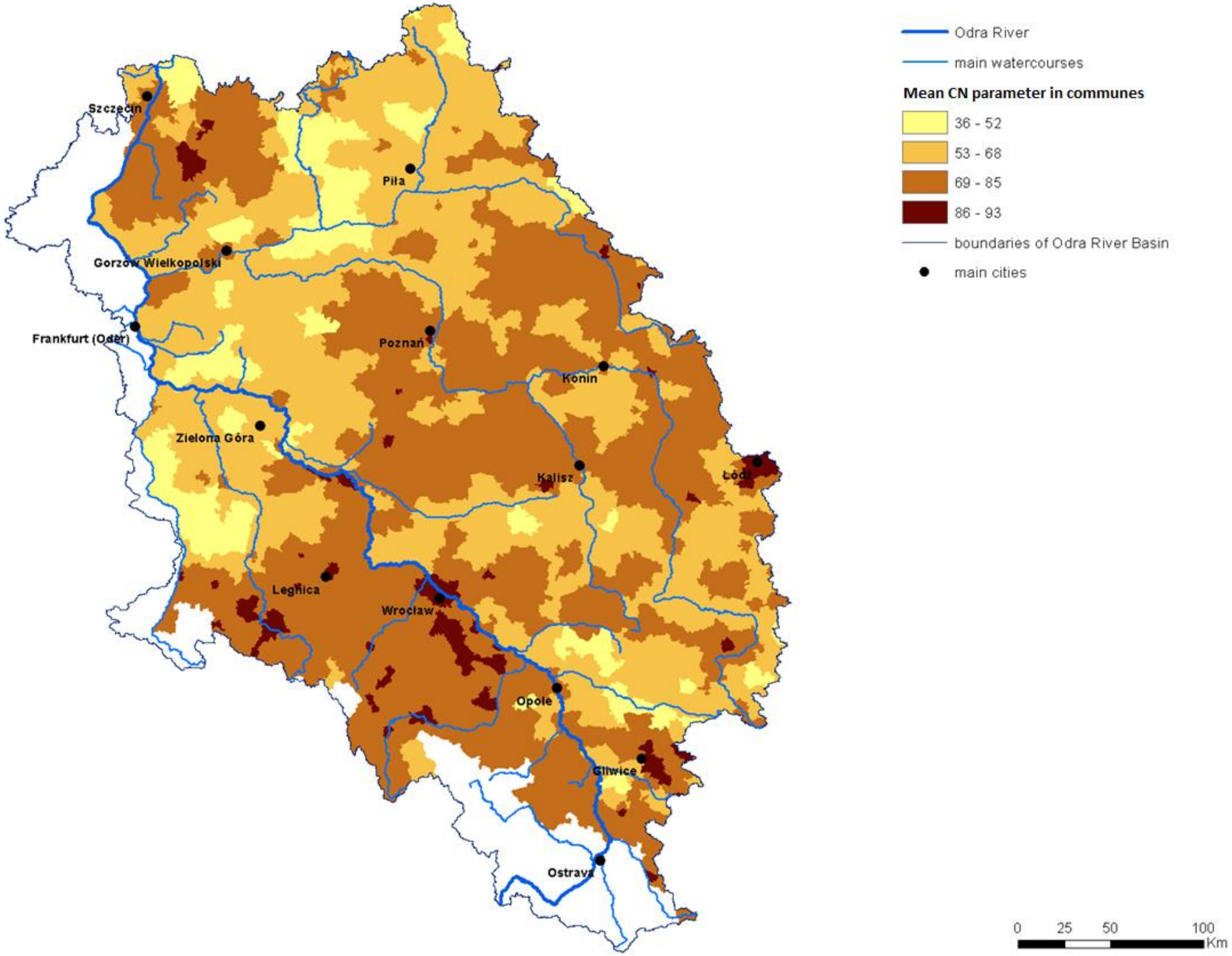

Fig. 4.2 Mean CN parameter in communes

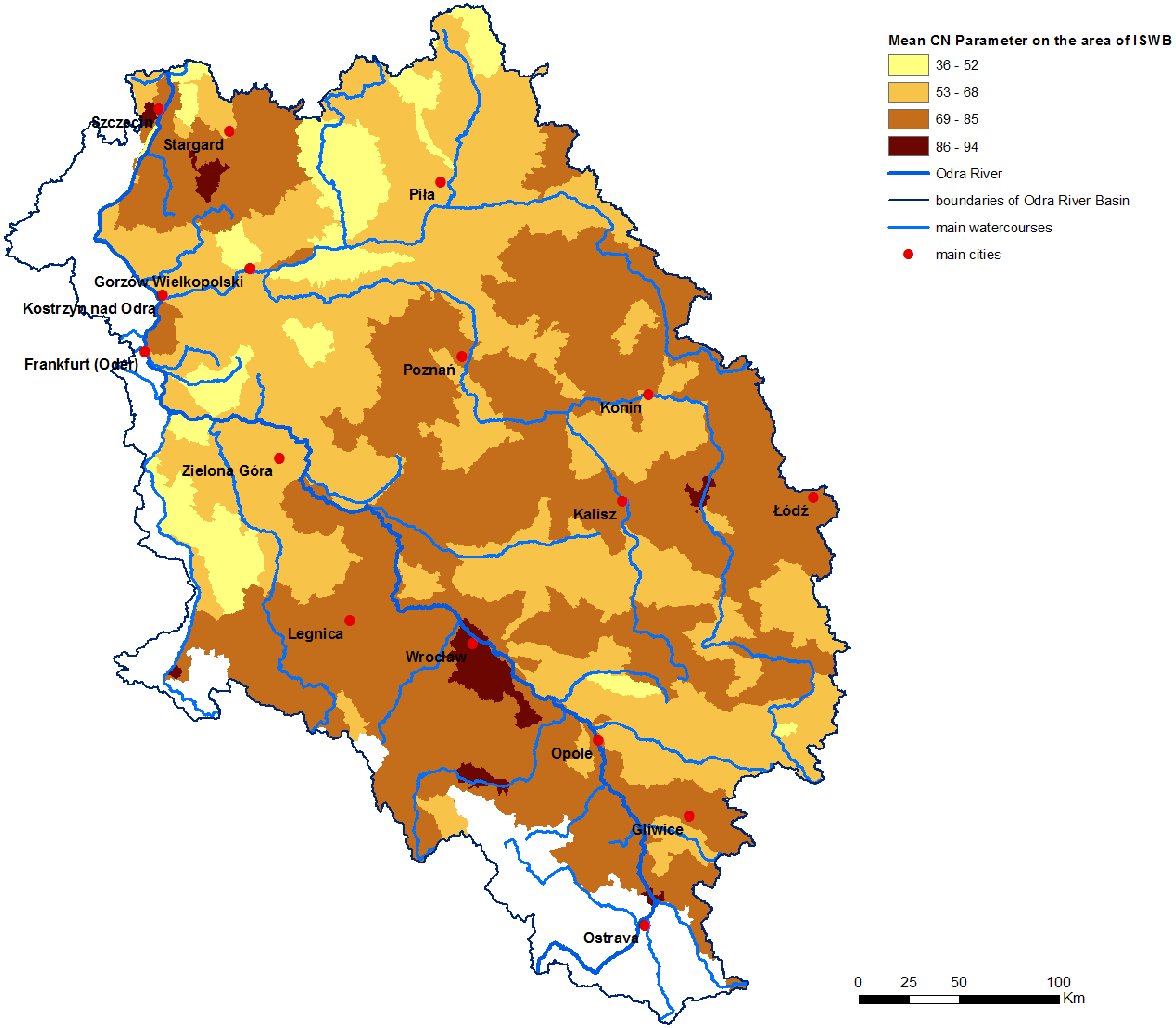

Fig. 4.3 Mean CN parameter on the area of ISWB (Integrated Surface Water Bodies)

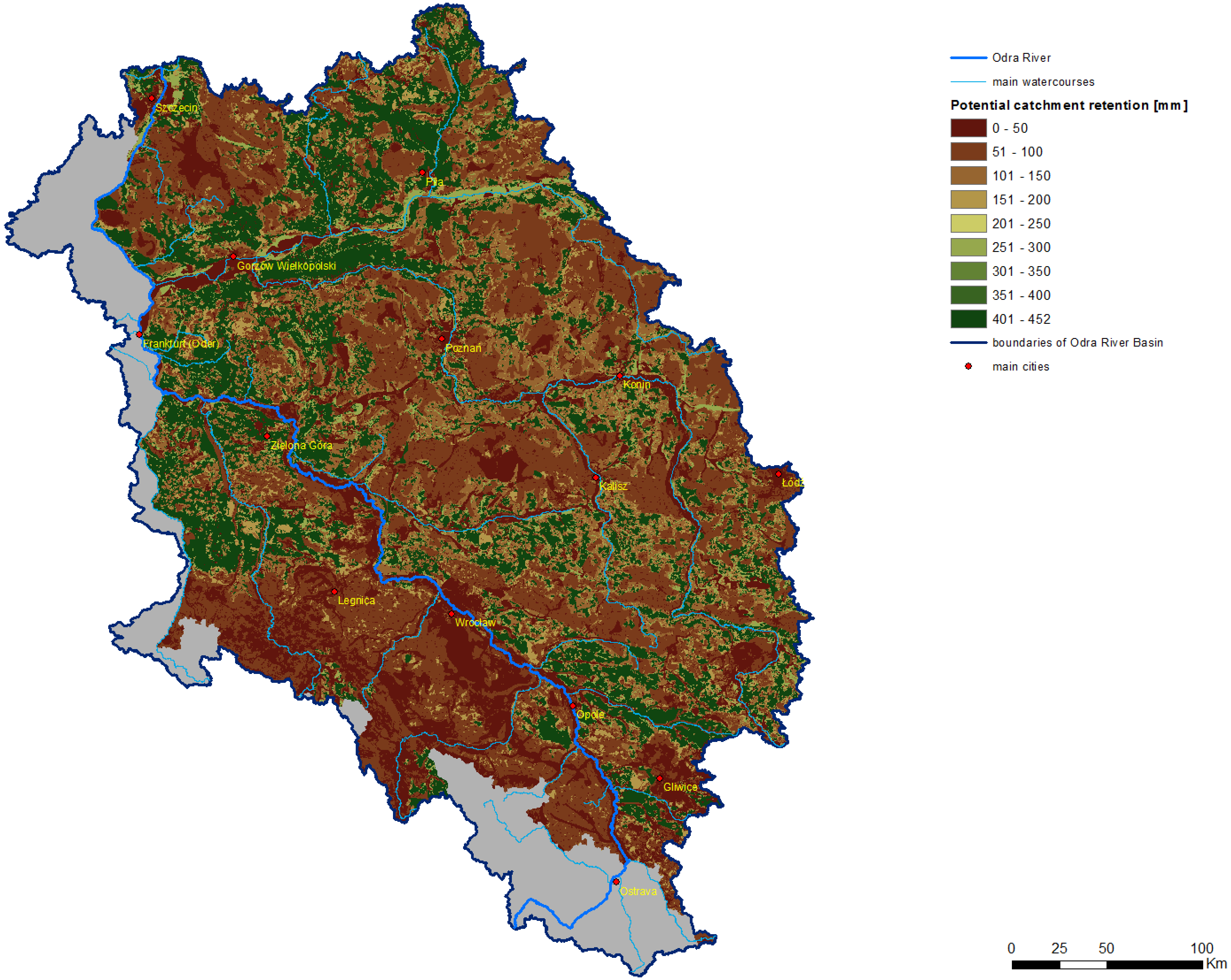

Fig. 4.4 Potential catchment retention of Oder River Basin

In the analyzed area, the lowest maximum retention and the highest CN parameter can be found most frequently in urbanized areas, where the catchment infiltration and retention (due to the significant share of built-up and impermeable areas, i.e., roads, pavements) is difficult. Low values of potential retention occur, among others in the area of the Wrocław Plain, the Grodkowska Plain, in the area of the Izerskie Foothills or the western part of the Gorzów Valley. On the other hand, the areas of Bory Dolnośląskie, Chodzieski Lake District, the eastern part of the Gorzów Valley, the Gwda Valley or a fragment of the Drawska Plain are characterized by high values of potential maximum retention.

Potential retention values (Fig. 4.4) calculated for the gridded area of Oder catchment allow to hypothesize that in the upper-most parts of the basin (catchments of Nysa Kłodzka except for Biała Lądecka, catchment of Kaczawa and upper part of the catchment of Bóbr and Nysa Łużycka) the maximum initial water retention capacity equal to some 50-60 mm and may allow for large rainfall floods (even flash floods). Considering physical capacities of functioning and planned reservoirs, the only efficient way to prevent quick runoff is to store water in headwater parts of these riverbasins. Preferably, with nature-based solutions applied.

## 4.3 Classification of sub-basins according to their water retention potential

For the entire Oder river basin, the average value of the CN parameter is 67, which indicates limited retention or increased potential for creating floods. The average potential, maximum retention for the entire Oder basin is about 123 mm, which, taking into account the basin area, translates into a volume of 14 642 million m$^3$. In the Fig. 4.3 the mean values of CN parameter for ISWBs is shown. In order to better visualize spatial variation of the maximum potential retention, the average value of the CN parameter [-] was determined, and the average potential retention S [mm] for each of the ISWB within the Oder basin was calculated (Appendix 2). Quantitative and percentage breakdown of ISWBs depending on the CN parameter range is compiled in Tab. 4.1 and presented in Fig. 4.5.

Tab. 4.1 The quantitative and percentage distribution of ISWB depending on the range of the CN parameter

| Range of CN parameter | Description | Count of ISWB | Percent |
|---|---|---|---|
| 36-52 | high retention | 40 | 11 |
| 53-68 | limited retention, increased potential for flood surges | 139 | 37 |
| 69-85 | low retention and high potential for flood surges | 185 | 49 |
| 86-93 | very high potential to create flood surges | 12 | 3 |
| Sum | | 376 | 100 |

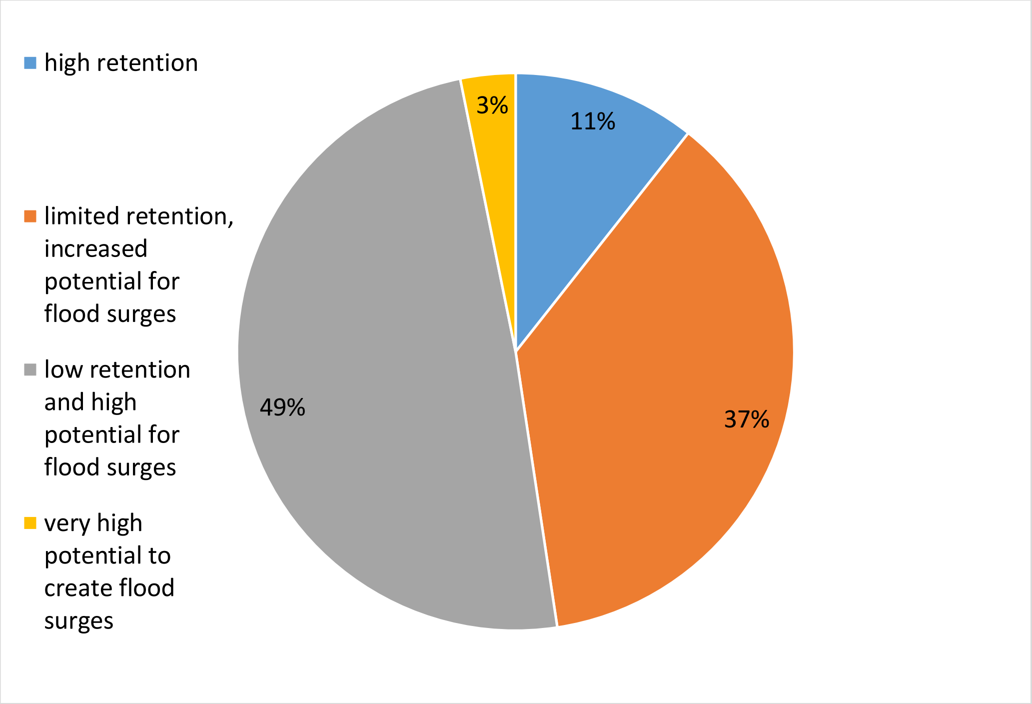

Fig. 4.5 Percentage share of ISWB depending on the CN parameter

## 4.4 Classification of communes according to their water retention potential

In order to better visualize the spatial variation of the maximum potential retention, the average value of the CN parameter [-] was determined, and the average potential retention S [mm] for each of the communes within the Oder basin was calculated (Annex 1). Quantitative and percentage breakdown of communes depending on the mean CN parameter in the intervals described in chapter 4.1 is compiled in Tab. 4.2 and presented in Fig. 4.6. Fig. 4.7 shows the mean CN parameter in communes in the area of the estuary of Oder.

Tab. 4.2 The quantitative and percentage distribution of communes depending on the range of the CN parameter

| Range of CN parameter | Description | Count of communes | Percent |
|---|---|---|---|
| 36-52 | high retention | 63 | 7 |
| 53-68 | limited retention, increased potential for flood surges | 303 | 35 |
| 69-85 | low retention and high potential for flood surges | 461 | 53 |
| 86-93 | very high potential to create flood surges | 44 | 5 |
|  | Sum | 871 | 100 |

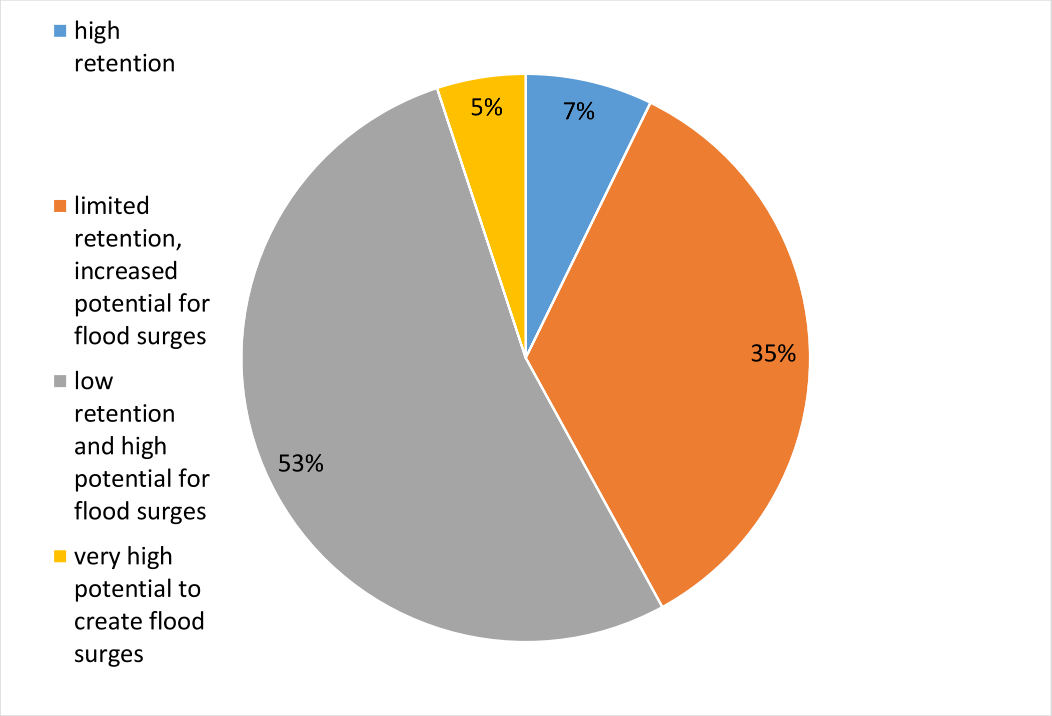

Fig. 4.6 Percentage share of communes depending on the CN parameter

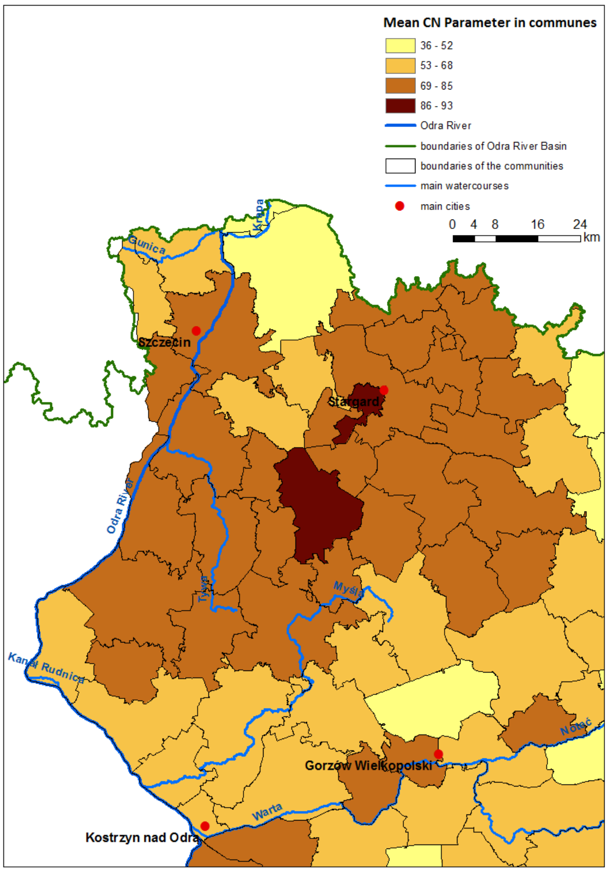

Fig. 4.7 Mean CN parameter in communes in the area of the estuary of Oder

## 4.5 Density of land reclamation systems

Based on the methodology described in chapter 3.3.2. maps of the spatial distribution of drainage densities for the Oder basin were created. The results of the calculations are presented at the background of the boundaries of communes and ISWBs (Fig. 4.8 and Fig. 4.9 respectively). As stated in the methodology section, areas where density of drainage ditches is lower than 1 km of ditches per 1 km$^2$ of the area were neglected in the analysis as the ones that do not provide significant potential for water retention increase in land reclamation systems.

Highest densities of ditches reaching more than 36 kms of ditches per 1 km$^2$ of the area are present in heavily modified stretches of river valleys (e.g., Lower Warta, Noteć and Barycz). In the scale of the whole Oder catchment, the most significant zone of high concentration of land reclamation systems is present in central and south-eastern part of the catchment. This corresponds to the previously shown maps of highest flood generation potential and means that appropriate water management in irrigation and drainage systems may become an efficient alternative to classic technical methods.

## 4.6 Water retention volume of land reclamation systems

Based on the methodology described in section 3.3.1, water retention volumes for land reclamation systems were calculated for individual communes and ISWB for the 6 proposed scenarios. The results of calculations have been included in Appendix 1 (for communes) and 2 (for ISWB). For two extreme scenarios (S3 - the highest damming and the highest range of the ditch impact and S4 - the lowest damming and the smallest range of the ditch's influence) maps were created – Fig. 4.11 A/B and Fig. 4.12 A/B. Total values of the water retention volume of land reclamation systems in the Oder basin in Poland for individual scenarios are presented in Tab. 4.3 and Fig. 4.10. With the most conservative assumptions (scenario S4), the total potential volume of water storage is 36 mln m$^3$. However, for the most optimistic scenario, it can increase by 10 times, reaching more than 370 mln m$^3$. Average volume of water retention calculated for all 6 scenarios (Tab. 4.3) reaches 165 mln m$^3$. The given volumes of water retention are technically feasible to be reached if appropriate regime of irrigation and drainage was kept.

Tab. 4.3 Water retention volume of land reclamation systems in the Oder catchment

| Scenarios: | S1 (h-0,1m r-50m) | S2 (h-0,3m r-50m) | S3 (h-0,5m r-50m) | S4 (h-0,1m r-20m) | S5 (h-0,2m r-20m) | S6 (h-0,5m r-20m) |
|---|---|---|---|---|---|---|
| potential volume of water in ditches [mln m$^3$] | 75 | 224 | 373 | 36 | 107 | 178 |

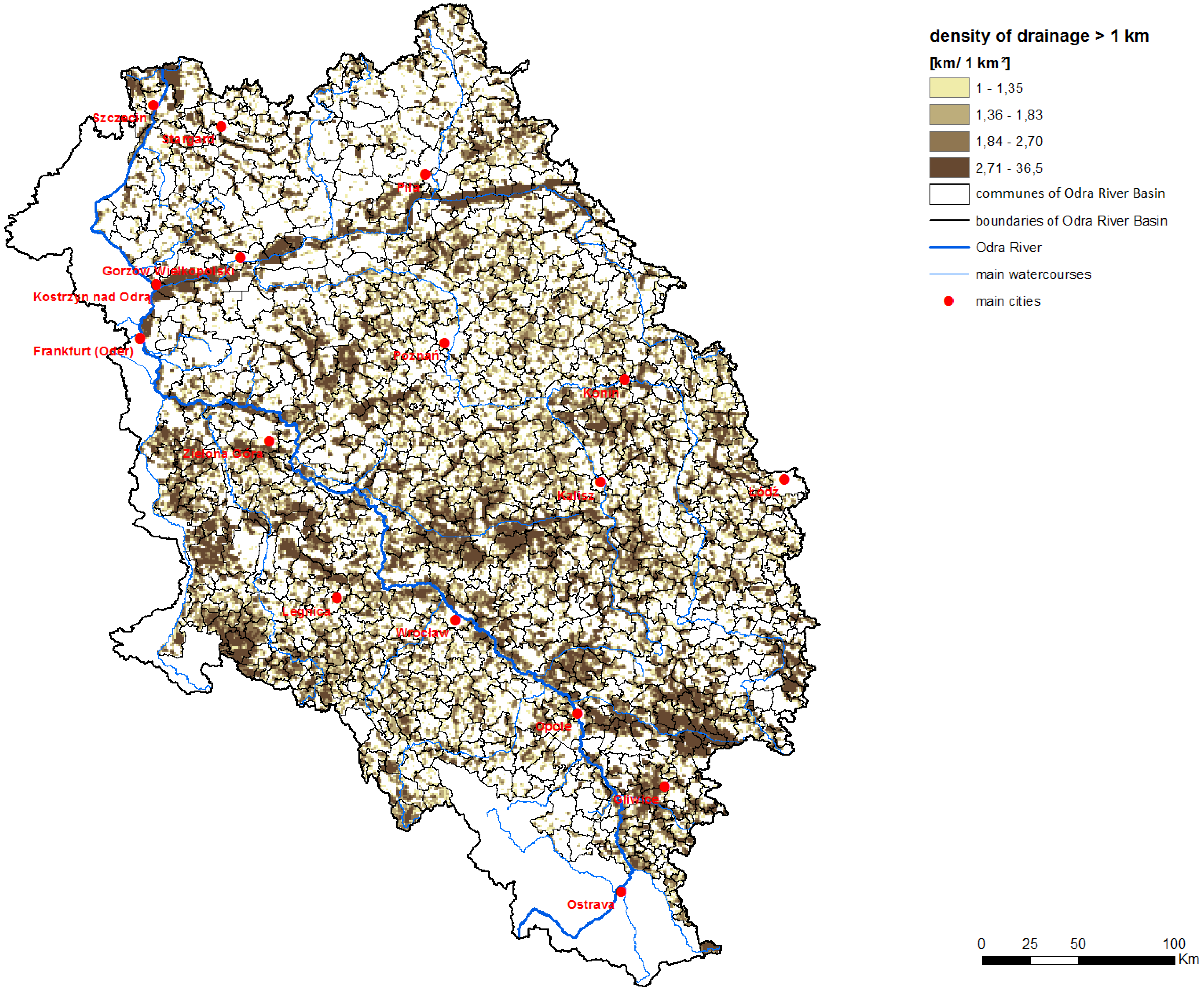

Fig. 4.8 Density of drainage ditches on the background map of communes' boundaries.

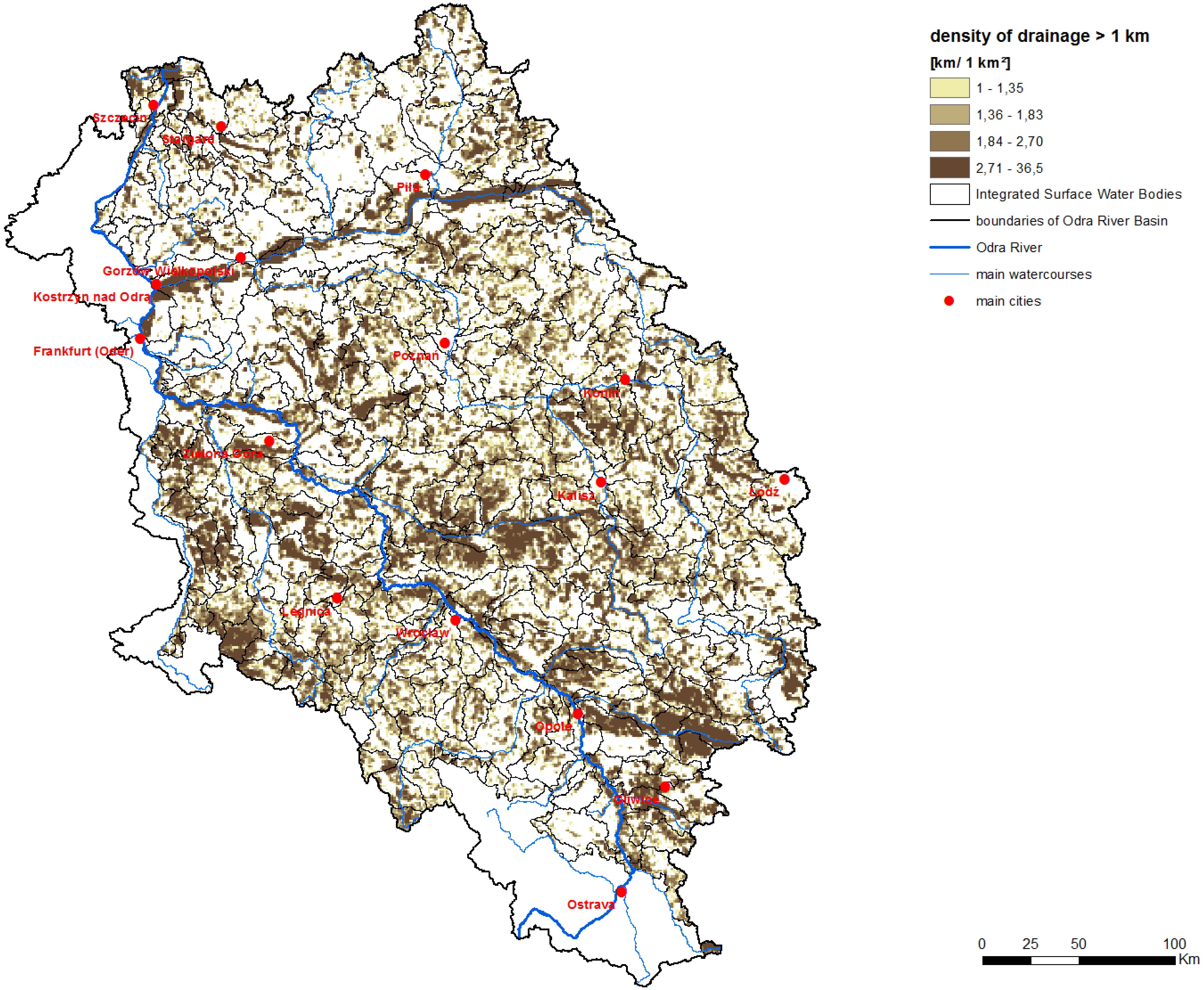

Fig. 4.9 Density of drainage system with the basis of the boundaries of ISWB

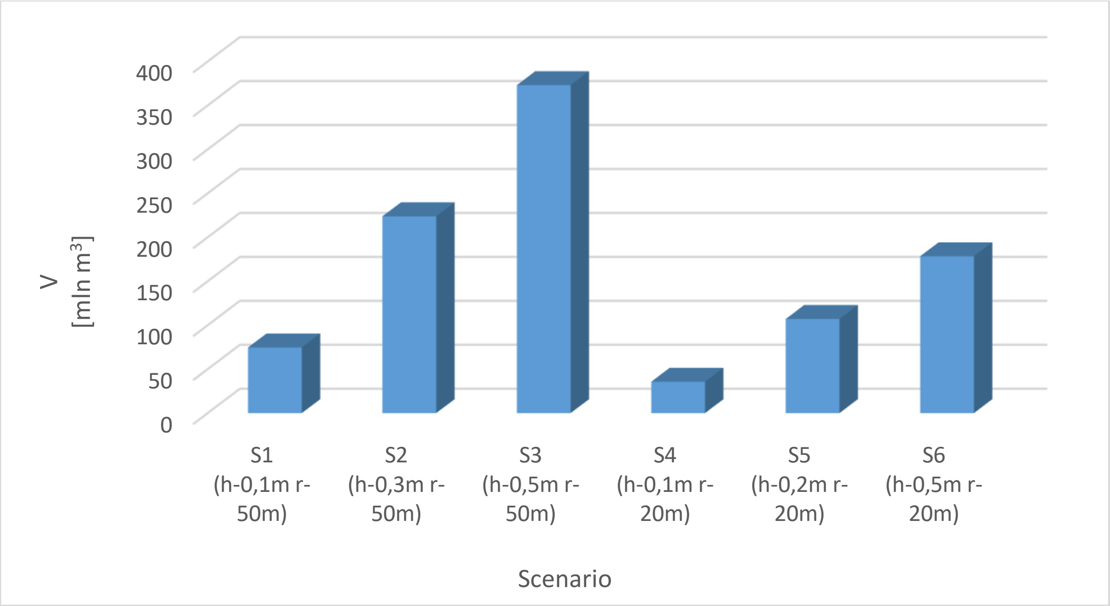

Fig. 4.10 Possible water retention volume of land reclamation systems in the Oder catchment

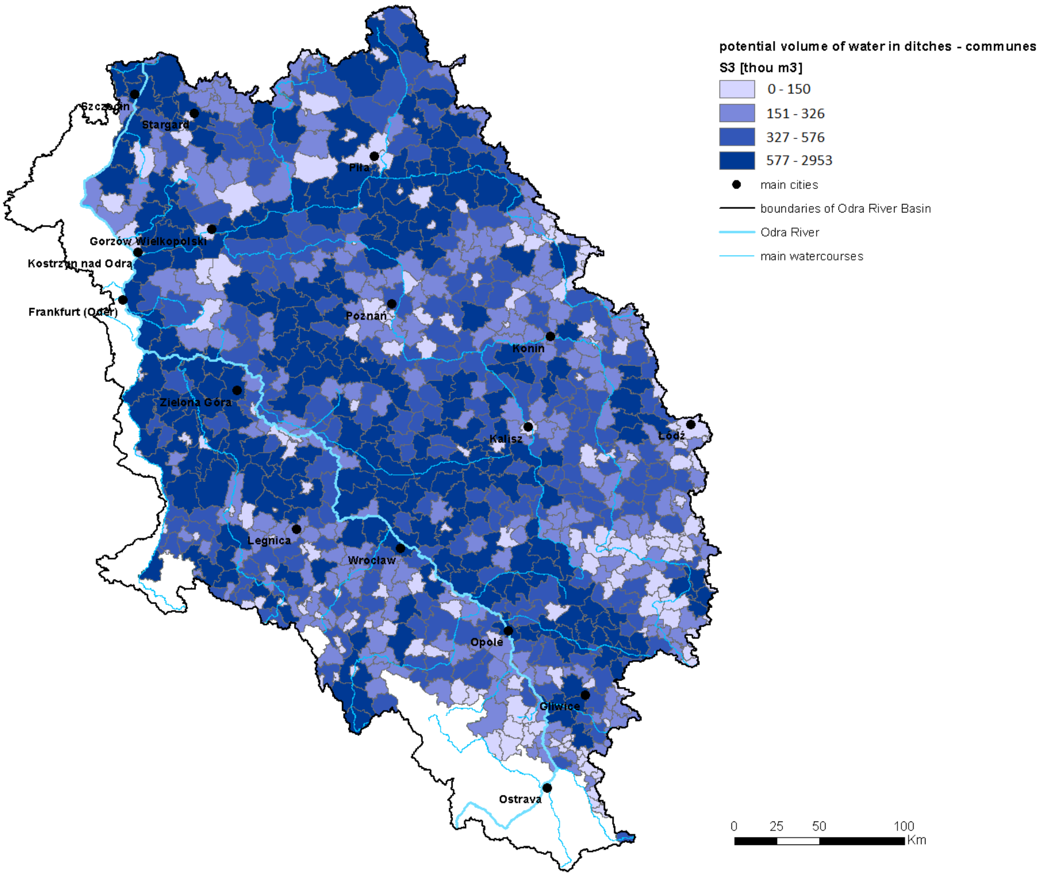

Fig. 4.11A Potential volume of water retention in land reclamation systems in S3 scenario in communes.

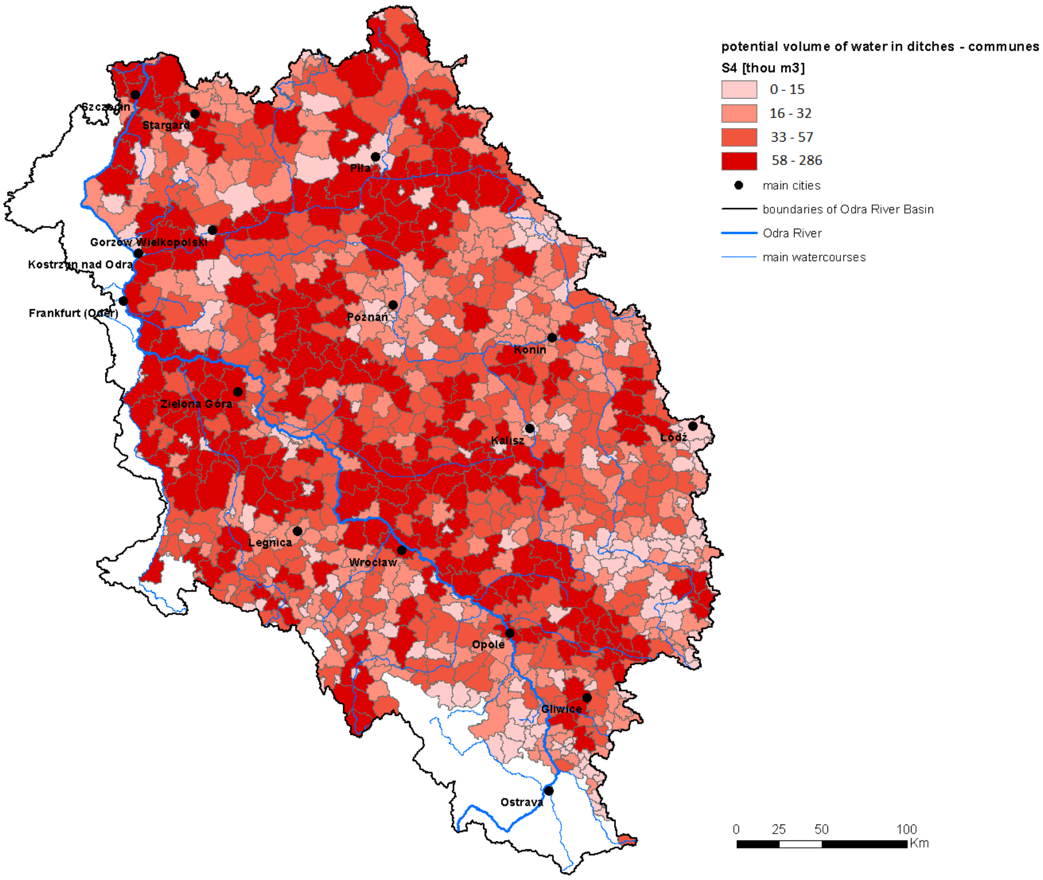

Fig. 4.11B Potential volume of water retention in land reclamation systems in S4 scenario in communes.

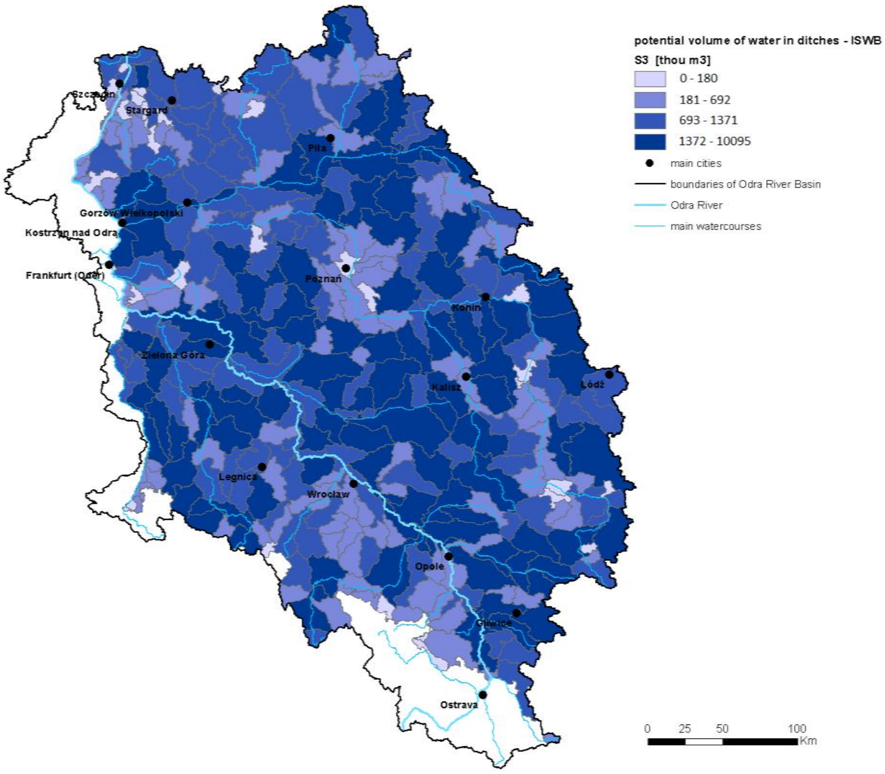

Fig. 4.12A Potential volume of water retention in land reclamation systems for S3 scenario in ISWB.

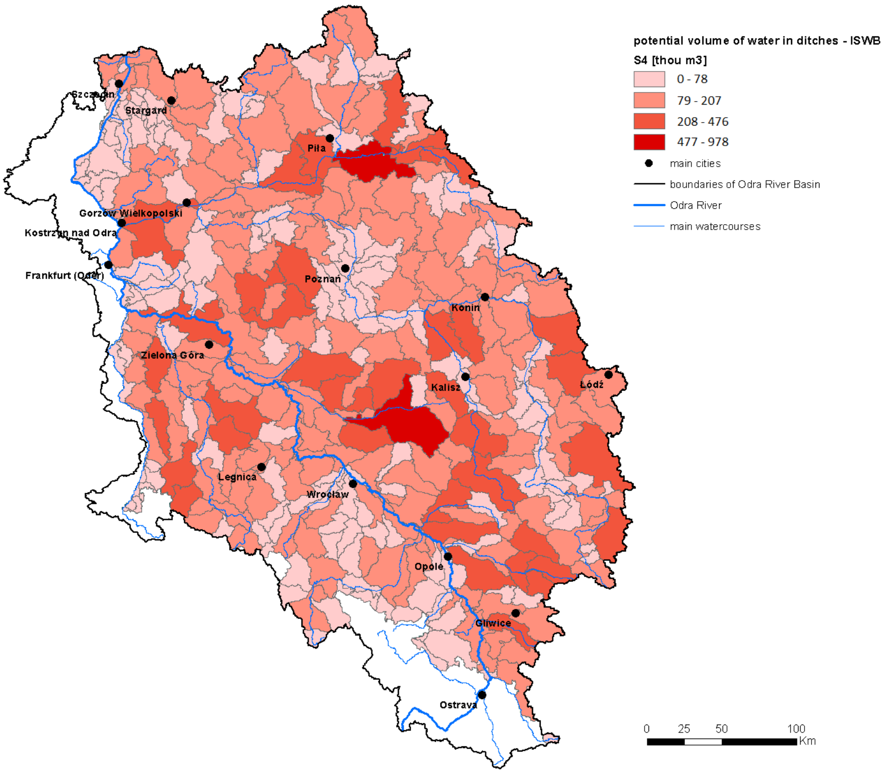

Fig. 4.12B Potential volume of water retention in land reclamation systems in scenario S4 in ISWB.

## 4.7 Integrated analysis of flood generation potential and water storage – prioritizing areas for action

Basing upon the results of calculated values of the CN parameter and summarized lengths of significant drainage ditches (potential volumes of water retention in land reclamation systems) for communes and ISWB, integrated analysis of prioritizing areas for water retention actions was carried out based on the assumptions described in chapter 3.4. The results of integrated analysis are presented in Appendix 1 and 2. The division of quantity and percentage of communes and ISWB depending on the priority for action interval is summarized in Tab. 4.4 and 4.5 and is presented in the Fig. 4.13 and Fig. 4.14. Spatial visualization of the priorities for communes and ISWB is shown in the Fig. 4.15 and Fig. 4.16.

Tab. 4.4 Quantitative division of communes depending on Priority for action

| Priority for action | number of communes | % of communes |
|---|---|---|
| High | 59 | 7% |
| Medium | 496 | 57% |
| Low | 293 | 34% |
| No necessary | 22 | 3% |

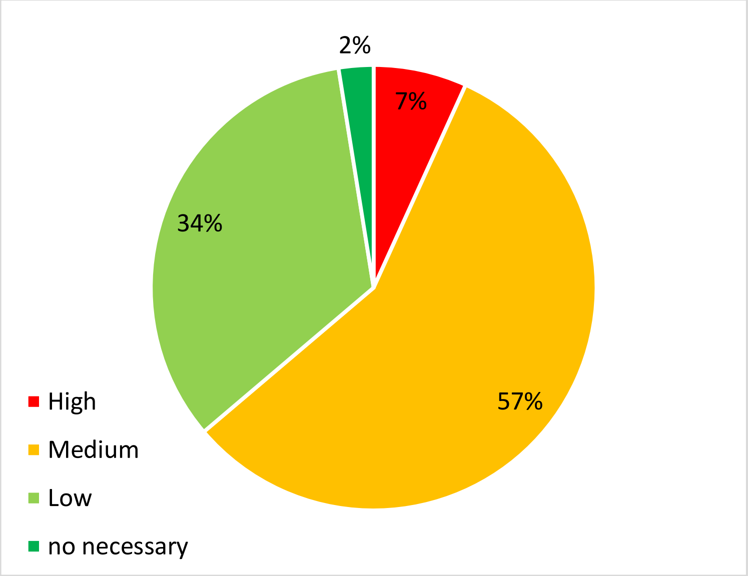

Fig. 4.13 Percentage division of communes depending on Priority for action

Tab. 4.5 Quantitative division of ISWB depending on Priority for action

| Priority for action | Number of ISWB | % of ISBW |
|---|---|---|
| High | 25 | 7% |
| Medium | 167 | 44% |
| Low | 150 | 39% |
| No necessary | 40 | 10% |

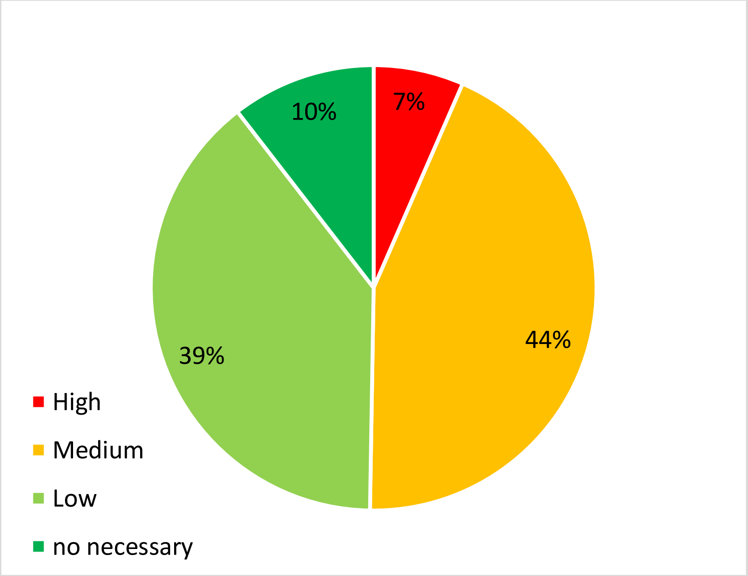

Fig. 4.14 Percentage division of ISWB depending on Priority for action

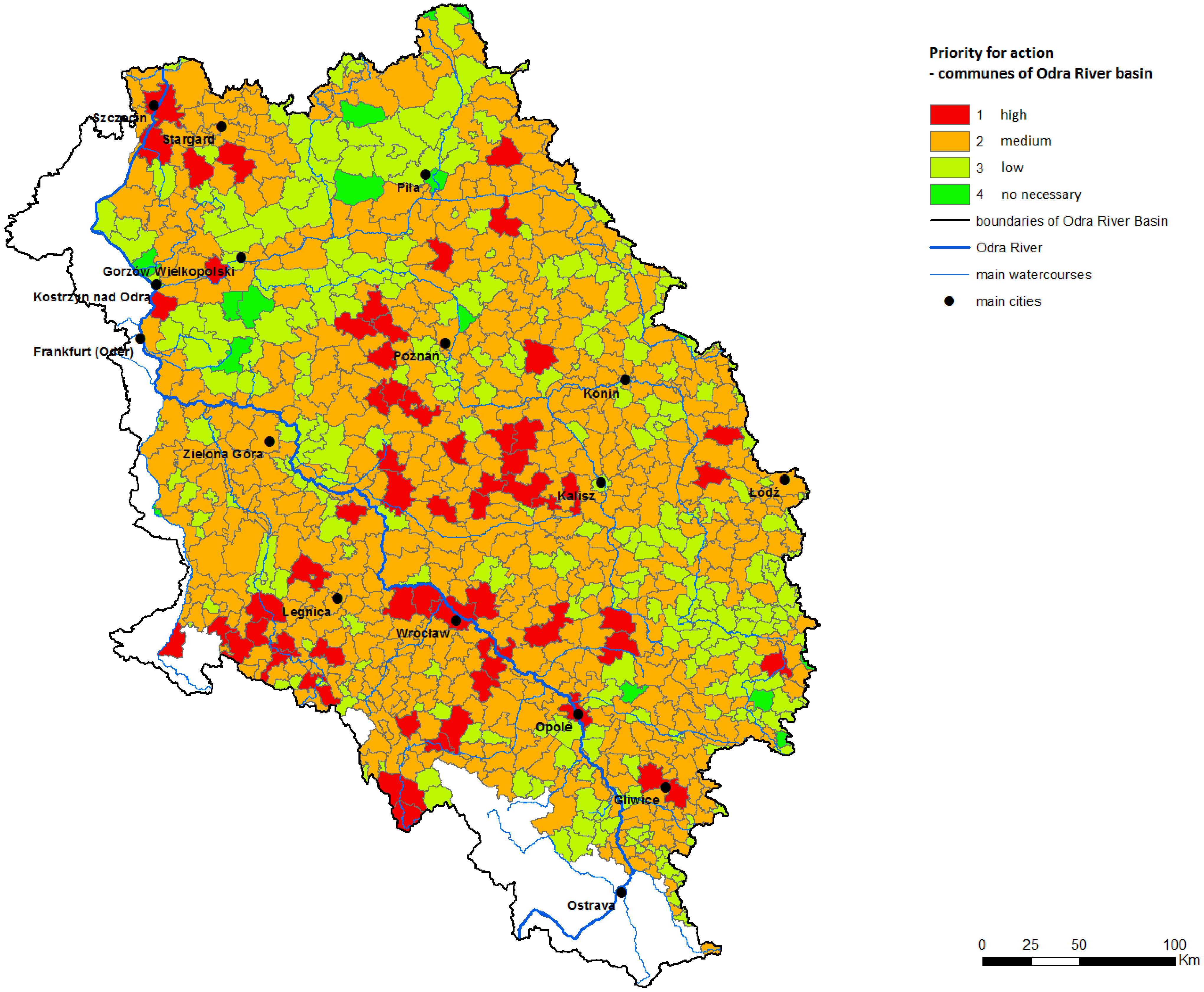

Fig. 4.15 Priority for action in communes of Oder catchment

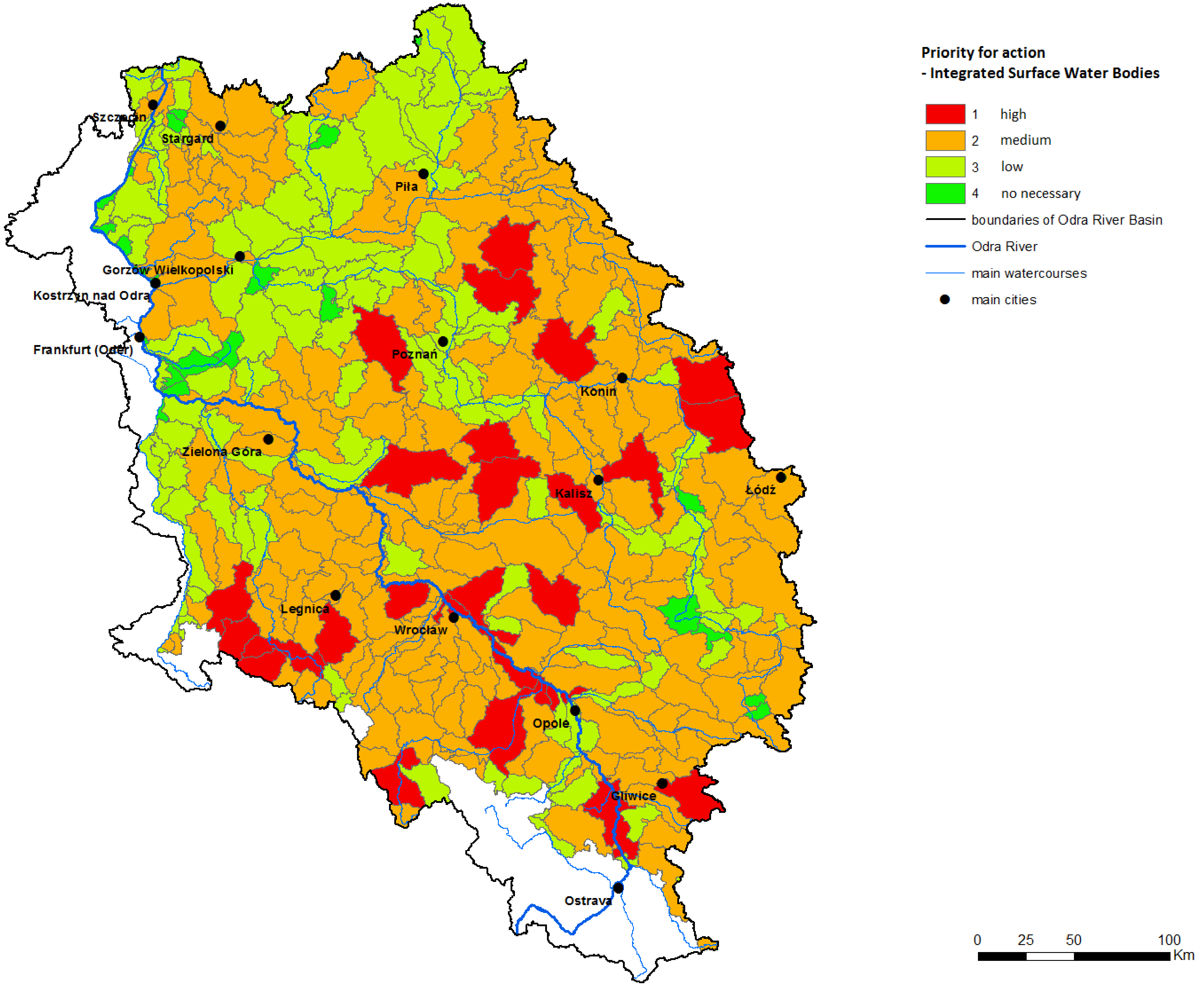

Fig. 4.16 Priority for action in Integrated Surface Water Bodies (ISWB) of Oder catchment

Although only 7% of the communes and ISWBs retain high priority for water storage increase for mitigating flood generation potential in the catchment of Oder, 64% of the communes and 51% of ISWBs retain Medium and High priority. This result presents that in most parts of the Oder catchment, actions related to water retention are required. Selected indicators used in the analysis of priorities present that areas defined as having "high" priority for action are distributed scatterly within the area of catchment (Fig. 4.15 and 4.16), not being concentrated in headwater parts.

## 5. Hydrological analysis of possibility for mitigation low water levels of Oder by active use of water stored in land reclamation systems

On the basis of hydrograph of water levels (Fig. 5.1) and discharges (Fig. 5.2) of Oder in Gozdowice, we analysed temporal trends of lowest annual water levels (Fig. 5.3) and discharges (Fig. 5.4). Note that hydrologic years analysed start on the 1st of November of the year before and ends on the 31st of October.

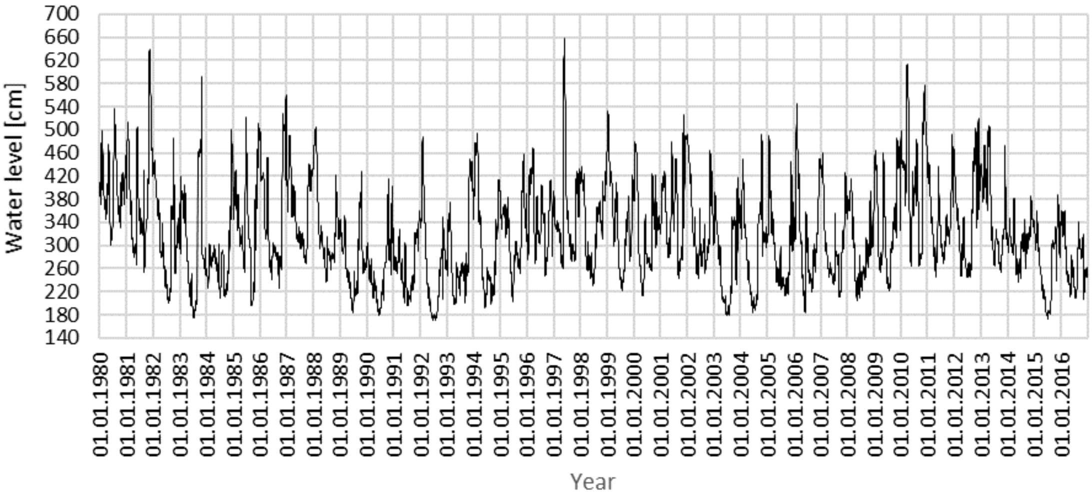

Fig. 5.1 Water levels of Oder in Gozdowice (1980-2016). Data: Institute of Meteorology and Water Management – National Research Intsitute (IMGW-PIB). URL: http://dane.imgw.pl

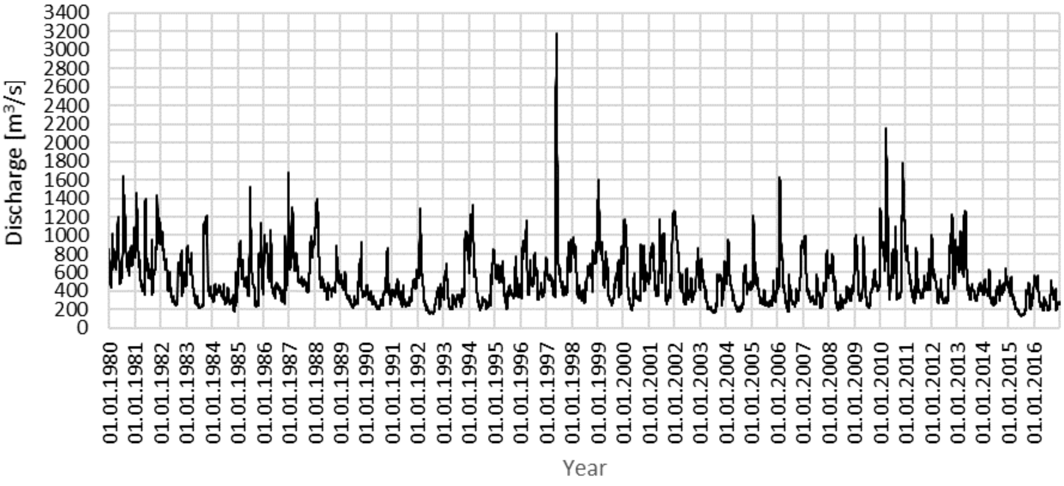

Fig. 5.2 Discharges of Oder in Gozdowice (1980-2016). Data: Institute of Meteorology and Water Management – National Research Intsitute (IMGW-PIB). URL: http://dane.imgw.pl

As the analysis period covers more than 35 years, it is long enough to conclude on the flow regime of a river (Huh et al., 2005). One can conclude that the trend of lowest annual water levels keeps slightly increasing, whilst lowest annual discharges are decreasing. However, both trends tend to be insignificant.

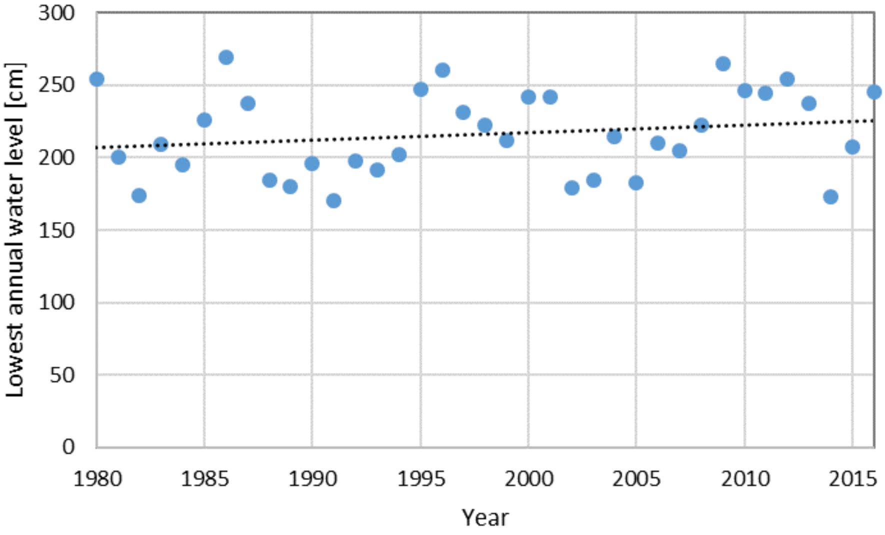

Fig. 5.3 Lowest annual water levels of Oder in Gozdowice (1980-2016). Data: Institute of Meteorology and Water Management – National Research Intsitute (IMGW-PIB). URL: http://dane.imgw.pl

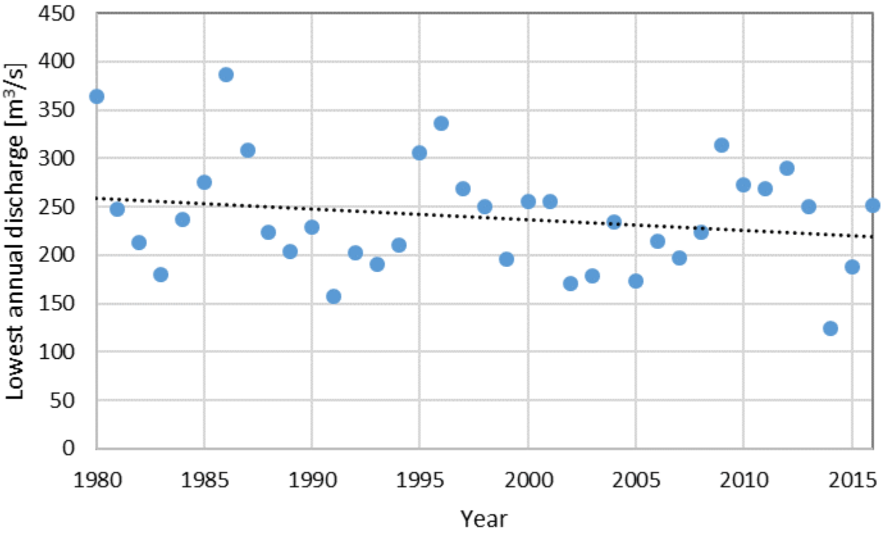

Fig. 5.4 Lowest annual discharges of Oder in Gozdowice (1980-2016). Data: Institute of Meteorology and Water Management – National Research Intsitute (IMGW-PIB). URL: http://dane.imgw.pl

In the next step, we calculated threshold discharge values representing 90% empirical exceedance frequency (Fig. 5.5) to verify what is the reference value of momentary discharge and related water level at exceedance frequencies of 90%. This value reached in our calculation 252 m$^3$/s, which is very close to result of the CfR where river discharge value of 250 m$^3$/s was calculated to correspond to a 90% exceedance frequency

(Hentschel and Huesener, 2014). Corresponding threshold in water level at exceedance frequency of 90% equalled in watergauge Gozdowice as high as 222 cm (Fig. 5.6).

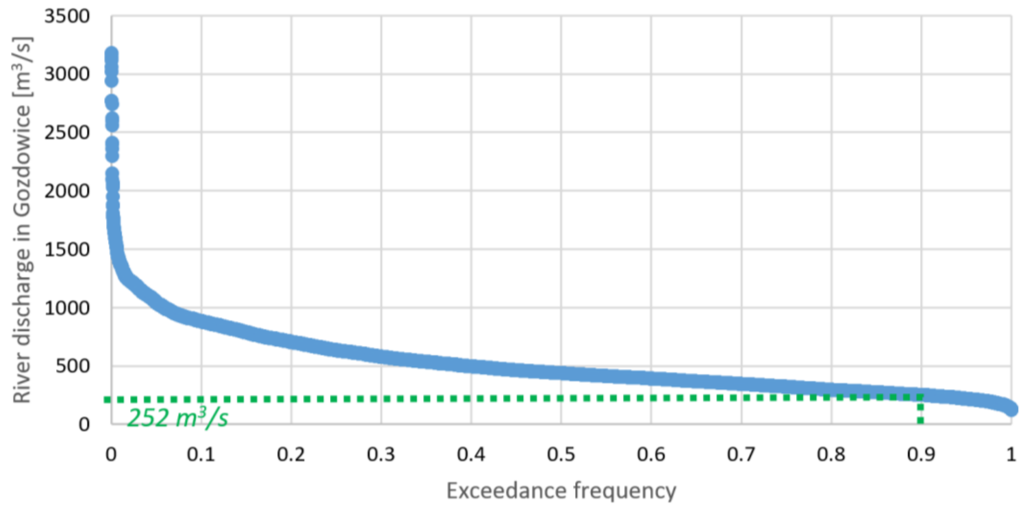

Fig. 5.5 Summaric exceedance frequency curve for 1980-2016 discharges of Oder in Gozdowice with marked threshold of 90% (0.9). Data: Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). URL: http://dane.imgw.pl.

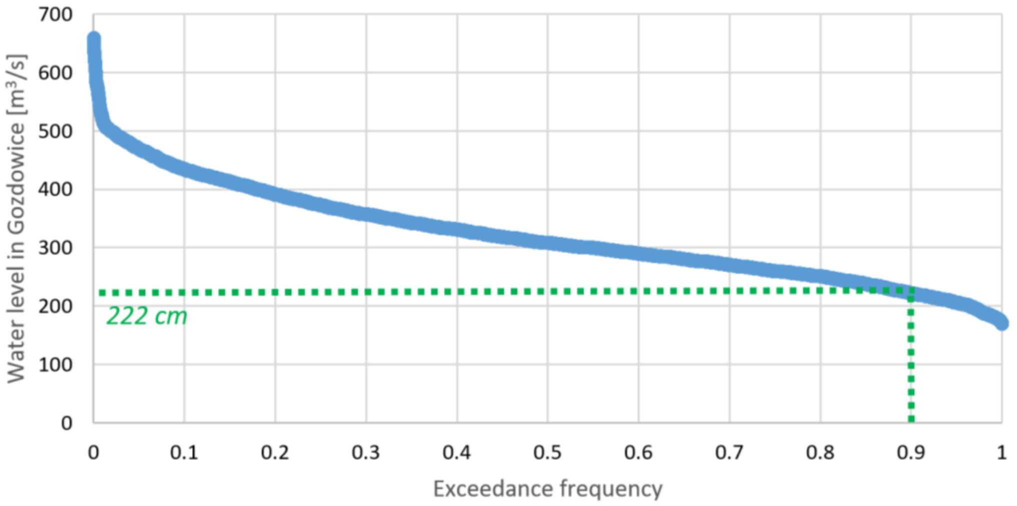

Fig. 5.6 Summaric exceedance frequency curve for 1980-2016 water levels of Oder in Gozdowice with marked threshold 90% (0.9). Data: Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). URL: http://dane.imgw.pl.

With the use of historical data of hydrometric measurements in this profile (Results of hydrometric measurements, 1973, 1974, 1980) (Tab. 5.1) we managed to analyze the relations of average depths in this profile and relate them to water levels (Fig. 5.7). The latter allowed us to set the threshold criterion of water level allowing for keeping average depth of river in this cross section at 1.8 m or higher. We revealed, that the average depth in Gozdowice cross-section is higher than 1.8 m when water levels are somehow higher than 180 cm at the watergauge (Tab. 5.1; Fig. 5.7). Bearing in mind we used historical data (up to now the geometry of cross-section might have changed) and in order to keep the uncertainty of our estimation at low level, we decided to use the value of **200 cm** as the threshold value, under which the risk of water depth decreasing below 1.8 m is very high. Water level 200 cm corresponds to the average water depth in Gozdowice profile at the level of around 195 cm and to the maximum water depth of around 3.3 m in Gozdowice profile (Tab. 5.1). Water level threshold of 200 cm was therefore used in further analyses.

Tab. 5.1 Relation between average depth in cross section of Oder in Gozdowice and water level measured on water gauge. Source of data: Results of hydrometric measurements (1973, 1974 and 1980).

| Date | H [cm] | Avg. Depth [m] | Max. Depth [m] |
|---|---|---|---|
| 28.05.1980 | 318 | 2.83 | 4.40 |
| 18.04.1980 | 311 | 3.02 | 4.62 |
| 17.09.1980 | 357 | 3.17 | 4.40 |
| 22.10.1980 | 408 | 3.68 | 5.02 |
| 19.09.1973 | 182 | 1.80 | 2.91 |
| 06.10.1973 | 180 | 1.87 | 3.10 |
| 22.10.1973 | 202 | 1.97 | 3.32 |
| 26.10.1973 | 221 | 1.96 | 3.12 |
| 04.05.1973 | 360 | 3.03 | 4.08 |
| 12.10.1977 | 395 | 3.71 | 5.90 |
| 19.11.1973 | 226 | 2.24 | 3.40 |
| 26.11.1973 | 235 | 2.35 | 3.45 |
| 05.04.1974 | 271 | 2.48 | 4.51 |
| 26.04.1974 | 210 | 2.01 | 3.78 |
| 16.05.1974 | 265 | 2.42 | 4.20 |
| 15.06.1974 | 258 | 2.43 | 4.20 |
| 12.07.1974 | 289 | 2.58 | 4.24 |
| 08.08.1974 | 315 | 2.67 | 4.16 |
| 21.08.1974 | 280 | 2.59 | 3.80 |
| 06.09.1974 | 286 | 2.60 | 3.74 |

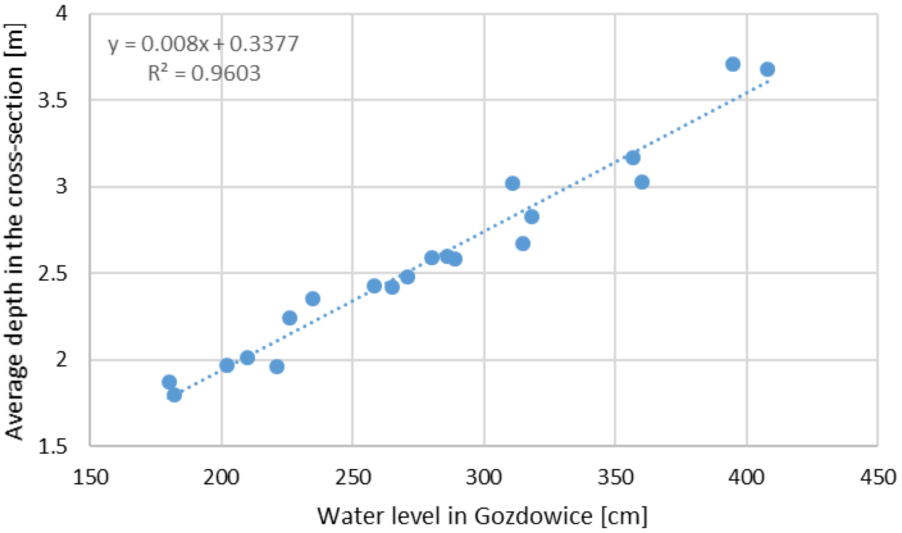

Fig. 5.7 Relation between average depth in cross section of Oder in Gozdowice and water level measured on water gauge. Source of data: Results of hydrometric measurements (1973, 1974 and 1980).

On the basis of available dataseries of water discharges and related water levels between 1980-2016 at water gauge Gozdowice we managed to provide an elementary rating curve of Oder in Gozdowice, representative for the range of water levels corresponding to low flow conditions (Fig. 5.8).

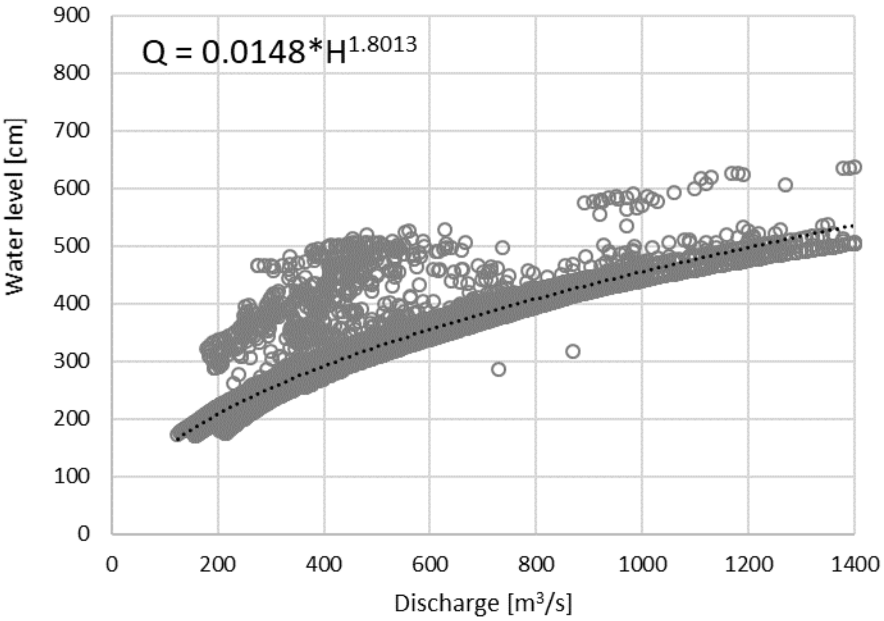

Fig. 5.8 Elementary rating curve of Oder in Gozdowice for Q < 1400 $m^3/s$ prepared on the basis of water level and river discharge dataseries from 1980-2016. Source of data: Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). URL: http://dane.imgw.pl.

With the use of rating curve equation (see Fig. 5.8) we managed to calculate river discharge deficit for periods, when water levels were lower than 200 cm. We estimated that momentary discharge that correspond to water level 200 cm used as a threshold in our analysis is as high as **207 $m^3/s$**.

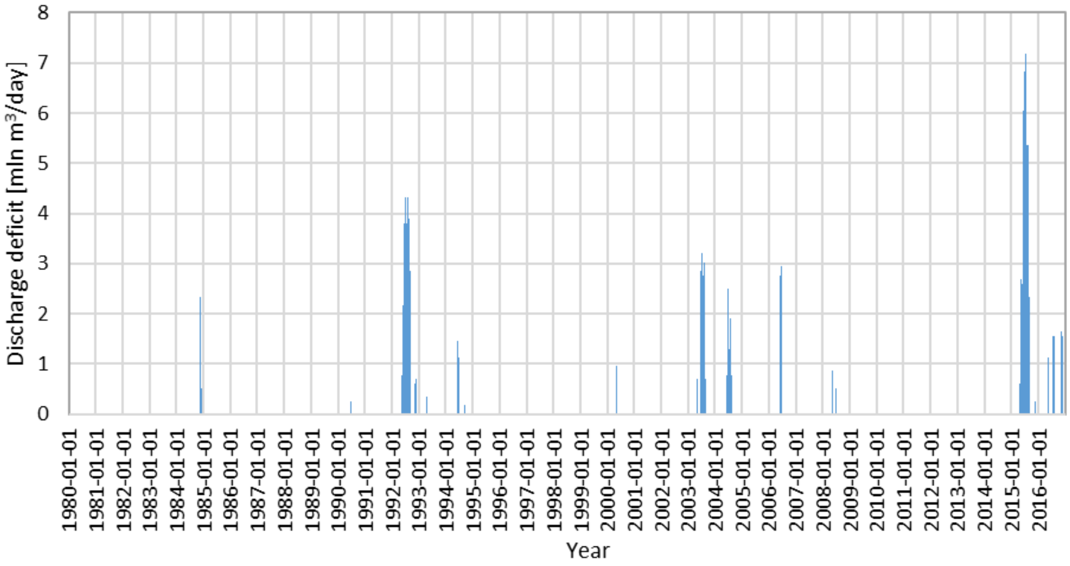

Fig. 5.9 Daily discharge deficit in Gozdowice (volume of water required to keep water level at the level 200 cm). Data: Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). URL: http://dane.imgw.pl.

Discharge deficit was calculated as the difference of threshold value and actual momentary discharge recorded every day, when water levels were lower than 200 cm. Discharge deficit calculated according to the proposed methodology was occurring in cycles, nearly every year in the analyzed multi-year period (Fig. 5.9).

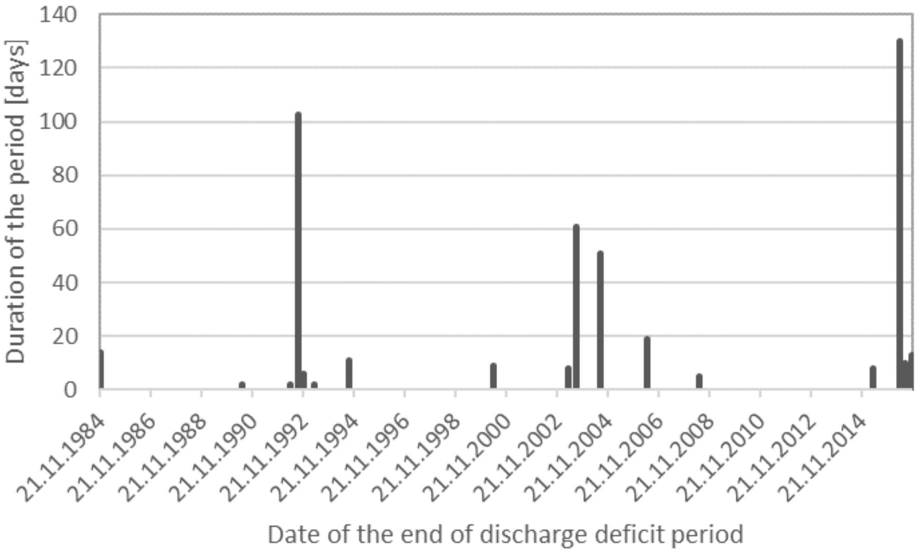

Fig. 5.10 Duration of all continuous periods with discharge deficit. Data: Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). URL: http://dane.imgw.pl.

Alltogether, 23 episodes with discharge deficit were recorded in Gozdowice in years 1980-2016. Their duration varied from 1 to 130 days (Fig. 5.10). Durations and volumes of winter discharge deficits were significantly shorter (max. 14 days) and smaller (max. 21.3 mln m$^3$; Tab. 5.2). Volume of discharge deficit was nonlinearly dependent on actual river discharge and duration of the episode (Fig. 5.11), and varied from 0.1 up to 479 mln m$^3$. Three episodes had the volume of discharge deficit higher than 100 mln m$^3$ (Fig. 5.12).

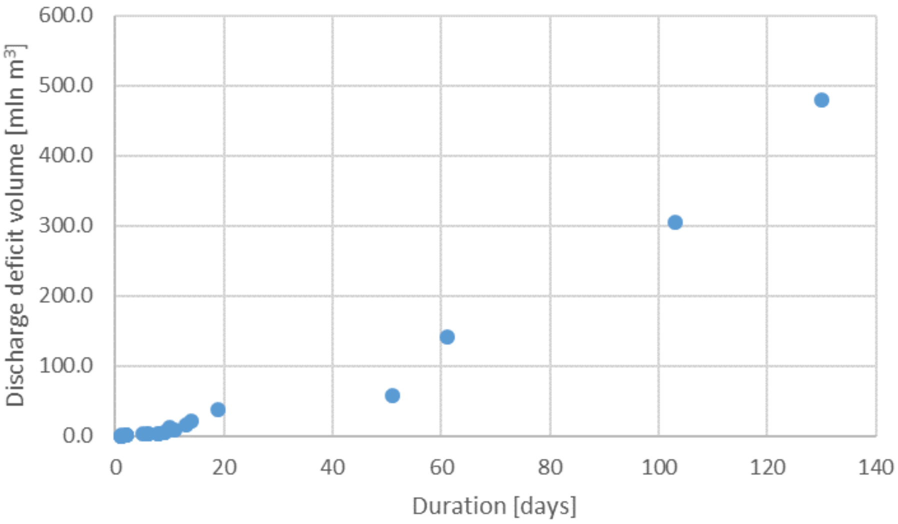

Fig. 5.11 Relation of volume of discharge deficit of particular drought episode with the duration of the episode. Data: Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). URL: http://dane.imgw.pl.

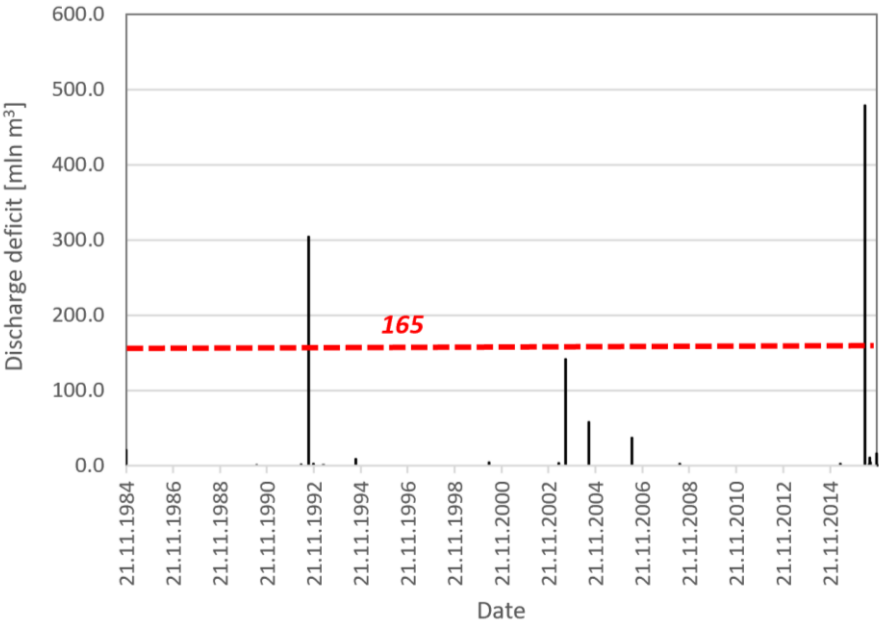

Fig. 5.12 Volume of discharge deficit (periods with Q lower than 207 m$^3$/s) of particular episodes of Oder in Gozdowice in years 1980-2016. Data: Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). URL: http://dane.imgw.pl.

Among the episodes of discharge deficit there were four that occurred in winter, in the time critical for icebreaking (Tab. 5.2). Among these four winter episodes, there were two episodes of discharge deficit bigger than 10 mln m$^3$, the winter episode with the biggest discharge deficit and also the longest duration was Discharge Deficit Episode No. 1 (discharge deficit 21.3 mln m$^3$, duration 14 days). The remaining 2 episodes of low flow had volumes of discharge deficit lower than 10 mln m$^3$. In spite of the fact that the Discharge Deficit Episode No. 18 (duration from 09.03. until 16.07.2016) started during a time where generally still ice cover can perform on Oder River, in the year 2016 there clearly was no ice cover anymore on the river, when this Discharge Deficit Episode No. 18 started in March. Therefore it can be legitime to not mark any part of this whole Discharge Deficit Episode No. 18 as a winter episode. The ice cover in 2016 was already broken up by the ice breakers in January 2016 and opened for commercial navigation already in February 2016[3,4].

Tab. 5.2. Dates of ocurrence, durations and volumes of discharge deficit episodes recorded in Gozdowice in years 1980-2016. Data: Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). URL: http://dane.imgw.pl.

| **No.** | **Date of the end** | **Duration [days]** | **Discharge deficit [mln m$^3$]** | **Season** |
|---|---|---|---|---|
| 1 | 21.11.1984 | ***14*** | ***21.3*** | ***Winter*** |
| 2 | 15.06.1990 | 2 | 0.4 | Other |
| 3 | 05.05.1992 | 2 | 1.6 | Other |
| 4 | 30.08.1992 | 103 | 304.3 | Other |
| 5 | 12.11.1992 | ***6*** | ***3.2*** | ***Winter*** |
| 6 | 11.04.1993 | 1 | 0.3 | Other |
| 7 | 15.04.1993 | 1 | 0.2 | Other |
| 8 | 19.04.1993 | 2 | 0.5 | Other |
| 9 | 03.09.1994 | 11 | 8.8 | Other |
| 10 | 06.05.2000 | 9 | 4.2 | Other |
| 11 | 22.04.2003 | 1 | 0.2 | Other |
| 12 | 01.05.2003 | 8 | 3.7 | Other |
| 13 | 11.08.2003 | 61 | 142.0 | Other |
| 14 | 02.08.2004 | 51 | 58.0 | Other |
| 15 | 10.06.2006 | 19 | 37.8 | Other |
| 16 | 16.06.2008 | 5 | 2.6 | Other |
| 17 | 25.04.2015 | 8 | 2.9 | Other |
| 18 | 16.05.2016 | 130 | 479.0 | Other |
| 19 | 14.07.2016 | 6 | 2.1 | Other |
| 20 | 25.07.2016 | 10 | 11.3 | Other |
| 21 | 05.08.2016 | 9 | 4.6 | Other |
| 22 | 13.11.2016 | ***13*** | ***16.4*** | ***Winter*** |
| 23 | 15.11.2016 | ***1*** | ***0.1*** | ***Winter*** |

Gozdowice profile was used for the analysis due to availability of data and – along – lack of data for the other sites that would allow drawing similar conclusions.

[3] https://www.wsv.de/ftp/presse/2016/00010_2016.pdf

[4] https://www.wsv.de/ftp/presse/2016/00051_2016.pdf

Being aware that Gozdowice profile due to its geometry is not frequently exposed to droughts that may negatively affect navigation (Hentschel and Huesener, 2014; Fig. 5.13), we claim that field-research-based analyses of discharge-depth and discharge deficit relations could be conducted along the whole stretch 2 of Border Oder.

Direct extrapolation of the results we obtained for Gozdowice is a complex task, as it requires the data on geometry of the cross-sections as well as rating curves for each of the problematic profiles.

However, as we see from our analyses for Gozdowice, the 90% discharge threshold corresponds to the discharge 252 $m^3/s$ and results in a related water level of 222 cm and a related average water depth of 211 cm.

At most shallow points of the Border Oder downstream Warta mouth the actual average water depth is only 10-30 cm shallower than the envisaged 180 cm during 90 % of the year, envisaged by the CfR (Hentschel and Huesener, 2014; see also Fig. 5.13). In the CfR the 90 %-of-the-year discharge treshold is calculated as 250 $m^3/s$ at Border Oder downstream Warta mouth, while we calculated the 90% discharge treshold as 252 $m^3/s$, since we used the more actual timeline 1980-2016, while in the CfR an older timeline was used (due to missing data there first was used the timeline 1981-2010 plus again the years 1981-1990, later, when more data were available, the timeline 1971-2010 was used; Hentschel and Huesener, 2014).

As described abbove, it is not possible to directly transfer the results from Gozdowice to the shallow parts of the river.

However, the results from Gozdowice show at least a trend being of high relevance also for the shallow parts of the river. This shall be illustrated using the following example.

In order to meet the goal of the CfR of 180 cm average water depth during 90% of the year in the whole part of the river including most of the shallow points, which are only 10-30 cm shallower than these 180 cm, one can conclude that:

(1) it could be assumed that for example at the watergauge Gozdowice the increase of average water depth of 22 cm (from 211 cm to 233 cm at Gozdowice) would be required in order to mitigate most of the shallow parts of the river,

(2) it would result in Gozdowice – according to our calculations – in a required increase of related water level by 25 cm from 222 cm to 247 cm which would result in Gozdowice – according to our calculations – in a required increase of related water discharge of 50 $m^3/s$ from 252 $m^3/s$ up to 302 $m^3/s$.

Calculated average total water retention volume in wisely managed land reclamation systems that reached 165 mln $m^3$ could allow – when stored water would be released again from the land reclamation systems into the Oder – to ensure this increase of water discharge in Gozdowice by 50 m³/s (increase of related water levels by 25 cm, increase of related average water depth by 22 cm, and – along – increase of river depth for navigation) for 37 days approximately.

Even if one assumes that the wise management of water levels in land reclamation sytems may be subjected to uncertainties, and assuming the most conservative scenario of water storage (36 mln m³), this volume of water would last to increase the water discharge by 50 m³/s in Gozdowice (increase of related water levels by 25 cm, increase of related average water depth by 22 cm) for some 8-9 days.

Assuming the maximum scenario of water storage (373 mln m³) in land reclamation systems, this volume of water would last to increase the water discharge by 50 m³/s in Gozdowice (increase of related water level by 25 cm, increase of related average water depth by 22 cm) for 83 days approximately.

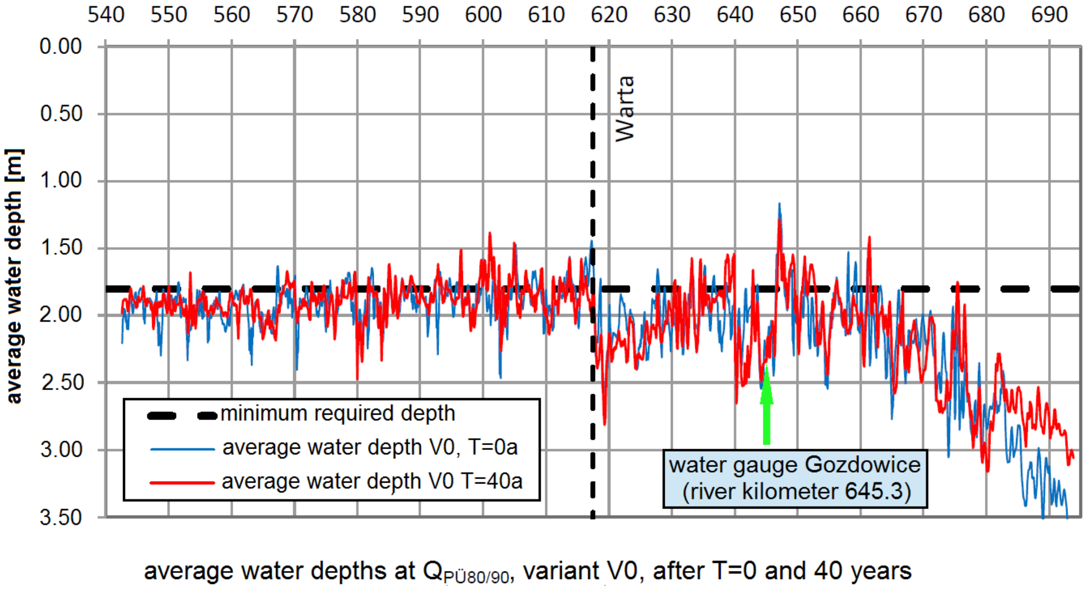

Fig. 5.13 Average water depths of Border Oder according to the CfR (An update of the concept for regulation of the Border Odra watercourse). The numbers in the X-axis show the river kilometer. The blue line is the actual average water depth as it is today without new channelization. The red line is the prognosted average water depth in 40 years, if the river would stay without new channelization. Downstream Warta river mouth (river kilometer 617) both lines (blue and red) are based on Q (90 %) = 250 m³/s for Oder. Upstream Warta river mouth both lines (blue and red) are based on Q (80 %) = 160 m³/s for Oder. Source: Modified from Hentschel and Huesener, 2014.

Similar calculations could be performed in other profiles, if rating curves are known and relations of water level to average river depth are constituted.

*Facing provided hydrological calculations and calculated volumes of water that could be potentially stored in appropriately managed land reclamation systems in the Oder catchment that was provided in Tab. 4.3 , one may derive several conclusions:*

- In years 1980-2016 water levels of Oder in Gozdowice for 90% of the total time were higher than 222 cm and related average water depths were higher than 211 cm. Considering the available data on the relation of water level and average water depth of Oder in Gozdowice cross-section, the river without any additional measures was capable to keep the minimum average water depth at above the level of 1.8 m during 90% of the year, which is the goal of the CfR (Hentschel and Huesener, 2014).

- *The volume of every individual winter discharge deficit episodes* (when the Oder depth in Gozdowice falled below the average water depth of 195 cm we chose as minimum treshold value and below the related water level of 200 cm and below the related water discharge of 207 $m^3/s$) *is significantly smaller than the calculated average active water retetion volume of wisely managed land reclamation systems, even in the most conservative scenario* (21.3 mln $m^3$ maximum water discharge deficit, in winter, Tab. 5.2., is lower than 36 mln $m^3$ minimum water storage in land reclamation systems; Tab. 4.3). *It is therefore expected that appropriate and systematic water management in land reclamation systems may successfully prevent vast majority of winter drought episodes, allowing for reaching the goal of the CfR during the whole winter discharge deficit episodes and not only during 90 % of the year.*

**Facing presented facts one could conclude that the proposed wise water management in land reclamation systems may be an efficient measure to be applied when increased navigational capacity of Oder is desired, especially in the winter periods.**

- The volumes of two of the biggest discharge deficit episodes (namely 479 mln $m^3$ and 304.3 mln $m^3$) that ocurred in Gozdowice in years 1980-2016 are so large that they could hardly be mitigated with any technical or nature-based measures – however, these discharge deficit episodes did *not* occur during winter.

- Also the CfR does not tackle droughts where water discharges less than 250 $m^3/s$ occur in Oder River, since the minimum average water depth of 180 cm which shall be achieved by the channelization is only achieved at water discharges of minimum 250 $m^3/s$ (Hentschel and Huesener, 2014). In this report, only droughts with related water discharges less than 207 $m^3/s$ were examined, showing that several of such droughts with related water discharges far lower than 250 $m^3/s$ did occur in winter. *So, also the CfR does not secure an average water depth of 180 cm during winter periods at related water discharges lower than 250 $m^3/s$-discharges which indeed occur in Oder River in winter. Different to this, our approach – with certain limitations – is able to secure average water depths of 180 cm along long stretches of the river also at water discharges much lower than 250 $m^3/s$.* The only condition is that the total discharge deficit volume of the drought episode (or at least the total discharge deficit volume of this part of the drought period where ice cover occurs) must not be bigger than the total volume of water storage capacity in land reclamation systems. *Since winter droughts between 1980 and 2016 with discharge deficits lower than 250 $m^3/s$ occured, but generally contained smaller total deficit volumes, it can be concluded that also along the shallow parts of Oder River our concept offers more security in reaching the goal of 1.80 m average water depth than the CfR does.*

- For those very few parts of the river being shallower than 150-160 cm average water depth, where our approach could not secure an average water depth of 180 cm (or secure an average water depth of 180 cm only for a very short time period) – single construction solutions could be applied, if shipping shall be improved (for ice breaking, this is not necessary, since there do exist alternatives such as the Amphibex which can break ice also at big rivers with very shallow depths; Schnauder and Domagalski 2018). However, even at some of these very shallow parts of Oder River there does exist a fairway which offers sufficient water depth (Schnauder and Domagalski 2018).

As shown above, at most shallow points of the Border Oder downstream Warta mouth the actual average water depth is only 10-30 cm shallower than the by the channelization envisaged 180 cm during 90% of the year (see also Fig. 5.13). The related minimum water discharge during 90% of the year is 250 $m^3/s$ in the CfR, we calculated 252 $m^3/s$, since we used more actual data (details were described above).

As presented, the CfR does not tackle droughts where less than 250 $m^3/s$ occur in winter in Oder River.

In case that our approach should ensure the same as the CfR – an average water depth of around 180 cm at most parts of the river during a minimum basic water discharge of 252 $m^3/s$ – the water discharge could be increased for example by 50 $m^3/s$ up to 302 $m^3/s$, so that the following results would be gained at Gozdowice:

- the most conservative water storage scenario of 36 mln $m^3$ in land reclamation systems can increase the water level by 25 cm and the related average water depth by 22 cm for around 8-9 days when the stored water is released from the land reclamation system,

- the average water storage scenario of 165 mln $m^3$ can increase the water level by 25 cm and the related average water depth by 22 cm for around 37 days when the stored water is released from the land reclamation system,

- the maximum water storage scenario of 373 mln $m^3$ can increase the water level by 25 cm and the related average water depth by 22 cm for around 83 days when the stored water is released from the land reclamation systems.

The given results are based on the rating curve for Gozdowice and cannot be transferred to the shallow parts of the river, since the rating curves for the shallow parts at Oder River are unknown to us (it may be that at the shallow parts the same increase of water discharge result in a lower gain of average water depth due to a wider river bed, or quite the opposite, that at the shallow parts the same increase of water discharge result even in a higher gain of average water depth due to the underwater dunes there which cause a reduced water speed and therefore cause a higher average water depth).

However, these results show a basic trend of high interest. Therefore we recommend to the authorities to further examine these results, based on the up-to-date rating curves for the shallow parts of Oder.

**Provided analysis should be performed for all of water gauging profiles along the border stretch of Oder River, as the geometry of river bed is likely to have a strong influence on calculated relations.**

## 6. Discussion

Results presented in this report, although partly based on open-access (and though – general) data provide and insight into the system-oriented topic on water retention and its possible role in mitigating low flows in the catchment of Oder. Applied methodology allowed for quantification of flood generation potential and delineation of important zones that are prerequisited for the enhacement of flooding. Our evidence-based study proved that areas that could be considered as flood-generating are randomly distributed within the catchment of Oder, being based on distribution of impermeable soils and land cover types that prerequisite accelerated surface runoff that forms the main body of flood hydrographs.

Average volume of water retention potential that could be achieved when wisely managing land reclamation systems, reached on average 165 mln m$^3$ of water. To compare, this volume is higher than the maximum potential water retention capacity of the Międzyodrze Polder calculated with hydrodynamic modeling (119,4 mln m$^3$ at a maximum average water depth of 220 cm in the Polder, 54.3 mln m$^3$ at an average water depth of 100 cm in the Polder, Schnauder and Domagalski, 2018). One should consider the fact that our study aimed at quantification of water storage capacity addressed only the areas of highest concentration of ditches. The optimum scenario of the highest damming capacity and the broadest spatial influence of ditches (Fig. 4.10) provides the prospective water storage volume of 373 mln m$^3$. To compare, flood-reserve capacity of newly constructed Racibórz polder-reservoir, estimated to reach 170 mln m$^3$, also provides theoretical lower retention capacity than roughly estimated water storage of land reclamation systems with some optimum assumptions. However, although the possible role of land reclamation systems distributed within the Oder basin in increasing water storage capacity of the catchment is high, the role of drainage systems in mitigating flood happens only in larger river valleys, where periodic flooding of reclaimed areas may slow down the floodwave propagation. Thus, it is likely that restoration of wetlands located in large river valleys may be much more successful in terms of flood risk management. However, land reclamation systems located in headwater parts of catchments still provide an important potential in regulating river discharge.

Bearing in mind that appropriate function of land reclamation systems allows for keeping high saturation of organic soils, preventing excessive $CO_2$ emission to the atmosphere (Fortuniak et al., 2017), proposed herein wise use of drainage systems for storing water is likely to have an excessive value, on top of flood risk management, in terms of ecosystem services.

Interpretation of hydrographs in Gozdowice allows to conclude that if wise use of land reclamation systems was implemented, then it should be theoretically possible to mitigate lowest winter discharges to allow improvement of navigability. Of course, there are still certain limitations related to the distance of particular land reclamation systems from the stretch 2 of Border Oder (Kostrzyn-Widuchowa) and possibility of storing water in autumn season. In dry years (e.g. such as 2015), this measure will not be possible to be implemented as country-wide limited water retention resources and a lack of rain do not allow for increase the retention capacity. However, in an average year such actions should be possible.

We propose the following instructions for damming:

- ditch dams should be blocked during 10 months of the year (blocked after a low water period in winter in the end of winter), which secures that a sufficient water storage is available for low water periods. New legal frames should be developed that ensure that concerned farmers receive at least the same level of EU-CAP subsidies which they received until now (ideally, 10-20 % more than they received until now) in order to compensate their losses in case that agriculture is not possible anymore due to too high water tables. Agri-environmental schemes should be adapted to this, as proposed by Grygoruk (2016).

- opening ditches should be done only when water discharge of Oder in the stretch 2 (Kostrzyn-Widuchowa) is foreseen to drop below certain threshold of 302 $m^3/s$ (the 90% value for the minimum water discharge during 90% of the year was calculated in this report as 252 $m^3/s$ which is very close to the 90 % value of 250 $m^3/s$ of the CfR + 50 $m^3/s$ that can be supplied by the opening of the ditches in order to ensure an average water depth of not too much lower than 1.80 m = roughly 302 $m^3/s$ at most shallow parts of this river stretch). Of course it does not make sense to open the ditches before a long freezing period starts, when it is still not predictable if a discharge deficit will appear during the freezing period - this would waste water and create the result that the ditches would already be empty before a possible discharge deficit period would have started. On the other hand it can be critized that it would be dangerous to open the ditches later, when a discharge deficit occurs while ice cover has already performed on river Oder, that such a late opening of the ditches could raise the water level and therefore also raise the danger of ice barriers. If such a case would happen, where ice cover has already performed on river Oder, when a discharge deficit with discharges lower than 302 m3/s is predicted to happen soon, we suggest to release the water initially in those areas of the catchment where freezing did not start (distribution of negative air temperatures is seldom homogeneous in the Oder catchment). So the water would be released just in time when the discharge deficit period starts after ice cover has already performed on river Oder. This would ensure that the water discharge would not fall lower than 302 m3/s in the stretch 2. of Oder, so that also the related water level would not fall and also not raise but stay stable, so that no additional risk of creating ice barriers would occur. In case that such an exact steering of the ditches would not be successful, so that during ice cover on river Oder the discharge would indeed drop significantly lower than 302 m3/s, before it could be raised again up to 302 m3/s, it still has to be mentioned that the raise of the water discharge up to 302 m3/s is still a low discharge for river Oder, so that this would probably not raise significantly the danger of ice barriers. Additionally it has to be mentioned that such a combination of an ice cover period lasting longer than one month on river Oder together with a significant discharge deficit (discharges even lower than 207 m3/s) during this long ice cover period did not occur during the last 30 years on the whole Border Oder (Compare discharge deficit periods described in Tab. 5.2 in chapter 5 with the ice cover periods described in Schuh (2011) (48) and with the ice cover periods described on the navigation information website ELWIS[5] of the german water and shipping administration - this comparison covers the timeline from 1986 to 2018; for the timeline before 1986 no detailled data concerning the exact duration of ice cover periods were available).

As shown above, this additional water discharge of 50 $m^3/s$ by opening the ditches could be conducted:

- during approximately 8-9 days (if the most conservative scenario of water storage of 36 mln $m^3$ in land reclamation systems was assumed),

- during approximately 37 days (if the average scenario of water storage of 165 mln $m^3$ in land reclamation systems was assumed)

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[5] https://www.elwis.de/DE/dynamisch/gewaesserkunde/eislage

- and during 83 days (if the maximum scenario of water storage of 373 mln m³ in land reclamation systems was assumed).

- alternatively, it could be chosen to not open the ditches when the water discharge falls below 302 m³/s in case that no freezing is predicted in the weather forecast, the ditches then could be opened later, e.g., when the water discharge is lower than 302 m³/s and when a significant freezing period and significant ice cover is predicted. For the prediction of the ice development the model developed for Border Oder by Kögel et al. (2017) can be very helpful which allows the monitoring and also the modelling and prediction of development of ice and ice cover based on Sentinel-1-Sattelite photos and the modelling programme RIVICE. Drought periods with water discharges lower than 302 m³/s do occur in winter time as mentioned above but are rare in winter time and last normally only few weeks (for discharges lower than 300 m³/s see Fig. 5.2; for discharges lower than 207 m³/s see additionally Tab. 5.2).

- opening ditches should be done according to a certain flow velocity-based scheme: ditches located close to the stretch 2 of Oder should be opened later than the ones located far.

As stated further above in chapter 3.5, there do exist alternative ice breaking methods (Amphibex) also for big rivers with very shallow water depths, so that shallow water depths do not limit ice breaking operations (Schnauder and Domagalski, 2018).

Additionally – due to the specific flowing conditions of Oder River – the realization of the CfR can even lead to the effect that the morphology of the river bottom may change and become dynamic. So, the official CfR contains the risk that the average water depth, will not be raised, compared with the contemorary condirions. Instead, even a reduction of the actual average water depth can happen as result of the channelization (Schnauder and Domagalski, 2018).

In addition, even if it would be assumed that the CfR would not create lower average water depths and would be able to realize the envisaged goal of 180 cm average water depth at related water discharge of 250 m³/s, also in this optimum scenario the CfR does not secure an average water depth of 180 cm at a related water discharge lower than 250 m³/s. Normally, water discharges in Oder River in winter are higher than 300 m³/s (Fig. 5.2), so that the average water depth of 180 cm is ensured already now without the CfR. In those cases where water discharges fall below 300 m³/s in winter, they also fall easily below 250 m³/s and even lower than 207 m³/s (Fig. 5.2, Tab. 5.2). In those cases, even if the CfR would correctly function, the 180 cm average water depth could not be realised.

These are further reasons to not conduct the planned channelization – and instead a further reason to search for nature-based solutions such as presented here in our approach.

Different to the CfR, our approach is able to secure average water depths of 180 cm along big parts of the river also at water discharges much lower than 250 m³/s, the only condition is that the time period of the draught episode must not last too long and that the water volume deficit of the drought episode must not be too large.

The examined drought episodes in winter (discharges lower than 207 m³/s) lasted only few weeks and were shorter than potential time periods of water release from land reclamation systems (see chapter 5).

Also the water volume deficit of these examined drought episodes in winter was lower than the volume of water storage in land reclamation systems (see chapter 5).

Even though in this report only drought episodes with related discharges lower than 207 m³/s were examined, it can be shown in Fig. 5.2 that also drought episodes with related discharges lower than 302 m³/s are also rare in winter and last short time, thererfore the probability is low that water volume deficit and duration of these drought episodes would be signficantly higher than those of the examined drought periods (302 m³/s is the higher treshold value suggested above, to which the water discharge should be raised when ice cover is predicted to happen in Oder).

So, it seems that our approach can fulfil these conditions (raising the average water depth up to around 180 cm at most parts of the river during a complete drought episode in winter). However, both, our approach and also the CfR, would not be able to secure the envisaged average water depth of 180 cm for a longer drought period in winter, in case that such would appear in the future.

For those very few parts of the Oder River being actually shallower than 150 – 160 cm average water depth at related discharge of 250 m³ /s, so that our approach could not secure the sufficient raise up to the average water depth of 180 cm (or secure the sufficient raise of the average water depth of 180 cm only for a very short time period) single construction solutions could be applied, if shipping shall be improved (for ice breaking, this is not necessary, since there do exist alternatives such as the Amphibex that can break ice also on large rivers with shallow water depths, as mentioned above).

However, even at some of these very shallow parts of Oder there does exist already now a basic fairway which offers sufficient water depth (Schnauder and Domagalski, 2018).

Steering water discharge presented in this report as useful measure in mitigating low flows of Oder River in winter remains an attempt to wise use existing land reclamation systems that may not be completely removed in order to fully allow natural processes or where it even is not possible to change the way of their agricultural use into e.g., Paludiculture. However, we foresee the proposed idea as the one that could be relatively easy to implement, and coherent with traditional agricultural use of Oder catchment.

The most desirable scenario for influencing the discharge regime of Oder and stabilize the lowst flows would be complete restoration of drained wetlands with special focus at peatlands. This action should be promoted in a wide scale. In terms of ecosystem services approach it is likely it would be much more efficient than any other scenario. However, very little or no data is available on the exact role of natural peatlands in changing flow regimes of rivers during droughts. Most of water stored e.g., in the peat, does not exchange "quickly" (horizon of days-months) with surface water (Ilnicki, 2002). Therefore, the long-term positive influence of fully restored wetlands in the basin of Oder on flow regime of Oder River between Kostrzyn and Widuchowa is probable, but hard to quantify and foresee. Despite this fact, we believe that wise use of land reclamation systems is a win-win situation, when available strategies for wetland (peatland) restoration do not allow to foresee quick progress in the field of broad scale ditch blocking (elimination) and when there are new ideas like building water storage reservoirs of certain capacity that will cause harm to the aquatic environment and provide little benefit for a broad scale flow regulation. At the moment, the volume of existing land reclamation systems which was quantified in this report is high enough to consider this type of water storage as a useful tool in low flow mitigation.

Proposed scheme of water management corresponds to some newly proposed changes to agro-environmental schemes in Poland, where the so-called "water retention package" was proposed (Grygoruk, 2016). If this package was implemented in the time horizon 2020 onwards, we believe the interest of land users in the proposed wise use of land reclamation system increases significantly.

Indicators used in the study for prioritizing water retention actions does not mean that the other areas should not be considered as potential sites for water retention enhancement. One should consider that some areas that received low priority for water retention enhancement have high flood generating potential, but quasi-nature-based water retention measures (such as the proposed water storage in ditch systems) might not be feasible to be applied there in a broad context due to the lack of land reclamation systems broad enough to handle water retention. However, areas that received "high" priority for action are the ones that (1) pose significant risk of flood generation due to physical features of the catchments and (2) land reclamation systems in these zones tend to be suitable to appropriate water management allowing for enhancement of water storage. Similar observations with respect to the other areas were pointed by Grzywna (2014), Kowalewski (2003), Stratford et al. (2015) and Pierzgalski et al. (2012).

## 7. Conclusions and recommendations

Results and analyses presented in this report allow to answer the questions stated in the research goals of this study:

*Is flood-generating potential, referred to as defined set of features allowing for rapid outflow of water from particular units of space in Oder catchment, variable in space?*

Flood-generating potential in the space of Oder catchment is strongly variable. Not only the upland and headwater parts of the catchment may contribute to rapid flooding. These areas that are important potential flood-generating zones are distributed randomly in the area analysed.

*Which areas of Oder catchment contribute the most to flood wave generation?*

The highest flood-generating potential described as a function of permeability of soils and land cover, are the areas of communes of Chojnów, Człuchów, Ksawerów, Lubań, Piekary Śląskie, Świdnica, Zgorzelec, Brzeg, Dzierżoniów, Głogów and Inowrocław. Among ISWB of the catchment of Oder, five the most significantly contributing to flood generation are Czadeczka, Dopływ z wyrobiska Turoszów, Odra w granicach Wrocławia, Kanał Młyński and Ślęza od Małej Ślęzy do Odry.

*What is the possible theoretical volume of water storage in land reclamation systems?*

Possible theoretical water storage volume of land reclamation systems reaches 165 mln $m^3$ (varies from 36 up to 373 mln $m^3$ depending on the scenario applied).

*Could water stored in land reclamation systems mitigate low winter flows of Oder?*

The average retention volume of wisely managed land reclamation systems is 165 mln $m^3$, which relates to an additional water discharge amount of 50 $m^3/s$ being deliverable for approx. 37 days during drought episodes in winter, when the natural water discharge amount is reduced to 252 $m^3/s$ (252 $m^3/s$ was calculated in this report in order to define the minimum water discharge during 90 % of the year on which the CfR is based, 250 $m^3/s$ is the 90% value which is calculated in the CfR itself, based on older data).

By far the most shallow points along the Border Oder are only 10-30 cm shallower than the by the CfR envisaged 180 cm average water depth (Fig. 5.13) :

- which is based on a water discharge of 250 $m^3/s$ between Warta River mouth and Widuchowa (= minimum water discharge during 90 % of the year)

- which is based on a water discharge of 160 m³/s between Nysa Luzycka mouth and Warta River mouth (= minimum water discharge during 80 % of the year), (details in chapter 3.5, 5 and 6).

When the natural water discharge amount is reduced to 252 m³/s, this additional 50 m³/s water discharge raising the water discharge up to 302 m³/s results in an additional average water depth of 22 cm at the Oder River at Gozdowice (situated on stretch 2 between Kostrzyn and Widuchowa).

Therefore it is likely that many of the shallow points (being only 10-30 cm shallower than 1.8 m, see Fig. 5.13) can receive the by the CfR envisaged water depth of 1.80 m even without channelization when an additional water discharge is released from the ditches, when the natural water discharge drops down to 252 m³/s. These average 165 mln m³ water storage capacity can receive especially during low water periods in winter times at most parts of the river similar positive results in gaining more water depth as the planned CfR, but – different to the planned CfR – without the need to harm on a large scale the ecosystems both within the channel and in its riparian zone.

Taking into account that these 165 mln m³ of water storage capacity represent only the average of our calculated scenarios and that the water storage may reach in the "S3"-scenario even 373 mln m³, (1) either this increase of water discharge of 50 m³/s can be delivered even during 83 days, or (2) the water discharge could be increased by 100 m³/s up to 352 m³ being delivered during 41 days which would increase the average water depth at Gozdowice by even 51 cm (from 211 cm average water depth – related water level 222 cm – related water discharge 252 m³/s up to 262 cm average water depth – related water level 275 cm – related water discharge of some 352 m³/s, compare Fig. 5.7, 5.8, 5.13), so that the raise of the average water depth can be much higher and/or the duration of days during which higher water levels can be secured can last much longer. We highly recommend to the shipping authorities to further examine this alternative in detail. It is expected that appropriate and systematic water management in land reclamation systems may successfully prevent vast majority of winter drought episodes, allowing for continuous improvement of navigation.

In these calculations we did not consider situations when the discharge of Oder River in winter falls below 252 m³/s (250 m³/s) downstream of river Warta mouth and therefore also below the by the CfR envisaged 180 cm average water depth (which is based on minimum 250 m³/s water discharge). However, these cases also were not considered in the CfR, so that in these cases (water discharges lower than 250 m³/s), which did happen in Gozdowice during the last decades several times (see chapters 5 and 6), also the official channelization concept would not have reached the envisaged average water depth of 180 cm.

Different to the CfR – which fails in such cases – , our approach can reach the envisaged average water depth of 180 cm at most shallow parts of the river also during drought episodes and discharges far lower than 250 m³/s, as shown in chapters 5 and 6 in this report.

Of course our approach could ensure the average water depth of 180 cm only for drought episodes which do not last too long.

However, as shown in chapters 5 and 6, such drought episodes in winter far lower than 250 m³/s in Oder River indeed lasted only for few weeks and included water volume deficit lower than water volume storage in land reclamation systems, so that our approach would most-likely have secured the average water depth of 180 cm in most shallow parts of the river during these short winter drought episodes, while the CfR would have failed to secure the average water depth of 180 cm in the shallow parts of the river during these short winter drought episodes.

Additionally – the CfR even raises the risk that the actual average water depth can even be reduced instead of being raised, so that even the goal of 180 cm at water discharges of minimum 250 m³ /s would not be achieved (Schnauder and Domagalski, 2018). This is a further reason to examine our approach more in detail as a possible alternative to the CfR.

### *Which areas of the Oder catchment should be assigned with high priority and high potential of water retention capacity?*

Communes and ISWBs of the highest priority for actions related to water retention are distributed in headwater and central part of the Oder catchment. Precise information in this matter are provided on the Fig. 4.15 and 4.16 as well as in the Appendix 1 and 2. Most of the catchment of Oder retains “Medium” or “High” priority for action.

# 8. List of Tables

# 9. List of Figures

## 10. References

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# 11. Appendixes

## Appendix 1. Table differentiation in communes of the CN parameter, potential retention divided into scenarios and priority for action.

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m$^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 1 | Aleksandrów Łódzki | 64 | 145 | 81 | 243 | 404 | 39 | 116 | 193 | Medium |
| 2 | Andrespol | 77 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 3 | Babiak | 67 | 123 | 70 | 211 | 352 | 34 | 101 | 168 | Medium |
| 4 | Babimost | 62 | 153 | 51 | 154 | 257 | 25 | 74 | 123 | Low |
| 5 | Baborów | 80 | 64 | 4 | 13 | 22 | 2 | 6 | 11 | Low |
| 6 | Banie | 75 | 85 | 26 | 79 | 132 | 13 | 38 | 63 | Low |
| 7 | Baranów | 70 | 110 | 48 | 145 | 241 | 23 | 69 | 115 | Low |
| 8 | Barcin | 74 | 88 | 31 | 93 | 154 | 15 | 44 | 74 | Medium |
| 9 | Bardo | 83 | 54 | 46 | 139 | 232 | 22 | 67 | 111 | Medium |
| 10 | Barlinek | 61 | 165 | 41 | 123 | 204 | 20 | 59 | 98 | Low |
| 11 | Barwice | 62 | 153 | 1 | 3 | 4 | 0 | 1 | 2 | Low |
| 12 | Bełchatów | 79 | 68 | 5 | 14 | 23 | 2 | 7 | 11 | Low |
| 13 | Bełchatów | 59 | 174 | 48 | 144 | 240 | 23 | 69 | 115 | Low |
| 14 | Biała | 77 | 76 | 36 | 107 | 179 | 17 | 51 | 86 | Medium |
| 15 | Biała | 75 | 84 | 75 | 225 | 375 | 36 | 108 | 179 | Medium |
| 16 | Białe Błota | 49 | 263 | 107 | 322 | 537 | 51 | 154 | 257 | Low |
| 17 | Białośliwie | 60 | 169 | 251 | 753 | 1255 | 120 | 360 | 600 | Medium |
| 18 | Biały Bór | 53 | 227 | 87 | 262 | 437 | 42 | 125 | 209 | Low |
| 19 | Bielawa | 86 | 41 | 21 | 62 | 103 | 10 | 30 | 49 | Medium |
| 20 | Bielice | 82 | 54 | 52 | 157 | 262 | 25 | 75 | 125 | Medium |
| 21 | Bierawa | 59 | 173 | 117 | 352 | 586 | 56 | 168 | 280 | Low |
| 22 | Bierutów | 69 | 116 | 72 | 217 | 361 | 35 | 104 | 173 | Medium |
| 23 | Bierzwnik | 55 | 205 | 96 | 287 | 478 | 46 | 137 | 229 | Low |
| 24 | Blachownia | 56 | 200 | 83 | 250 | 417 | 40 | 120 | 199 | Low |
| 25 | Bledzew | 56 | 197 | 9 | 28 | 46 | 4 | 13 | 22 | not necessary |
| 26 | Blizanów | 75 | 86 | 87 | 261 | 434 | 42 | 125 | 208 | Medium |
| 27 | Błaszki | 76 | 79 | 96 | 289 | 481 | 46 | 138 | 230 | Medium |
| 28 | Bobolice | 46 | 302 | 19 | 56 | 93 | 9 | 27 | 44 | not necessary |
| 29 | Bobrowice | 53 | 225 | 109 | 326 | 543 | 52 | 156 | 260 | Low |
| 30 | Bogatynia | 84 | 47 | 154 | 463 | 772 | 74 | 221 | 369 | High |
| 31 | Bogdaniec | 73 | 93 | 138 | 413 | 688 | 66 | 197 | 329 | High |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 32 | Boguszów-Gorce | 63 | 148 | 15 | 45 | 75 | 7 | 22 | 36 | Low |
| 33 | Bojadła | 57 | 193 | 105 | 316 | 526 | 50 | 151 | 252 | Low |
| 34 | Bojanowo | 73 | 92 | 118 | 354 | 591 | 56 | 169 | 282 | Medium |
| 35 | Bolesławiec | 61 | 160 | 57 | 172 | 287 | 27 | 82 | 137 | Low |
| 36 | Bolesławiec | 75 | 85 | 2 | 6 | 10 | 1 | 3 | 5 | Low |
| 37 | Bolesławiec | 69 | 117 | 60 | 180 | 300 | 29 | 86 | 143 | Low |
| 38 | Boleszkowice | 58 | 183 | 9 | 27 | 45 | 4 | 13 | 22 | not necessary |
| 39 | Bolków | 83 | 51 | 158 | 475 | 791 | 76 | 227 | 378 | High |
| 40 | Boniewo | 77 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 41 | Borek Wielkopolski | 81 | 60 | 94 | 281 | 469 | 45 | 134 | 224 | Medium |
| 42 | Borne Sulinowo | 55 | 209 | 130 | 389 | 649 | 62 | 186 | 310 | Medium |
| 43 | Boronów | 49 | 266 | 93 | 280 | 466 | 45 | 134 | 223 | Low |
| 44 | Borów | 84 | 47 | 34 | 101 | 169 | 16 | 48 | 81 | Medium |
| 45 | Bralin | 67 | 125 | 110 | 329 | 549 | 53 | 158 | 263 | Medium |
| 46 | Branice | 79 | 66 | 19 | 57 | 96 | 9 | 27 | 46 | Low |
| 47 | Brąszewice | 56 | 203 | 98 | 293 | 488 | 47 | 140 | 234 | Low |
| 48 | Brodnica | 68 | 118 | 27 | 80 | 133 | 13 | 38 | 63 | Low |
| 49 | Brody | 52 | 236 | 214 | 641 | 1068 | 102 | 306 | 511 | Medium |
| 50 | Brójce | 83 | 53 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 51 | Brudzew | 68 | 118 | 60 | 179 | 299 | 29 | 86 | 143 | Low |
| 52 | Brzeg | 90 | 27 | 3 | 8 | 13 | 1 | 4 | 6 | Medium |
| 53 | Brzeg Dolny | 65 | 134 | 43 | 128 | 214 | 20 | 61 | 102 | Low |
| 54 | Brzeziny | 54 | 218 | 139 | 416 | 693 | 66 | 199 | 331 | Medium |
| 55 | Brzeźnica | 68 | 121 | 77 | 232 | 387 | 37 | 111 | 185 | Medium |
| 56 | Brzeźnio | 65 | 139 | 40 | 119 | 199 | 19 | 57 | 95 | Low |
| 57 | Brzeżno | 65 | 138 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 58 | Buczek | 68 | 121 | 68 | 203 | 339 | 32 | 97 | 162 | Medium |
| 59 | Budzyń | 62 | 156 | 176 | 527 | 878 | 84 | 252 | 420 | Medium |
| 60 | Buk | 77 | 76 | 40 | 120 | 199 | 19 | 57 | 95 | Medium |
| 61 | Burzenin | 70 | 110 | 39 | 116 | 193 | 19 | 56 | 93 | Low |
| 62 | Byczyna | 79 | 68 | 125 | 376 | 627 | 60 | 180 | 300 | High |
| 63 | Bydgoszcz | 43 | 336 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 64 | Bystrzyca Kłodzka | 79 | 66 | 226 | 677 | 1128 | 108 | 324 | 539 | High |
| 65 | Bytnica | 42 | 351 | 65 | 195 | 325 | 31 | 93 | 156 | Low |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 66 | Bytom | 88 | 35 | 19 | 56 | 94 | 9 | 27 | 45 | Medium |
| 67 | Bytom Odrzański | 69 | 112 | 38 | 115 | 191 | 18 | 55 | 92 | Low |
| 68 | Bytoń | 77 | 76 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 69 | Cedynia | 64 | 141 | 59 | 178 | 297 | 28 | 85 | 142 | Low |
| 70 | Ceków-Kolonia | 65 | 139 | 97 | 290 | 483 | 46 | 139 | 231 | Medium |
| 71 | Chocianów | 53 | 225 | 260 | 780 | 1301 | 124 | 373 | 622 | Medium |
| 72 | Chociwel | 72 | 97 | 40 | 120 | 201 | 19 | 58 | 96 | Medium |
| 73 | Chocz | 55 | 208 | 98 | 295 | 492 | 47 | 141 | 235 | Low |
| 74 | Chodecz | 74 | 87 | 3 | 9 | 15 | 1 | 4 | 7 | Low |
| 75 | Chodów | 82 | 55 | 51 | 153 | 255 | 24 | 73 | 122 | Medium |
| 76 | Chodzież | 78 | 72 | 14 | 42 | 71 | 7 | 20 | 34 | Low |
| 77 | Chodzież | 54 | 220 | 456 | 1368 | 2280 | 218 | 654 | 1090 | Medium |
| 78 | Chojna | 68 | 118 | 123 | 368 | 613 | 59 | 176 | 293 | Medium |
| 79 | Chojnów | 73 | 94 | 247 | 740 | 1234 | 118 | 354 | 590 | High |
| 80 | Chojnów | 93 | 19 | 2 | 6 | 11 | 1 | 3 | 5 | Medium |
| 81 | Chorzów | 84 | 48 | 5 | 15 | 25 | 2 | 7 | 12 | Low |
| 82 | Choszczno | 74 | 91 | 100 | 300 | 501 | 48 | 144 | 239 | Medium |
| 83 | Chrząstowice | 58 | 182 | 171 | 512 | 853 | 82 | 245 | 408 | Medium |
| 84 | Chrzypsko Wielkie | 70 | 107 | 37 | 111 | 184 | 18 | 53 | 88 | Medium |
| 85 | Ciasna | 62 | 155 | 211 | 634 | 1056 | 101 | 303 | 505 | Medium |
| 86 | Ciepłowody | 77 | 77 | 16 | 47 | 79 | 8 | 23 | 38 | Low |
| 87 | Cieszków | 62 | 154 | 86 | 258 | 430 | 41 | 123 | 206 | Medium |
| 88 | Cieszyn | 89 | 32 | 13 | 40 | 67 | 6 | 19 | 32 | Medium |
| 89 | Cisek | 84 | 48 | 64 | 193 | 321 | 31 | 92 | 154 | Medium |
| 90 | Cybinka | 53 | 225 | 123 | 368 | 613 | 59 | 176 | 293 | Medium |
| 91 | Czajków | 52 | 235 | 93 | 279 | 465 | 44 | 133 | 222 | Low |
| 92 | Czaplinek | 61 | 162 | 96 | 288 | 480 | 46 | 138 | 229 | Medium |
| 93 | Czarne | 56 | 197 | 65 | 196 | 327 | 31 | 94 | 157 | Low |
| 94 | Czarnków | 73 | 92 | 6 | 19 | 32 | 3 | 9 | 15 | Low |
| 95 | Czarnków | 55 | 208 | 394 | 1181 | 1968 | 188 | 565 | 941 | Medium |
| 96 | Czarnożyły | 73 | 96 | 65 | 194 | 323 | 31 | 93 | 154 | Medium |
| 97 | Czarny Bór | 68 | 118 | 63 | 188 | 314 | 30 | 90 | 150 | Medium |
| 98 | Czastary | 67 | 125 | 46 | 137 | 228 | 22 | 66 | 109 | Low |
| 99 | Czempiń | 78 | 72 | 93 | 279 | 465 | 44 | 133 | 222 | Medium |
| 100 | Czermin | 73 | 94 | 67 | 202 | 337 | 32 | 97 | 161 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 101 | Czernica | 73 | 96 | 99 | 297 | 495 | 47 | 142 | 237 | Medium |
| 102 | Czerniejewo | 65 | 138 | 84 | 252 | 420 | 40 | 120 | 201 | Medium |
| 103 | Czerwieńsk | 57 | 192 | 221 | 663 | 1105 | 106 | 317 | 529 | Medium |
| 104 | Czerwionka-Leszczyny | 68 | 120 | 98 | 293 | 488 | 47 | 140 | 234 | Medium |
| 105 | Czerwonak | 57 | 190 | 21 | 62 | 103 | 10 | 29 | 49 | not necessary |
| 106 | Częstochowa | 83 | 53 | 18 | 54 | 90 | 9 | 26 | 43 | Low |
| 107 | Człopa | 49 | 265 | 21 | 64 | 107 | 10 | 31 | 51 | not necessary |
| 108 | Człuchów | 92 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | Medium |
| 109 | Człuchów | 64 | 142 | 37 | 111 | 185 | 18 | 53 | 88 | Low |
| 110 | Dalików | 75 | 84 | 81 | 243 | 406 | 39 | 116 | 194 | Medium |
| 111 | Damasławek | 80 | 64 | 70 | 209 | 349 | 33 | 100 | 167 | Medium |
| 112 | Daszyna | 82 | 54 | 5 | 14 | 24 | 2 | 7 | 11 | Low |
| 113 | Dąbie | 53 | 221 | 136 | 408 | 680 | 65 | 195 | 325 | Medium |
| 114 | Dąbie | 64 | 141 | 70 | 209 | 348 | 33 | 100 | 167 | Medium |
| 115 | Dąbrowa | 74 | 91 | 14 | 43 | 72 | 7 | 21 | 35 | Low |
| 116 | Dąbrowa | 75 | 87 | 105 | 316 | 526 | 50 | 151 | 252 | Medium |
| 117 | Dąbrowa Biskupia | 70 | 108 | 39 | 116 | 193 | 18 | 55 | 92 | Medium |
| 118 | Dąbrowa Zielona | 59 | 179 | 131 | 393 | 656 | 63 | 188 | 314 | Medium |
| 119 | Dąbrowice | 83 | 53 | 1 | 4 | 7 | 1 | 2 | 4 | Low |
| 120 | Debrzno | 67 | 125 | 80 | 239 | 398 | 38 | 114 | 190 | Medium |
| 121 | Deszczno | 67 | 124 | 152 | 456 | 759 | 73 | 218 | 363 | Medium |
| 122 | Dębno | 54 | 221 | 127 | 382 | 636 | 61 | 183 | 304 | Medium |
| 123 | Dębowiec | 80 | 62 | 2 | 6 | 10 | 1 | 3 | 5 | Low |
| 124 | Długołęka | 75 | 84 | 189 | 568 | 947 | 91 | 272 | 453 | High |
| 125 | Dłutów | 65 | 138 | 27 | 80 | 134 | 13 | 38 | 64 | Low |
| 126 | Dobiegniew | 54 | 220 | 62 | 185 | 308 | 29 | 88 | 147 | Low |
| 127 | Dobra | 70 | 107 | 86 | 258 | 429 | 41 | 123 | 205 | Medium |
| 128 | Dobra | 77 | 77 | 32 | 95 | 158 | 15 | 45 | 75 | Medium |
| 129 | Dobra (Szczecińska) | 66 | 131 | 148 | 443 | 739 | 71 | 212 | 353 | Medium |
| 130 | Dobre | 77 | 75 | 10 | 30 | 50 | 5 | 14 | 24 | Low |
| 131 | Dobrodzień | 52 | 231 | 172 | 515 | 858 | 82 | 246 | 410 | Medium |
| 132 | Dobromierz | 80 | 62 | 63 | 189 | 315 | 30 | 91 | 151 | Medium |
| 133 | Dobroń | 62 | 159 | 62 | 185 | 308 | 30 | 89 | 148 | Medium |
| 134 | Dobroszyce | 60 | 167 | 58 | 174 | 290 | 28 | 83 | 139 | Low |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 135 | Dobryszyce | 61 | 159 | 27 | 82 | 136 | 13 | 39 | 65 | Low |
| 136 | Dobrzany | 72 | 98 | 46 | 137 | 228 | 22 | 65 | 109 | Medium |
| 137 | Dobrzeń Wielki | 65 | 138 | 73 | 219 | 365 | 35 | 105 | 175 | Medium |
| 138 | Dobrzyca | 81 | 58 | 89 | 266 | 443 | 42 | 127 | 212 | Medium |
| 139 | Dolice | 72 | 97 | 135 | 404 | 673 | 64 | 193 | 322 | High |
| 140 | Dolsk | 64 | 141 | 60 | 181 | 301 | 29 | 86 | 144 | Low |
| 141 | Domaniów | 86 | 40 | 20 | 61 | 102 | 10 | 29 | 49 | Medium |
| 142 | Domaszowice | 67 | 122 | 64 | 191 | 318 | 30 | 91 | 152 | Medium |
| 143 | Dominowo | 69 | 113 | 30 | 89 | 149 | 14 | 43 | 71 | Low |
| 144 | Dopiewo | 73 | 95 | 27 | 80 | 133 | 13 | 38 | 63 | Low |
| 145 | Doruchów | 60 | 169 | 108 | 324 | 541 | 52 | 155 | 259 | Medium |
| 146 | Drawno | 49 | 267 | 71 | 214 | 357 | 34 | 103 | 171 | Low |
| 147 | Drawsko | 46 | 293 | 83 | 249 | 415 | 40 | 119 | 198 | Low |
| 148 | Drawsko Pomorskie | 61 | 164 | 62 | 186 | 310 | 30 | 89 | 148 | Medium |
| 149 | Drezdenko | 52 | 238 | 170 | 510 | 850 | 81 | 244 | 407 | Medium |
| 150 | Drużbice | 71 | 106 | 83 | 249 | 415 | 40 | 119 | 199 | Medium |
| 151 | Duszniki | 77 | 78 | 133 | 400 | 667 | 64 | 191 | 319 | High |
| 152 | Duszniki-Zdrój | 82 | 56 | 9 | 28 | 46 | 4 | 13 | 22 | Low |
| 153 | Dziadowa Kłoda | 72 | 100 | 76 | 229 | 382 | 37 | 110 | 183 | Medium |
| 154 | Działoszyn | 61 | 163 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 155 | Dzierżoniów | 90 | 30 | 10 | 30 | 50 | 5 | 14 | 24 | Medium |
| 156 | Dzierżoniów | 85 | 46 | 104 | 313 | 522 | 50 | 150 | 250 | Medium |
| 157 | Galewice | 54 | 215 | 175 | 526 | 877 | 84 | 252 | 419 | Medium |
| 158 | Gaszowice | 79 | 66 | 13 | 38 | 63 | 6 | 18 | 30 | Low |
| 159 | Gaworzyce | 78 | 74 | 105 | 315 | 525 | 50 | 151 | 251 | Medium |
| 160 | Gąsawa | 69 | 113 | 47 | 140 | 234 | 22 | 67 | 112 | Low |
| 161 | Gidle | 59 | 179 | 196 | 589 | 982 | 94 | 282 | 470 | Medium |
| 162 | Gierałtowice | 85 | 43 | 47 | 142 | 236 | 23 | 68 | 113 | Medium |
| 163 | Gizałki | 54 | 218 | 135 | 406 | 677 | 65 | 194 | 324 | Medium |
| 164 | Gliwice | 89 | 31 | 68 | 205 | 341 | 33 | 98 | 163 | High |
| 165 | Głogów | 90 | 29 | 3 | 8 | 13 | 1 | 4 | 6 | Medium |
| 166 | Głogów | 81 | 59 | 33 | 99 | 165 | 16 | 47 | 79 | Medium |
| 167 | Głogówek | 82 | 58 | 61 | 182 | 304 | 29 | 87 | 145 | Medium |
| 168 | Głubczyce | 79 | 67 | 53 | 159 | 265 | 25 | 76 | 127 | Medium |
| 169 | Głuchołazy | 81 | 59 | 32 | 96 | 160 | 15 | 46 | 76 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 170 | Głuszyca | 72 | 96 | 50 | 150 | 250 | 24 | 72 | 119 | Medium |
| 171 | Gniewkowo | 83 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 172 | Gniezno | 80 | 62 | 16 | 48 | 80 | 8 | 23 | 38 | Low |
| 173 | Gniezno | 70 | 107 | 112 | 336 | 560 | 54 | 161 | 268 | Medium |
| 174 | Godów | 82 | 56 | 31 | 94 | 156 | 15 | 45 | 75 | Medium |
| 175 | Godziesze Wielkie | 66 | 133 | 83 | 249 | 416 | 40 | 119 | 199 | Medium |
| 176 | Gogolin | 70 | 110 | 40 | 121 | 202 | 19 | 58 | 96 | Low |
| 177 | Goleniów | 50 | 254 | 569 | 1707 | 2846 | 272 | 817 | 1361 | Medium |
| 178 | Goleszów | 79 | 70 | 30 | 89 | 149 | 14 | 43 | 71 | Low |
| 179 | Golina | 73 | 95 | 54 | 162 | 270 | 26 | 77 | 129 | Medium |
| 180 | Gołańcz | 72 | 99 | 133 | 399 | 666 | 64 | 191 | 318 | High |
| 181 | Gołuchów | 81 | 61 | 44 | 133 | 222 | 21 | 64 | 106 | Medium |
| 182 | Gomunice | 53 | 222 | 32 | 95 | 159 | 15 | 46 | 76 | Low |
| 183 | Gorzkowice | 71 | 106 | 5 | 15 | 25 | 2 | 7 | 12 | Low |
| 184 | Gorzów Śląski | 74 | 91 | 119 | 357 | 595 | 57 | 171 | 285 | Medium |
| 185 | Gorzów Wielkopolski | 83 | 52 | 16 | 47 | 78 | 7 | 22 | 37 | Low |
| 186 | Gorzyce | 83 | 52 | 95 | 284 | 473 | 45 | 136 | 226 | Medium |
| 187 | Gostyń | 76 | 78 | 125 | 376 | 627 | 60 | 180 | 300 | High |
| 188 | Goszczanów | 79 | 67 | 80 | 239 | 399 | 38 | 114 | 191 | Medium |
| 189 | Gozdnica | 47 | 284 | 39 | 118 | 197 | 19 | 57 | 94 | Low |
| 190 | Góra | 74 | 87 | 235 | 705 | 1175 | 112 | 337 | 562 | High |
| 191 | Górzyca | 70 | 106 | 185 | 554 | 923 | 88 | 265 | 441 | High |
| 192 | Grabica | 76 | 80 | 46 | 139 | 232 | 22 | 67 | 111 | Medium |
| 193 | Grabów | 75 | 85 | 81 | 244 | 406 | 39 | 117 | 194 | Medium |
| 194 | Grabów nad Prosną | 62 | 154 | 152 | 455 | 758 | 72 | 217 | 362 | Medium |
| 195 | Granowo | 82 | 57 | 22 | 65 | 108 | 10 | 31 | 52 | Low |
| 196 | Grębocice | 79 | 66 | 124 | 371 | 618 | 59 | 177 | 296 | High |
| 197 | Grodków | 85 | 46 | 99 | 298 | 497 | 48 | 143 | 238 | Medium |
| 198 | Grodziec | 62 | 159 | 211 | 633 | 1055 | 101 | 303 | 505 | Medium |
| 199 | Grodzisk Wielkopolski | 65 | 140 | 98 | 294 | 490 | 47 | 141 | 234 | Medium |
| 200 | Gromadka | 52 | 231 | 267 | 800 | 1333 | 128 | 383 | 638 | Medium |
| 201 | Gryfino | 72 | 100 | 129 | 388 | 646 | 62 | 185 | 309 | High |
| 202 | Gryfów Śląski | 83 | 54 | 102 | 305 | 509 | 49 | 146 | 243 | Medium |
| 203 | Grzegorzew | 71 | 104 | 76 | 227 | 378 | 36 | 108 | 181 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 204 | Grzmiąca | 39 | 403 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 205 | Gubin | 52 | 231 | 347 | 1042 | 1736 | 166 | 498 | 830 | Medium |
| 206 | Gubin | 75 | 84 | 17 | 51 | 84 | 8 | 24 | 40 | Low |
| 207 | Hażlach | 78 | 71 | 22 | 67 | 112 | 11 | 32 | 54 | Low |
| 208 | Herby | 54 | 220 | 167 | 501 | 835 | 80 | 240 | 399 | Medium |
| 209 | Iłowa | 44 | 317 | 223 | 670 | 1117 | 107 | 320 | 534 | Medium |
| 210 | Inowrocław | 90 | 28 | 1 | 3 | 6 | 1 | 2 | 3 | Medium |
| 211 | Inowrocław | 81 | 60 | 28 | 83 | 138 | 13 | 40 | 66 | Low |
| 212 | Ińsko | 67 | 124 | 39 | 118 | 197 | 19 | 56 | 94 | Low |
| 213 | Istebna | 80 | 64 | 107 | 322 | 537 | 51 | 154 | 257 | Medium |
| 214 | Izbica Kujawska | 69 | 115 | 40 | 120 | 201 | 19 | 58 | 96 | Low |
| 215 | Izbicko | 65 | 139 | 90 | 271 | 452 | 43 | 130 | 216 | Medium |
| 216 | Janikowo | 81 | 59 | 5 | 16 | 27 | 3 | 8 | 13 | Low |
| 217 | Janowice Wielkie | 84 | 48 | 46 | 137 | 229 | 22 | 66 | 110 | Medium |
| 218 | Janowiec Wielkopolski | 80 | 64 | 57 | 170 | 284 | 27 | 81 | 136 | Medium |
| 219 | Janów | 52 | 238 | 49 | 147 | 246 | 24 | 71 | 118 | Low |
| 220 | Jaraczewo | 79 | 68 | 134 | 402 | 669 | 64 | 192 | 320 | High |
| 221 | Jarocin | 72 | 98 | 125 | 374 | 623 | 60 | 179 | 298 | High |
| 222 | Jasień | 54 | 217 | 146 | 437 | 728 | 70 | 209 | 348 | Medium |
| 223 | Jastrowie | 47 | 286 | 88 | 265 | 442 | 42 | 127 | 212 | Low |
| 224 | Jastrzębie-Zdrój | 83 | 53 | 21 | 64 | 106 | 10 | 31 | 51 | Low |
| 225 | Jawor | 83 | 51 | 3 | 8 | 13 | 1 | 4 | 6 | Low |
| 226 | Jaworzyna Śląska | 78 | 72 | 31 | 93 | 155 | 15 | 44 | 74 | Medium |
| 227 | Jedlina-Zdrój | 76 | 79 | 14 | 41 | 69 | 7 | 20 | 33 | Low |
| 228 | Jejkowice | 64 | 142 | 5 | 15 | 24 | 2 | 7 | 12 | Low |
| 229 | Jelcz-Laskowice | 62 | 153 | 158 | 474 | 790 | 76 | 227 | 378 | Medium |
| 230 | Jelenia Góra | 87 | 39 | 108 | 324 | 540 | 52 | 155 | 258 | High |
| 231 | Jemielnica | 49 | 261 | 135 | 406 | 676 | 65 | 194 | 323 | Medium |
| 232 | Jemielno | 60 | 169 | 57 | 172 | 286 | 27 | 82 | 137 | Low |
| 233 | Jerzmanowa | 63 | 150 | 27 | 82 | 137 | 13 | 39 | 65 | Low |
| 234 | Jeziora Wielkie | 71 | 106 | 51 | 153 | 256 | 24 | 73 | 122 | Medium |
| 235 | Jeżów Sudecki | 85 | 45 | 73 | 220 | 367 | 35 | 105 | 175 | High |
| 236 | Jordanów Śląski | 79 | 69 | 27 | 80 | 133 | 13 | 38 | 64 | Low |
| 237 | Jutrosin | 71 | 105 | 141 | 424 | 707 | 68 | 203 | 338 | High |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 238 | Kaczory | 57 | 191 | 341 | 1022 | 1703 | 163 | 489 | 814 | Medium |
| 239 | Kalety | 54 | 218 | 286 | 858 | 1430 | 137 | 410 | 684 | Medium |
| 240 | Kalisz | 84 | 50 | 13 | 38 | 63 | 6 | 18 | 30 | Low |
| 241 | Kalisz Pomorski | 48 | 279 | 120 | 360 | 600 | 57 | 172 | 287 | Low |
| 242 | Kamienica Polska | 53 | 227 | 51 | 154 | 257 | 25 | 74 | 123 | Low |
| 243 | Kamieniec | 77 | 78 | 166 | 499 | 832 | 80 | 239 | 398 | High |
| 244 | Kamieniec Ząbkowicki | 88 | 35 | 63 | 190 | 316 | 30 | 91 | 151 | High |
| 245 | Kamienna Góra | 77 | 78 | 182 | 547 | 911 | 87 | 261 | 436 | High |
| 246 | Kamienna Góra | 82 | 56 | 17 | 51 | 84 | 8 | 24 | 40 | Low |
| 247 | Kamiennik | 74 | 91 | 19 | 56 | 93 | 9 | 27 | 45 | Low |
| 248 | Kamień Krajeński | 52 | 235 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 249 | Kamieńsk | 62 | 159 | 28 | 85 | 142 | 14 | 41 | 68 | Low |
| 250 | Kargowa | 55 | 205 | 130 | 389 | 648 | 62 | 186 | 310 | Medium |
| 251 | Karpacz | 83 | 52 | 13 | 40 | 66 | 6 | 19 | 32 | Low |
| 252 | Katowice | 65 | 138 | 40 | 121 | 202 | 19 | 58 | 97 | Low |
| 253 | Kawęczyn | 73 | 96 | 89 | 266 | 443 | 42 | 127 | 212 | Medium |
| 254 | Kazimierz Biskupi | 65 | 137 | 67 | 200 | 334 | 32 | 96 | 160 | Medium |
| 255 | Kaźmierz | 78 | 71 | 56 | 167 | 279 | 27 | 80 | 133 | Medium |
| 256 | Kąty Wrocławskie | 83 | 50 | 98 | 293 | 489 | 47 | 140 | 234 | Medium |
| 257 | Kcynia | 67 | 126 | 314 | 942 | 1571 | 150 | 451 | 751 | Medium |
| 258 | Kędzierzyn-Koźle | 64 | 146 | 90 | 270 | 450 | 43 | 129 | 215 | Medium |
| 259 | Kępno | 71 | 106 | 98 | 293 | 488 | 47 | 140 | 234 | Medium |
| 260 | Kiełczygłów | 64 | 143 | 59 | 177 | 295 | 28 | 85 | 141 | Low |
| 261 | Kietrz | 79 | 68 | 21 | 62 | 104 | 10 | 30 | 50 | Low |
| 262 | Kiszkowo | 74 | 89 | 79 | 236 | 393 | 38 | 113 | 188 | Medium |
| 263 | Kleczew | 81 | 59 | 97 | 291 | 485 | 46 | 139 | 232 | Medium |
| 264 | Kleszczewo | 81 | 59 | 19 | 58 | 96 | 9 | 28 | 46 | Low |
| 265 | Kleszczów | 68 | 119 | 88 | 263 | 438 | 42 | 126 | 209 | Medium |
| 266 | Klonowa | 56 | 198 | 100 | 301 | 501 | 48 | 144 | 240 | Low |
| 267 | Kluczbork | 74 | 88 | 126 | 379 | 631 | 60 | 181 | 302 | High |
| 268 | Kluki | 53 | 227 | 50 | 149 | 248 | 24 | 71 | 118 | Low |
| 269 | Kłecko | 81 | 58 | 54 | 163 | 272 | 26 | 78 | 130 | Medium |
| 270 | Kłobuck | 71 | 106 | 80 | 239 | 399 | 38 | 114 | 191 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 271 | Kłodawa | 46 | 297 | 112 | 337 | 562 | 54 | 161 | 269 | Low |
| 272 | Kłodawa | 78 | 70 | 60 | 180 | 301 | 29 | 86 | 144 | Medium |
| 273 | Kłodzko | 89 | 31 | 10 | 31 | 51 | 5 | 15 | 24 | Medium |
| 274 | Kłodzko | 82 | 54 | 121 | 362 | 603 | 58 | 173 | 288 | Medium |
| 275 | Kłomnice | 78 | 71 | 203 | 610 | 1016 | 97 | 292 | 486 | High |
| 276 | Knurów | 77 | 74 | 47 | 141 | 235 | 22 | 67 | 112 | Medium |
| 277 | Kobiele Wielkie | 66 | 130 | 16 | 47 | 78 | 7 | 22 | 37 | Low |
| 278 | Kobierzyce | 85 | 45 | 54 | 163 | 272 | 26 | 78 | 130 | Medium |
| 279 | Kobyla Góra | 55 | 206 | 102 | 306 | 510 | 49 | 146 | 244 | Low |
| 280 | Kobylanka | 57 | 195 | 135 | 406 | 676 | 65 | 194 | 323 | Medium |
| 281 | Kobylin | 75 | 86 | 129 | 388 | 647 | 62 | 186 | 310 | High |
| 282 | Kochanowice | 65 | 140 | 171 | 513 | 855 | 82 | 245 | 409 | Medium |
| 283 | Koczała | 46 | 302 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 284 | Kodrąb | 72 | 97 | 58 | 174 | 290 | 28 | 83 | 139 | Medium |
| 285 | Kolonowskie | 46 | 294 | 118 | 354 | 591 | 56 | 169 | 282 | Low |
| 286 | Kolsko | 54 | 220 | 62 | 186 | 310 | 30 | 89 | 148 | Low |
| 287 | Kołaczkowo | 70 | 111 | 45 | 134 | 224 | 21 | 64 | 107 | Low |
| 288 | Kołbaskowo | 74 | 89 | 53 | 158 | 263 | 25 | 76 | 126 | Medium |
| 289 | Koło | 86 | 43 | 1 | 2 | 4 | 0 | 1 | 2 | Medium |
| 290 | Koło | 77 | 75 | 38 | 113 | 188 | 18 | 54 | 90 | Medium |
| 291 | Komorniki | 73 | 93 | 4 | 12 | 21 | 2 | 6 | 10 | Low |
| 292 | Komprachcice | 71 | 104 | 26 | 77 | 129 | 12 | 37 | 62 | Low |
| 293 | Kondratowice | 79 | 68 | 46 | 139 | 231 | 22 | 66 | 110 | Medium |
| 294 | Koniecpol | 61 | 161 | 4 | 13 | 21 | 2 | 6 | 10 | Low |
| 295 | Konin | 82 | 56 | 38 | 115 | 192 | 18 | 55 | 92 | Medium |
| 296 | Konopiska | 61 | 159 | 65 | 196 | 327 | 31 | 94 | 157 | Medium |
| 297 | Konopnica | 71 | 101 | 42 | 125 | 208 | 20 | 60 | 99 | Medium |
| 298 | Konstantynów Łódzki | 77 | 76 | 30 | 90 | 150 | 14 | 43 | 72 | Low |
| 299 | Korfantów | 73 | 92 | 110 | 329 | 548 | 52 | 157 | 262 | Medium |
| 300 | Kornowac | 75 | 86 | 16 | 48 | 81 | 8 | 23 | 39 | Low |
| 301 | Koronowo | 83 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 302 | Kostomłoty | 81 | 60 | 58 | 174 | 290 | 28 | 83 | 139 | Medium |
| 303 | Kostrzyn | 69 | 114 | 74 | 221 | 368 | 35 | 105 | 176 | Medium |
| 304 | Kostrzyn nad Odrą | 62 | 157 | 29 | 87 | 145 | 14 | 42 | 69 | Low |
| 305 | Koszęcin | 57 | 188 | 289 | 868 | 1447 | 138 | 415 | 692 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m$^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 306 | Kościan | 88 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | Medium |
| 307 | Kościan | 71 | 103 | 237 | 710 | 1184 | 113 | 340 | 566 | High |
| 308 | Kościelec | 75 | 84 | 53 | 160 | 267 | 26 | 77 | 128 | Medium |
| 309 | Kotla | 63 | 152 | 49 | 147 | 244 | 23 | 70 | 117 | Low |
| 310 | Kotlin | 74 | 88 | 56 | 169 | 282 | 27 | 81 | 135 | Medium |
| 311 | Kowary | 83 | 52 | 17 | 52 | 87 | 8 | 25 | 41 | Low |
| 312 | Koziegłowy | 66 | 129 | 99 | 297 | 495 | 47 | 142 | 237 | Medium |
| 313 | Kozielice | 81 | 58 | 37 | 111 | 185 | 18 | 53 | 89 | Medium |
| 314 | Koźmin Wielkopolski | 84 | 48 | 124 | 373 | 622 | 59 | 178 | 297 | High |
| 315 | Koźminek | 73 | 95 | 32 | 95 | 158 | 15 | 45 | 76 | Medium |
| 316 | Kożuchów | 63 | 148 | 137 | 412 | 686 | 66 | 197 | 328 | Medium |
| 317 | Kórnik | 69 | 116 | 65 | 194 | 324 | 31 | 93 | 155 | Medium |
| 318 | Krajenka | 56 | 203 | 95 | 285 | 475 | 45 | 136 | 227 | Low |
| 319 | Kramsk | 66 | 130 | 122 | 367 | 611 | 58 | 175 | 292 | Medium |
| 320 | Krapkowice | 77 | 76 | 34 | 101 | 169 | 16 | 49 | 81 | Medium |
| 321 | Kraszewice | 57 | 192 | 80 | 239 | 399 | 38 | 114 | 191 | Low |
| 322 | Krobia | 83 | 51 | 111 | 332 | 553 | 53 | 159 | 265 | Medium |
| 323 | Krosno Odrzańskie | 61 | 165 | 191 | 574 | 957 | 92 | 275 | 458 | Medium |
| 324 | Krośnice | 57 | 194 | 327 | 981 | 1636 | 156 | 469 | 782 | Medium |
| 325 | Krośniewice | 83 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 326 | Krotoszyce | 82 | 58 | 33 | 100 | 166 | 16 | 48 | 79 | Medium |
| 327 | Krotoszyn | 76 | 82 | 158 | 475 | 792 | 76 | 227 | 379 | High |
| 328 | Krupski Młyn | 52 | 236 | 99 | 298 | 497 | 48 | 143 | 238 | Low |
| 329 | Kruszwica | 80 | 65 | 117 | 350 | 583 | 56 | 167 | 279 | Medium |
| 330 | Kruszyna | 64 | 140 | 88 | 264 | 439 | 42 | 126 | 210 | Medium |
| 331 | Krzanowice | 80 | 64 | 35 | 106 | 176 | 17 | 50 | 84 | Medium |
| 332 | Krzemieniewo | 80 | 63 | 43 | 128 | 214 | 20 | 61 | 102 | Medium |
| 333 | Krzepice | 79 | 67 | 58 | 174 | 290 | 28 | 83 | 138 | Medium |
| 334 | Krzeszyce | 59 | 174 | 161 | 482 | 804 | 77 | 231 | 384 | Medium |
| 335 | Krzęcin | 74 | 91 | 55 | 166 | 277 | 27 | 80 | 133 | Medium |
| 336 | Krzykosy | 82 | 56 | 75 | 224 | 374 | 36 | 107 | 179 | Medium |
| 337 | Krzymów | 68 | 120 | 88 | 265 | 442 | 42 | 127 | 211 | Medium |
| 338 | Krzywiń | 62 | 153 | 134 | 401 | 669 | 64 | 192 | 320 | Medium |
| 339 | Krzyż Wielkopolski | 50 | 255 | 147 | 440 | 734 | 70 | 211 | 351 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 340 | Krzyżanowice | 84 | 49 | 44 | 131 | 218 | 21 | 63 | 104 | Medium |
| 341 | Ksawerów | 91 | 25 | 1 | 4 | 7 | 1 | 2 | 3 | Medium |
| 342 | Książ Wielkopolski | 65 | 137 | 69 | 208 | 347 | 33 | 100 | 166 | Medium |
| 343 | Kudowa-Zdrój | 83 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 344 | Kunice | 79 | 69 | 95 | 285 | 475 | 45 | 136 | 227 | Medium |
| 345 | Kuślin | 76 | 79 | 76 | 228 | 381 | 36 | 109 | 182 | Medium |
| 346 | Kuźnia Raciborska | 49 | 263 | 155 | 465 | 774 | 74 | 222 | 370 | Medium |
| 347 | Kwilcz | 62 | 153 | 45 | 136 | 227 | 22 | 65 | 109 | Low |
| 348 | Lasowice Wielkie | 51 | 242 | 111 | 332 | 554 | 53 | 159 | 265 | Low |
| 349 | Lądek | 78 | 71 | 41 | 124 | 207 | 20 | 59 | 99 | Medium |
| 350 | Lądek-Zdrój | 65 | 137 | 34 | 103 | 172 | 16 | 49 | 82 | Low |
| 351 | Legnica | 87 | 37 | 35 | 104 | 173 | 17 | 50 | 83 | Medium |
| 352 | Legnickie Pole | 79 | 68 | 56 | 168 | 280 | 27 | 80 | 134 | Medium |
| 353 | Lelów | 62 | 156 | 6 | 17 | 28 | 3 | 8 | 13 | Low |
| 354 | Leszno | 87 | 38 | 29 | 86 | 143 | 14 | 41 | 68 | Medium |
| 355 | Leśna | 83 | 53 | 188 | 563 | 939 | 90 | 269 | 449 | High |
| 356 | Leśnica | 73 | 92 | 50 | 149 | 249 | 24 | 71 | 119 | Medium |
| 357 | Lewin Brzeski | 79 | 69 | 40 | 119 | 198 | 19 | 57 | 95 | Medium |
| 358 | Lewin Kłodzki | 82 | 56 | 2 | 6 | 10 | 1 | 3 | 5 | Low |
| 359 | Lgota Wielka | 72 | 98 | 14 | 42 | 70 | 7 | 20 | 34 | Low |
| 360 | Lipiany | 81 | 59 | 19 | 56 | 93 | 9 | 27 | 45 | Low |
| 361 | Lipie | 67 | 126 | 32 | 96 | 159 | 15 | 46 | 76 | Low |
| 362 | Lipinki Łużyckie | 57 | 188 | 102 | 307 | 511 | 49 | 147 | 244 | Low |
| 363 | Lipka | 66 | 131 | 120 | 360 | 600 | 57 | 172 | 287 | Medium |
| 364 | Lipno | 80 | 63 | 64 | 191 | 319 | 30 | 91 | 152 | Medium |
| 365 | Lisków | 70 | 109 | 66 | 199 | 331 | 32 | 95 | 158 | Medium |
| 366 | Lubań | 91 | 26 | 8 | 23 | 39 | 4 | 11 | 19 | Medium |
| 367 | Lubań | 80 | 65 | 94 | 281 | 468 | 45 | 134 | 224 | Medium |
| 368 | Lubasz | 58 | 181 | 92 | 277 | 461 | 44 | 132 | 221 | Low |
| 369 | Lubawka | 79 | 69 | 98 | 293 | 488 | 47 | 140 | 233 | Medium |
| 370 | Lubin | 83 | 50 | 11 | 34 | 56 | 5 | 16 | 27 | Low |
| 371 | Lubin | 68 | 117 | 178 | 534 | 890 | 85 | 255 | 426 | Medium |
| 372 | Lubiszyn | 55 | 204 | 196 | 587 | 979 | 94 | 281 | 468 | Medium |
| 373 | Lubliniec | 58 | 182 | 305 | 914 | 1523 | 146 | 437 | 728 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 374 | Lubniewice | 47 | 291 | 15 | 46 | 77 | 7 | 22 | 37 | not necessary |
| 375 | Lubomia | 83 | 50 | 36 | 107 | 178 | 17 | 51 | 85 | Medium |
| 376 | Lubomierz | 85 | 44 | 177 | 532 | 887 | 85 | 254 | 424 | High |
| 377 | Luboń | 89 | 33 | 2 | 7 | 11 | 1 | 3 | 5 | Medium |
| 378 | Lubrza | 60 | 169 | 55 | 166 | 277 | 26 | 79 | 132 | Low |
| 379 | Lubrza | 81 | 60 | 11 | 32 | 54 | 5 | 15 | 26 | Low |
| 380 | Lubsko | 62 | 159 | 273 | 818 | 1363 | 130 | 391 | 652 | Medium |
| 381 | Lubsza | 64 | 145 | 138 | 413 | 689 | 66 | 198 | 329 | Medium |
| 382 | Lutomiersk | 65 | 135 | 222 | 666 | 1110 | 106 | 319 | 531 | Medium |
| 383 | Lututów | 67 | 124 | 83 | 250 | 416 | 40 | 119 | 199 | Medium |
| 384 | Lwówek | 74 | 89 | 186 | 558 | 930 | 89 | 267 | 445 | High |
| 385 | Lwówek Śląski | 82 | 54 | 151 | 453 | 755 | 72 | 217 | 361 | High |
| 386 | Lyski | 64 | 144 | 49 | 146 | 244 | 23 | 70 | 117 | Low |
| 387 | Łabiszyn | 58 | 183 | 176 | 529 | 882 | 84 | 253 | 422 | Medium |
| 388 | Ładzice | 65 | 134 | 22 | 65 | 108 | 10 | 31 | 52 | Low |
| 389 | Łagiewniki | 82 | 57 | 80 | 239 | 399 | 38 | 114 | 191 | Medium |
| 390 | Łagów | 52 | 237 | 7 | 21 | 35 | 3 | 10 | 17 | not necessary |
| 391 | Łambinowice | 76 | 79 | 56 | 169 | 281 | 27 | 81 | 135 | Medium |
| 392 | Łask | 68 | 119 | 77 | 230 | 384 | 37 | 110 | 184 | Medium |
| 393 | Łaziska Górne | 89 | 33 | 1 | 3 | 4 | 0 | 1 | 2 | Medium |
| 394 | Łęczyca | 82 | 55 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 395 | Łęczyca | 72 | 99 | 91 | 273 | 455 | 43 | 130 | 217 | Medium |
| 396 | Łęka Opatowska | 65 | 136 | 118 | 353 | 588 | 56 | 169 | 281 | Medium |
| 397 | Łęknica | 44 | 317 | 7 | 21 | 34 | 3 | 10 | 16 | not necessary |
| 398 | Łobżenica | 72 | 96 | 124 | 373 | 621 | 59 | 178 | 297 | High |
| 399 | Łódź | 89 | 32 | 15 | 45 | 75 | 7 | 21 | 36 | Medium |
| 400 | Łubniany | 61 | 161 | 94 | 281 | 469 | 45 | 134 | 224 | Medium |
| 401 | Łubnice | 76 | 82 | 58 | 175 | 292 | 28 | 84 | 140 | Medium |
| 402 | Łubowo | 74 | 90 | 93 | 280 | 466 | 45 | 134 | 223 | Medium |
| 403 | Malanów | 60 | 170 | 77 | 230 | 383 | 37 | 110 | 183 | Low |
| 404 | Malczyce | 77 | 76 | 38 | 113 | 188 | 18 | 54 | 90 | Medium |
| 405 | Małomice | 61 | 164 | 119 | 357 | 595 | 57 | 171 | 285 | Medium |
| 406 | Marcinowice | 78 | 73 | 58 | 174 | 290 | 28 | 83 | 138 | Medium |
| 407 | Marciszów | 81 | 59 | 76 | 229 | 382 | 37 | 110 | 183 | Medium |
| 408 | Margonin | 66 | 129 | 23 | 68 | 113 | 11 | 33 | 54 | Low |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 409 | Marianowo | 72 | 98 | 34 | 103 | 171 | 16 | 49 | 82 | Medium |
| 410 | Marklowice | 78 | 70 | 1 | 2 | 3 | 0 | 1 | 2 | Low |
| 411 | Masłowice | 64 | 142 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 412 | Maszewo | 50 | 249 | 137 | 410 | 684 | 65 | 196 | 327 | Medium |
| 413 | Maszewo | 78 | 70 | 46 | 137 | 229 | 22 | 66 | 110 | Medium |
| 414 | Męcinka | 80 | 64 | 99 | 296 | 493 | 47 | 142 | 236 | Medium |
| 415 | Miasteczko Krajeńskie | 55 | 204 | 273 | 818 | 1364 | 130 | 391 | 652 | Medium |
| 416 | Miasteczko Śląskie | 41 | 360 | 95 | 285 | 475 | 45 | 136 | 227 | Low |
| 417 | Miastko | 54 | 213 | 24 | 71 | 119 | 11 | 34 | 57 | not necessary |
| 418 | Miedzichowo | 48 | 280 | 155 | 466 | 776 | 74 | 223 | 371 | Medium |
| 419 | Miedźno | 58 | 182 | 33 | 100 | 167 | 16 | 48 | 80 | Low |
| 420 | Miejska Górka | 82 | 56 | 66 | 199 | 331 | 32 | 95 | 158 | Medium |
| 421 | Mieleszyn | 75 | 86 | 39 | 117 | 195 | 19 | 56 | 93 | Medium |
| 422 | Mieroszów | 65 | 137 | 33 | 98 | 163 | 16 | 47 | 78 | Low |
| 423 | Mieszkowice | 60 | 171 | 62 | 185 | 309 | 30 | 89 | 148 | Low |
| 424 | Mieścisko | 69 | 115 | 104 | 313 | 522 | 50 | 150 | 250 | Medium |
| 425 | Mietków | 81 | 59 | 60 | 181 | 302 | 29 | 87 | 144 | Medium |
| 426 | Międzybórz | 58 | 185 | 106 | 317 | 528 | 50 | 151 | 252 | Low |
| 427 | Międzychód | 55 | 206 | 90 | 271 | 452 | 43 | 130 | 216 | Low |
| 428 | Międzylesie | 77 | 75 | 191 | 573 | 955 | 91 | 274 | 457 | High |
| 429 | Międzyrzecz | 54 | 213 | 120 | 360 | 601 | 57 | 172 | 287 | Low |
| 430 | Miękinia | 80 | 65 | 190 | 569 | 948 | 91 | 272 | 453 | High |
| 431 | Mikołów | 73 | 94 | 63 | 188 | 313 | 30 | 90 | 150 | Medium |
| 432 | Mikstat | 58 | 182 | 68 | 203 | 338 | 32 | 97 | 162 | Low |
| 433 | Milicz | 63 | 148 | 582 | 1747 | 2912 | 279 | 836 | 1393 | Medium |
| 434 | Milówka | 75 | 85 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 435 | Miłkowice | 79 | 68 | 118 | 353 | 588 | 56 | 169 | 281 | Medium |
| 436 | Miłosław | 72 | 101 | 73 | 219 | 365 | 35 | 105 | 175 | Medium |
| 437 | Mirosławiec | 50 | 256 | 60 | 180 | 300 | 29 | 86 | 144 | Low |
| 438 | Mirsk | 83 | 50 | 441 | 1324 | 2207 | 211 | 633 | 1055 | High |
| 439 | Mogilno | 75 | 83 | 120 | 361 | 601 | 58 | 173 | 288 | Medium |
| 440 | Mokrsko | 73 | 96 | 18 | 54 | 91 | 9 | 26 | 43 | Low |
| 441 | Moryń | 75 | 85 | 20 | 61 | 102 | 10 | 29 | 49 | Low |
| 442 | Mosina | 61 | 162 | 41 | 124 | 207 | 20 | 59 | 99 | Low |
| 443 | Moszczenica | 82 | 57 | 0 | 0 | 0 | 0 | 0 | 0 | Low |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m$^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 444 | Mrocza | 71 | 105 | 67 | 201 | 336 | 32 | 96 | 161 | Medium |
| 445 | Mstów | 70 | 108 | 25 | 75 | 124 | 12 | 36 | 59 | Low |
| 446 | Mszana | 83 | 53 | 5 | 16 | 27 | 3 | 8 | 13 | Low |
| 447 | Mściwojów | 78 | 71 | 9 | 26 | 44 | 4 | 13 | 21 | Low |
| 448 | Murowana Goślina | 52 | 231 | 50 | 151 | 251 | 24 | 72 | 120 | Low |
| 449 | Murów | 48 | 279 | 265 | 794 | 1324 | 127 | 380 | 633 | Medium |
| 450 | Mycielin | 62 | 154 | 124 | 372 | 621 | 59 | 178 | 297 | Medium |
| 451 | Mykanów | 80 | 62 | 24 | 73 | 121 | 12 | 35 | 58 | Low |
| 452 | Mysłakowice | 84 | 47 | 119 | 358 | 597 | 57 | 171 | 286 | Medium |
| 453 | Myszków | 72 | 101 | 56 | 169 | 282 | 27 | 81 | 135 | Medium |
| 454 | Myślibórz | 70 | 108 | 118 | 354 | 590 | 56 | 169 | 282 | Medium |
| 455 | Nakło nad Notecią | 65 | 136 | 300 | 900 | 1501 | 144 | 431 | 718 | Medium |
| 456 | Namysłów | 71 | 103 | 168 | 505 | 842 | 81 | 242 | 403 | High |
| 457 | Nekla | 59 | 176 | 87 | 261 | 435 | 42 | 125 | 208 | Low |
| 458 | Nędza | 64 | 140 | 64 | 193 | 321 | 31 | 92 | 154 | Medium |
| 459 | Niechanowo | 80 | 64 | 72 | 217 | 362 | 35 | 104 | 173 | Medium |
| 460 | Niechlów | 75 | 86 | 86 | 257 | 429 | 41 | 123 | 205 | Medium |
| 461 | Niegosławice | 70 | 109 | 166 | 498 | 830 | 79 | 238 | 397 | Medium |
| 462 | Niegowa | 68 | 121 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 463 | Niemcza | 79 | 66 | 34 | 101 | 168 | 16 | 48 | 80 | Medium |
| 464 | Niemodlin | 70 | 109 | 103 | 308 | 513 | 49 | 147 | 245 | Medium |
| 465 | Nowa Brzeźnica | 64 | 145 | 37 | 111 | 186 | 18 | 53 | 89 | Low |
| 466 | Nowa Ruda | 86 | 40 | 10 | 29 | 48 | 5 | 14 | 23 | Medium |
| 467 | Nowa Ruda | 83 | 51 | 74 | 222 | 371 | 35 | 106 | 177 | Medium |
| 468 | Nowa Sól | 50 | 250 | 73 | 219 | 365 | 35 | 105 | 175 | Low |
| 469 | Nowa Sól | 84 | 49 | 19 | 58 | 97 | 9 | 28 | 46 | Low |
| 470 | Nowa Wieś Wielka | 50 | 255 | 44 | 132 | 219 | 21 | 63 | 105 | Low |
| 471 | Nowe Miasteczko | 71 | 103 | 35 | 104 | 173 | 17 | 50 | 83 | Medium |
| 472 | Nowe Miasto nad Wartą | 71 | 103 | 70 | 209 | 348 | 33 | 100 | 166 | Medium |
| 473 | Nowe Skalmierzyce | 80 | 65 | 55 | 165 | 275 | 26 | 79 | 132 | Medium |
| 474 | Nowogrodziec | 68 | 121 | 95 | 286 | 477 | 46 | 137 | 228 | Medium |
| 475 | Nowogród Bobrzański | 53 | 222 | 189 | 567 | 945 | 90 | 271 | 452 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 476 | Nowogródek Pomorski | 56 | 199 | 76 | 228 | 380 | 36 | 109 | 182 | Low |
| 477 | Nowosolna | 75 | 86 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 478 | Nowy Tomyśl | 70 | 111 | 275 | 825 | 1374 | 131 | 394 | 657 | Medium |
| 479 | Nysa | 82 | 57 | 75 | 225 | 374 | 36 | 107 | 179 | Medium |
| 480 | Oborniki | 64 | 146 | 139 | 418 | 696 | 67 | 200 | 333 | Medium |
| 481 | Oborniki Śląskie | 64 | 142 | 120 | 359 | 599 | 57 | 172 | 286 | Medium |
| 482 | Obrzycko | 58 | 182 | 58 | 173 | 288 | 28 | 83 | 138 | Low |
| 483 | Obrzycko | 71 | 103 | 2 | 6 | 10 | 1 | 3 | 5 | Low |
| 484 | Odolanów | 66 | 133 | 296 | 887 | 1479 | 141 | 424 | 707 | Medium |
| 485 | Okonek | 59 | 173 | 107 | 322 | 537 | 51 | 154 | 257 | Low |
| 486 | Olesno | 61 | 163 | 156 | 469 | 782 | 75 | 224 | 374 | Medium |
| 487 | Oleśnica | 70 | 108 | 122 | 366 | 610 | 58 | 175 | 292 | Medium |
| 488 | Oleśnica | 88 | 35 | 8 | 24 | 39 | 4 | 11 | 19 | Medium |
| 489 | Olszanka | 86 | 42 | 21 | 62 | 103 | 10 | 30 | 49 | Medium |
| 490 | Olszówka | 81 | 60 | 16 | 49 | 81 | 8 | 23 | 39 | Low |
| 491 | Olsztyn | 52 | 233 | 6 | 18 | 30 | 3 | 9 | 15 | not necessary |
| 492 | Olszyna | 83 | 51 | 55 | 165 | 275 | 26 | 79 | 132 | Medium |
| 493 | Oława | 80 | 64 | 187 | 561 | 934 | 89 | 268 | 447 | High |
| 494 | Oława | 89 | 31 | 11 | 32 | 53 | 5 | 15 | 25 | Medium |
| 495 | Opalenica | 74 | 87 | 123 | 369 | 615 | 59 | 177 | 294 | High |
| 496 | Opatów | 71 | 105 | 27 | 81 | 136 | 13 | 39 | 65 | Low |
| 497 | Opatówek | 78 | 73 | 38 | 115 | 192 | 18 | 55 | 92 | Medium |
| 498 | Opole | 80 | 63 | 138 | 415 | 691 | 66 | 198 | 330 | High |
| 499 | Orchowo | 67 | 126 | 46 | 139 | 232 | 22 | 67 | 111 | Low |
| 500 | Ornontowice | 77 | 77 | 14 | 43 | 71 | 7 | 20 | 34 | Low |
| 501 | Orzesze | 65 | 140 | 30 | 90 | 151 | 14 | 43 | 72 | Low |
| 502 | Osieczna | 70 | 108 | 86 | 257 | 429 | 41 | 123 | 205 | Medium |
| 503 | Osiecznica | 46 | 304 | 316 | 947 | 1578 | 151 | 453 | 755 | Medium |
| 504 | Osiek Mały | 68 | 119 | 24 | 71 | 118 | 11 | 34 | 56 | Low |
| 505 | Osięciny | 77 | 75 | 3 | 9 | 15 | 1 | 4 | 7 | Low |
| 506 | Osjaków | 60 | 171 | 69 | 206 | 344 | 33 | 99 | 164 | Low |
| 507 | Ostroróg | 69 | 114 | 56 | 168 | 279 | 27 | 80 | 134 | Low |
| 508 | Ostrowice | 65 | 136 | 55 | 164 | 274 | 26 | 79 | 131 | Low |
| 509 | Ostrowite | 67 | 123 | 54 | 162 | 269 | 26 | 77 | 129 | Low |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 510 | Ostrów Wielkopolski | 71 | 101 | 137 | 410 | 683 | 65 | 196 | 327 | High |
| 511 | Ostrów Wielkopolski | 86 | 40 | 15 | 46 | 77 | 7 | 22 | 37 | Medium |
| 512 | Ostrówek | 59 | 173 | 77 | 232 | 386 | 37 | 111 | 185 | Low |
| 513 | Ostrzeszów | 55 | 210 | 123 | 368 | 614 | 59 | 176 | 294 | Medium |
| 514 | Ośno Lubuskie | 54 | 213 | 43 | 129 | 215 | 21 | 62 | 103 | Low |
| 515 | Otmuchów | 84 | 49 | 83 | 249 | 415 | 40 | 119 | 199 | Medium |
| 516 | Otyń | 60 | 168 | 77 | 230 | 383 | 37 | 110 | 183 | Medium |
| 517 | Ozimek | 53 | 222 | 163 | 489 | 814 | 78 | 234 | 389 | Medium |
| 518 | Ozorków | 83 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 519 | Pabianice | 89 | 32 | 9 | 27 | 45 | 4 | 13 | 21 | Medium |
| 520 | Pabianice | 71 | 104 | 68 | 203 | 339 | 32 | 97 | 162 | Medium |
| 521 | Paczków | 85 | 47 | 58 | 174 | 290 | 28 | 83 | 139 | Medium |
| 522 | Pajęczno | 67 | 127 | 23 | 68 | 114 | 11 | 33 | 54 | Low |
| 523 | Pakosław | 69 | 116 | 99 | 296 | 494 | 47 | 142 | 236 | Medium |
| 524 | Pakosławice | 81 | 61 | 25 | 75 | 125 | 12 | 36 | 60 | Low |
| 525 | Pakość | 76 | 81 | 31 | 93 | 155 | 15 | 45 | 74 | Medium |
| 526 | Panki | 67 | 127 | 29 | 88 | 147 | 14 | 42 | 70 | Low |
| 527 | Parzęczew | 77 | 74 | 29 | 86 | 143 | 14 | 41 | 68 | Low |
| 528 | Paszowice | 80 | 62 | 91 | 272 | 454 | 43 | 130 | 217 | Medium |
| 529 | Pawłowice | 78 | 71 | 20 | 59 | 99 | 9 | 28 | 47 | Low |
| 530 | Pawłowiczki | 78 | 73 | 8 | 23 | 38 | 4 | 11 | 18 | Low |
| 531 | Pawonków | 63 | 151 | 338 | 1013 | 1688 | 161 | 484 | 807 | Medium |
| 532 | Pątnów | 64 | 144 | 21 | 63 | 106 | 10 | 30 | 51 | Low |
| 533 | Pełczyce | 77 | 78 | 51 | 154 | 256 | 25 | 74 | 123 | Medium |
| 534 | Perzów | 76 | 82 | 91 | 274 | 457 | 44 | 131 | 219 | Medium |
| 535 | Pęcław | 85 | 43 | 61 | 182 | 304 | 29 | 87 | 145 | Medium |
| 536 | Pęczniew | 77 | 75 | 51 | 154 | 257 | 25 | 74 | 123 | Medium |
| 537 | Pępowo | 77 | 76 | 83 | 250 | 417 | 40 | 120 | 199 | Medium |
| 538 | Piaski | 81 | 59 | 76 | 228 | 380 | 36 | 109 | 182 | Medium |
| 539 | Piechowice | 83 | 52 | 57 | 170 | 283 | 27 | 81 | 135 | Medium |
| 540 | Piekary Śląskie | 91 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | Medium |
| 541 | Pielgrzymka | 79 | 69 | 49 | 148 | 246 | 24 | 71 | 118 | Medium |
| 542 | Pieńsk | 62 | 153 | 70 | 211 | 352 | 34 | 101 | 168 | Medium |
| 543 | Pieszyce | 84 | 48 | 50 | 150 | 249 | 24 | 72 | 119 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m$^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 544 | Pietrowice Wielkie | 81 | 61 | 22 | 67 | 111 | 11 | 32 | 53 | Low |
| 545 | Pilchowice | 69 | 114 | 94 | 282 | 470 | 45 | 135 | 225 | Medium |
| 546 | Piła | 58 | 184 | 29 | 87 | 145 | 14 | 42 | 69 | not necessary |
| 547 | Piława Górna | 85 | 45 | 4 | 13 | 22 | 2 | 6 | 11 | Low |
| 548 | Piotrków Kujawski | 78 | 72 | 21 | 62 | 103 | 10 | 29 | 49 | Low |
| 549 | Platerówka | 80 | 62 | 84 | 252 | 420 | 40 | 121 | 201 | Medium |
| 550 | Pleszew | 75 | 83 | 117 | 352 | 587 | 56 | 168 | 281 | Medium |
| 551 | Pniewy | 71 | 103 | 132 | 395 | 659 | 63 | 189 | 315 | High |
| 552 | Pobiedziska | 62 | 153 | 65 | 195 | 325 | 31 | 93 | 156 | Medium |
| 553 | Poczesna | 71 | 106 | 53 | 160 | 267 | 26 | 77 | 128 | Medium |
| 554 | Poddębice | 68 | 118 | 211 | 633 | 1055 | 101 | 303 | 505 | Medium |
| 555 | Podgórzyn | 84 | 48 | 81 | 243 | 405 | 39 | 116 | 194 | Medium |
| 556 | Pogorzela | 84 | 48 | 101 | 302 | 503 | 48 | 144 | 241 | Medium |
| 557 | Pokój | 55 | 209 | 238 | 715 | 1192 | 114 | 342 | 570 | Medium |
| 558 | Polanica-Zdrój | 83 | 51 | 13 | 38 | 64 | 6 | 18 | 30 | Low |
| 559 | Police | 56 | 196 | 154 | 461 | 769 | 74 | 221 | 368 | Medium |
| 560 | Polkowice | 59 | 175 | 118 | 355 | 592 | 57 | 170 | 283 | Low |
| 561 | Polska Cerekiew | 77 | 75 | 24 | 72 | 120 | 11 | 34 | 57 | Low |
| 562 | Połajewo | 69 | 115 | 131 | 394 | 656 | 63 | 188 | 314 | Medium |
| 563 | Połczyn-Zdrój | 68 | 119 | 20 | 61 | 102 | 10 | 29 | 49 | Low |
| 564 | Poniec | 79 | 69 | 117 | 350 | 584 | 56 | 167 | 279 | Medium |
| 565 | Popielów | 65 | 139 | 257 | 772 | 1287 | 123 | 369 | 615 | Medium |
| 566 | Popów | 64 | 145 | 4 | 12 | 20 | 2 | 6 | 9 | Low |
| 567 | Poraj | 67 | 125 | 46 | 138 | 230 | 22 | 66 | 110 | Low |
| 568 | Poręba | 85 | 44 | 2 | 5 | 8 | 1 | 2 | 4 | Medium |
| 569 | Powidz | 60 | 167 | 11 | 33 | 56 | 5 | 16 | 27 | Low |
| 570 | Poznań | 78 | 72 | 65 | 196 | 327 | 31 | 94 | 156 | Medium |
| 571 | Praszka | 62 | 154 | 62 | 187 | 312 | 30 | 89 | 149 | Medium |
| 572 | Prochowice | 79 | 68 | 91 | 272 | 454 | 43 | 130 | 217 | Medium |
| 573 | Prószków | 66 | 131 | 45 | 136 | 227 | 22 | 65 | 109 | Low |
| 574 | Prudnik | 82 | 56 | 19 | 57 | 95 | 9 | 27 | 46 | Low |
| 575 | Prusice | 66 | 133 | 189 | 567 | 945 | 90 | 271 | 452 | Medium |
| 576 | Przechlewo | 36 | 452 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 577 | Przedecz | 70 | 107 | 61 | 182 | 304 | 29 | 87 | 145 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 578 | Przelewice | 85 | 46 | 38 | 113 | 188 | 18 | 54 | 90 | Medium |
| 579 | Przemęt | 67 | 126 | 179 | 536 | 893 | 85 | 256 | 427 | Medium |
| 580 | Przemków | 58 | 184 | 214 | 643 | 1072 | 103 | 308 | 513 | Medium |
| 581 | Przeworno | 80 | 63 | 94 | 283 | 472 | 45 | 135 | 226 | Medium |
| 582 | Przewóz | 51 | 242 | 175 | 526 | 876 | 84 | 251 | 419 | Medium |
| 583 | Przygodzice | 55 | 207 | 301 | 902 | 1504 | 144 | 432 | 719 | Medium |
| 584 | Przykona | 78 | 72 | 64 | 193 | 322 | 31 | 92 | 154 | Medium |
| 585 | Przyrów | 55 | 210 | 148 | 444 | 740 | 71 | 212 | 354 | Medium |
| 586 | Przystajń | 68 | 121 | 71 | 212 | 354 | 34 | 102 | 169 | Medium |
| 587 | Przytoczna | 63 | 146 | 76 | 228 | 380 | 36 | 109 | 182 | Medium |
| 588 | Pszczew | 54 | 217 | 105 | 314 | 523 | 50 | 150 | 250 | Low |
| 589 | Pszów | 78 | 71 | 13 | 39 | 64 | 6 | 18 | 31 | Low |
| 590 | Puszczykowo | 62 | 153 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 591 | Pyrzyce | 87 | 38 | 115 | 345 | 575 | 55 | 165 | 275 | High |
| 592 | Pyskowice | 88 | 35 | 19 | 57 | 95 | 9 | 27 | 45 | Medium |
| 593 | Pyzdry | 65 | 136 | 97 | 291 | 485 | 46 | 139 | 232 | Medium |
| 594 | Racibórz | 84 | 47 | 43 | 128 | 214 | 20 | 61 | 102 | Medium |
| 595 | Radków | 84 | 50 | 61 | 182 | 303 | 29 | 87 | 145 | Medium |
| 596 | Radlin | 82 | 55 | 3 | 10 | 16 | 2 | 5 | 8 | Low |
| 597 | Radłów | 69 | 113 | 79 | 236 | 393 | 38 | 113 | 188 | Medium |
| 598 | Radomsko | 83 | 51 | 17 | 50 | 84 | 8 | 24 | 40 | Low |
| 599 | Radomsko | 61 | 160 | 67 | 202 | 336 | 32 | 97 | 161 | Medium |
| 600 | Radwanice | 66 | 128 | 157 | 471 | 785 | 75 | 225 | 375 | Medium |
| 601 | Radziejów | 82 | 54 | 6 | 18 | 30 | 3 | 9 | 14 | Low |
| 602 | Radziejów | 87 | 39 | 2 | 5 | 8 | 1 | 2 | 4 | Medium |
| 603 | Radzionków | 74 | 91 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 604 | Rakoniewice | 62 | 156 | 159 | 478 | 796 | 76 | 228 | 381 | Medium |
| 605 | Raszków | 81 | 60 | 108 | 324 | 540 | 52 | 155 | 258 | Medium |
| 606 | Rawicz | 76 | 80 | 214 | 642 | 1069 | 102 | 307 | 511 | High |
| 607 | Recz | 66 | 133 | 110 | 329 | 549 | 53 | 158 | 263 | Medium |
| 608 | Reńska Wieś | 83 | 54 | 68 | 205 | 342 | 33 | 98 | 163 | Medium |
| 609 | Rędziny | 88 | 33 | 3 | 8 | 14 | 1 | 4 | 7 | Medium |
| 610 | Rogowo | 69 | 114 | 42 | 127 | 211 | 20 | 61 | 101 | Low |
| 611 | Rogoźno | 66 | 133 | 188 | 563 | 938 | 90 | 269 | 448 | Medium |
| 612 | Rojewo | 81 | 60 | 2 | 7 | 12 | 1 | 4 | 6 | Low |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 613 | Rokietnica | 72 | 99 | 53 | 160 | 266 | 25 | 76 | 127 | Medium |
| 614 | Rozdrażew | 84 | 49 | 47 | 141 | 234 | 22 | 67 | 112 | Medium |
| 615 | Rozprza | 67 | 127 | 3 | 9 | 15 | 1 | 4 | 7 | Low |
| 616 | Ruda Śląska | 74 | 89 | 59 | 178 | 296 | 28 | 85 | 142 | Medium |
| 617 | Rudna | 74 | 89 | 86 | 257 | 428 | 41 | 123 | 204 | Medium |
| 618 | Rudnik | 78 | 71 | 12 | 37 | 62 | 6 | 18 | 30 | Low |
| 619 | Rudniki | 74 | 90 | 30 | 90 | 149 | 14 | 43 | 71 | Low |
| 620 | Rudziniec | 74 | 89 | 245 | 736 | 1226 | 117 | 352 | 586 | High |
| 621 | Ruja | 82 | 55 | 61 | 182 | 303 | 29 | 87 | 145 | Medium |
| 622 | Rusiec | 67 | 123 | 70 | 211 | 351 | 34 | 101 | 168 | Medium |
| 623 | Rybnik | 72 | 101 | 121 | 363 | 605 | 58 | 174 | 289 | Medium |
| 624 | Rychtal | 62 | 159 | 20 | 60 | 99 | 10 | 29 | 48 | Low |
| 625 | Rychwał | 62 | 158 | 106 | 318 | 530 | 51 | 152 | 253 | Medium |
| 626 | Ryczywół | 72 | 99 | 183 | 550 | 916 | 88 | 263 | 438 | High |
| 627 | Rydułtowy | 86 | 41 | 4 | 13 | 22 | 2 | 6 | 10 | Medium |
| 628 | Rydzyna | 75 | 85 | 113 | 338 | 563 | 54 | 162 | 269 | Medium |
| 629 | Rząśnia | 74 | 89 | 54 | 162 | 269 | 26 | 77 | 129 | Medium |
| 630 | Rzeczenica | 45 | 307 | 130 | 391 | 651 | 62 | 187 | 311 | Medium |
| 631 | Rzepin | 54 | 219 | 88 | 263 | 438 | 42 | 126 | 210 | Low |
| 632 | Rzgów | 82 | 55 | 31 | 93 | 154 | 15 | 44 | 74 | Medium |
| 633 | Rzgów | 64 | 144 | 98 | 293 | 488 | 47 | 140 | 234 | Medium |
| 634 | Sadki | 66 | 131 | 335 | 1006 | 1676 | 160 | 481 | 802 | Medium |
| 635 | Santok | 60 | 167 | 225 | 674 | 1123 | 107 | 322 | 537 | Medium |
| 636 | Sędziejowice | 66 | 129 | 80 | 240 | 400 | 38 | 115 | 191 | Medium |
| 637 | Sępólno Krajeńskie | 63 | 150 | 64 | 193 | 322 | 31 | 92 | 154 | Medium |
| 638 | Sicienko | 69 | 112 | 87 | 260 | 434 | 42 | 125 | 208 | Medium |
| 639 | Siechnice | 84 | 49 | 100 | 300 | 500 | 48 | 144 | 239 | Medium |
| 640 | Siedlec | 68 | 120 | 221 | 662 | 1103 | 105 | 316 | 527 | Medium |
| 641 | Siedlisko | 64 | 142 | 77 | 232 | 386 | 37 | 111 | 185 | Medium |
| 642 | Siekierczyn | 84 | 48 | 31 | 92 | 153 | 15 | 44 | 73 | Low |
| 643 | Siemkowice | 61 | 161 | 57 | 170 | 283 | 27 | 81 | 135 | Low |
| 644 | Sieradz | 81 | 60 | 11 | 33 | 55 | 5 | 16 | 26 | Low |
| 645 | Sieradz | 70 | 106 | 90 | 269 | 448 | 43 | 129 | 214 | Medium |
| 646 | Sieraków | 57 | 194 | 71 | 214 | 357 | 34 | 103 | 171 | Low |
| 647 | Sieroszewice | 67 | 126 | 307 | 920 | 1533 | 147 | 440 | 733 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 648 | Skarbimierz | 85 | 46 | 55 | 164 | 274 | 26 | 79 | 131 | Medium |
| 649 | Skąpe | 52 | 237 | 54 | 162 | 270 | 26 | 77 | 129 | Low |
| 650 | Skoki | 59 | 177 | 120 | 359 | 598 | 57 | 172 | 286 | Low |
| 651 | Skomlin | 71 | 102 | 60 | 179 | 298 | 29 | 86 | 143 | Medium |
| 652 | Skoroszyce | 87 | 38 | 57 | 171 | 285 | 27 | 82 | 136 | Medium |
| 653 | Skulsk | 71 | 102 | 12 | 37 | 62 | 6 | 18 | 30 | Low |
| 654 | Skwierzyna | 52 | 234 | 96 | 287 | 479 | 46 | 137 | 229 | Low |
| 655 | Sława | 55 | 209 | 119 | 358 | 597 | 57 | 171 | 285 | Low |
| 656 | Słońsk | 69 | 117 | 325 | 975 | 1625 | 155 | 466 | 777 | Medium |
| 657 | Słubice | 61 | 165 | 207 | 622 | 1037 | 99 | 298 | 496 | Medium |
| 658 | Słupca | 72 | 99 | 50 | 149 | 248 | 24 | 71 | 119 | Medium |
| 659 | Słupca | 83 | 54 | 1 | 2 | 4 | 0 | 1 | 2 | Low |
| 660 | Sobótka | 77 | 76 | 97 | 290 | 483 | 46 | 139 | 231 | Medium |
| 661 | Sokolniki | 65 | 136 | 53 | 158 | 263 | 25 | 75 | 126 | Low |
| 662 | Sompolno | 71 | 102 | 92 | 275 | 458 | 44 | 131 | 219 | Medium |
| 663 | Sośnicowice | 64 | 141 | 215 | 644 | 1074 | 103 | 308 | 514 | Medium |
| 664 | Sośnie | 48 | 273 | 291 | 872 | 1454 | 139 | 417 | 695 | Medium |
| 665 | Sośno | 76 | 82 | 42 | 127 | 212 | 20 | 61 | 101 | Medium |
| 666 | Stara Dąbrowa | 79 | 69 | 33 | 98 | 164 | 16 | 47 | 78 | Medium |
| 667 | Stara Kamienica | 85 | 46 | 118 | 355 | 591 | 57 | 170 | 283 | Medium |
| 668 | Starcza | 70 | 111 | 19 | 58 | 97 | 9 | 28 | 46 | Low |
| 669 | Stare Bogaczowice | 77 | 74 | 70 | 211 | 352 | 34 | 101 | 168 | Medium |
| 670 | Stare Czarnowo | 67 | 122 | 91 | 272 | 453 | 43 | 130 | 217 | Medium |
| 671 | Stare Kurowo | 67 | 125 | 144 | 433 | 721 | 69 | 207 | 345 | Medium |
| 672 | Stare Miasto | 64 | 144 | 54 | 161 | 268 | 26 | 77 | 128 | Low |
| 673 | Stargard | 87 | 37 | 8 | 24 | 40 | 4 | 12 | 19 | Medium |
| 674 | Stargard | 78 | 71 | 121 | 362 | 603 | 58 | 173 | 289 | Medium |
| 675 | Stawiszyn | 75 | 83 | 78 | 234 | 389 | 37 | 112 | 186 | Medium |
| 676 | Stepnica | 40 | 387 | 54 | 162 | 270 | 26 | 78 | 129 | Low |
| 677 | Stęszew | 71 | 102 | 51 | 154 | 257 | 25 | 74 | 123 | Medium |
| 678 | Stoszowice | 82 | 55 | 125 | 376 | 626 | 60 | 180 | 299 | High |
| 679 | Stronie Śląskie | 52 | 231 | 91 | 274 | 457 | 44 | 131 | 219 | Low |
| 680 | Strumień | 74 | 88 | 4 | 12 | 20 | 2 | 6 | 9 | Low |
| 681 | Strzałkowo | 71 | 103 | 50 | 150 | 250 | 24 | 72 | 120 | Medium |
| 682 | Strzegom | 79 | 66 | 121 | 362 | 604 | 58 | 173 | 289 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 683 | Strzelce Krajeńskie | 62 | 158 | 24 | 72 | 120 | 11 | 34 | 57 | Low |
| 684 | Strzelce Opolskie | 66 | 129 | 109 | 328 | 546 | 52 | 157 | 261 | Medium |
| 685 | Strzelce Wielkie | 76 | 79 | 20 | 59 | 99 | 9 | 28 | 47 | Low |
| 686 | Strzeleczki | 64 | 142 | 39 | 117 | 194 | 19 | 56 | 93 | Low |
| 687 | Strzelin | 85 | 46 | 120 | 360 | 599 | 57 | 172 | 287 | Medium |
| 688 | Strzelno | 69 | 115 | 38 | 113 | 188 | 18 | 54 | 90 | Low |
| 689 | Suchań | 74 | 87 | 98 | 294 | 490 | 47 | 141 | 234 | Medium |
| 690 | Suchy Las | 58 | 185 | 58 | 175 | 291 | 28 | 84 | 139 | Low |
| 691 | Sulechów | 64 | 146 | 91 | 272 | 454 | 43 | 130 | 217 | Medium |
| 692 | Sulęcin | 56 | 196 | 41 | 124 | 207 | 20 | 59 | 99 | Low |
| 693 | Sulików | 83 | 50 | 78 | 233 | 389 | 37 | 112 | 186 | Medium |
| 694 | Sulmierzyce | 69 | 116 | 16 | 47 | 79 | 8 | 23 | 38 | Low |
| 695 | Sulmierzyce | 70 | 108 | 25 | 74 | 123 | 12 | 35 | 59 | Low |
| 696 | Suszec | 80 | 65 | 1 | 2 | 4 | 0 | 1 | 2 | Low |
| 697 | Swarzędz | 73 | 96 | 32 | 97 | 162 | 15 | 46 | 77 | Medium |
| 698 | Syców | 69 | 115 | 119 | 356 | 593 | 57 | 170 | 284 | Medium |
| 699 | Szadek | 76 | 78 | 120 | 359 | 598 | 57 | 172 | 286 | Medium |
| 700 | Szamocin | 57 | 192 | 496 | 1487 | 2478 | 237 | 711 | 1185 | Medium |
| 701 | Szamotuły | 74 | 91 | 87 | 262 | 436 | 42 | 125 | 209 | Medium |
| 702 | Szczaniec | 66 | 134 | 85 | 254 | 423 | 40 | 121 | 202 | Medium |
| 703 | Szczawno-Zdrój | 82 | 55 | 12 | 36 | 60 | 6 | 17 | 29 | Low |
| 704 | Szczecin | 78 | 73 | 217 | 651 | 1085 | 104 | 311 | 519 | High |
| 705 | Szczecinek | 61 | 159 | 207 | 621 | 1036 | 99 | 297 | 495 | Medium |
| 706 | Szczecinek | 73 | 93 | 20 | 59 | 98 | 9 | 28 | 47 | Low |
| 707 | Szczerców | 61 | 162 | 111 | 332 | 554 | 53 | 159 | 265 | Medium |
| 708 | Szczytna | 82 | 57 | 75 | 225 | 374 | 36 | 107 | 179 | Medium |
| 709 | Szczytniki | 76 | 81 | 63 | 189 | 315 | 30 | 90 | 151 | Medium |
| 710 | Szklarska Poręba | 83 | 53 | 78 | 234 | 390 | 37 | 112 | 187 | Medium |
| 711 | Szlichtyngowa | 67 | 123 | 100 | 299 | 498 | 48 | 143 | 238 | Medium |
| 712 | Szprotawa | 66 | 132 | 247 | 740 | 1233 | 118 | 354 | 590 | Medium |
| 713 | Szubin | 59 | 179 | 300 | 899 | 1498 | 143 | 430 | 716 | Medium |
| 714 | Szydłowo | 60 | 167 | 26 | 77 | 128 | 12 | 37 | 61 | Low |
| 715 | Ścinawa | 80 | 62 | 79 | 237 | 395 | 38 | 113 | 189 | Medium |
| 716 | Ślesin | 69 | 114 | 49 | 146 | 244 | 23 | 70 | 117 | Low |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 717 | Śmigiel | 78 | 73 | 121 | 364 | 607 | 58 | 174 | 290 | Medium |
| 718 | Śrem | 69 | 116 | 73 | 219 | 365 | 35 | 105 | 175 | Medium |
| 719 | Środa Śląska | 75 | 83 | 169 | 508 | 847 | 81 | 243 | 405 | High |
| 720 | Środa Wielkopolska | 78 | 73 | 72 | 217 | 362 | 35 | 104 | 173 | Medium |
| 721 | Świdnica | 91 | 25 | 4 | 11 | 19 | 2 | 5 | 9 | Medium |
| 722 | Świdnica | 82 | 55 | 111 | 332 | 553 | 53 | 159 | 265 | Medium |
| 723 | Świdnica | 50 | 255 | 127 | 381 | 635 | 61 | 182 | 304 | Medium |
| 724 | Świebodzice | 84 | 48 | 14 | 42 | 70 | 7 | 20 | 34 | Low |
| 725 | Świebodzin | 67 | 124 | 81 | 242 | 403 | 39 | 116 | 193 | Medium |
| 726 | Świeradów-Zdrój | 85 | 44 | 42 | 127 | 212 | 20 | 61 | 102 | Medium |
| 727 | Świerczów | 73 | 95 | 107 | 322 | 537 | 51 | 154 | 257 | Medium |
| 728 | Świerklaniec | 57 | 191 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 729 | Świerklany | 78 | 70 | 3 | 9 | 15 | 1 | 4 | 7 | Low |
| 730 | Świerzawa | 85 | 46 | 82 | 245 | 409 | 39 | 117 | 195 | Medium |
| 731 | Święciechowa | 70 | 107 | 130 | 389 | 648 | 62 | 186 | 310 | High |
| 732 | Świętochłowice | 88 | 34 | 0 | 0 | 0 | 0 | 0 | 0 | Medium |
| 733 | Świnice Warckie | 69 | 114 | 140 | 420 | 701 | 67 | 201 | 335 | Medium |
| 734 | Tarnowo Podgórne | 78 | 70 | 45 | 135 | 224 | 21 | 64 | 107 | Medium |
| 735 | Tarnowskie Góry | 63 | 150 | 136 | 407 | 678 | 65 | 195 | 324 | Medium |
| 736 | Tarnów Opolski | 55 | 210 | 95 | 286 | 476 | 46 | 137 | 228 | Low |
| 737 | Tarnówka | 58 | 180 | 62 | 186 | 311 | 30 | 89 | 149 | Low |
| 738 | Topólka | 56 | 200 | 5 | 16 | 27 | 3 | 8 | 13 | not necessary |
| 739 | Torzym | 53 | 224 | 71 | 214 | 356 | 34 | 102 | 170 | Low |
| 740 | Toszek | 82 | 57 | 55 | 165 | 275 | 26 | 79 | 131 | Medium |
| 741 | Trzcianka | 54 | 220 | 431 | 1294 | 2156 | 206 | 619 | 1031 | Medium |
| 742 | Trzciel | 55 | 208 | 188 | 563 | 939 | 90 | 269 | 449 | Medium |
| 743 | Trzcinica | 62 | 157 | 65 | 194 | 324 | 31 | 93 | 155 | Medium |
| 744 | Trzcińsko-Zdrój | 73 | 96 | 46 | 138 | 231 | 22 | 66 | 110 | Medium |
| 745 | Trzebiechów | 82 | 57 | 95 | 284 | 473 | 45 | 136 | 226 | Medium |
| 746 | Trzebiel | 50 | 255 | 188 | 565 | 942 | 90 | 270 | 450 | Medium |
| 747 | Trzebnica | 70 | 111 | 268 | 804 | 1340 | 128 | 384 | 641 | Medium |
| 748 | Trzemeszno | 69 | 116 | 111 | 332 | 554 | 53 | 159 | 265 | Medium |
| 749 | Tuczno | 58 | 185 | 64 | 192 | 320 | 31 | 92 | 153 | Low |
| 750 | Tuliszków | 57 | 193 | 184 | 553 | 922 | 88 | 265 | 441 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 751 | Tułowice | 49 | 264 | 57 | 170 | 283 | 27 | 81 | 135 | Low |
| 752 | Tuplice | 50 | 256 | 72 | 215 | 359 | 34 | 103 | 172 | Low |
| 753 | Turawa | 56 | 199 | 78 | 235 | 392 | 37 | 112 | 187 | Low |
| 754 | Turek | 59 | 174 | 82 | 245 | 408 | 39 | 117 | 195 | Low |
| 755 | Turek | 82 | 54 | 12 | 35 | 59 | 6 | 17 | 28 | Low |
| 756 | Tuszyn | 66 | 128 | 5 | 15 | 24 | 2 | 7 | 12 | Low |
| 757 | Twardogóra | 53 | 222 | 151 | 452 | 754 | 72 | 216 | 361 | Medium |
| 758 | Tworóg | 50 | 256 | 446 | 1337 | 2229 | 213 | 640 | 1066 | Medium |
| 759 | Udanin | 79 | 68 | 50 | 151 | 252 | 24 | 72 | 121 | Medium |
| 760 | Ujazd | 71 | 105 | 26 | 77 | 128 | 12 | 37 | 61 | Low |
| 761 | Ujście | 62 | 156 | 140 | 420 | 700 | 67 | 201 | 335 | Medium |
| 762 | Uniejów | 77 | 76 | 50 | 149 | 248 | 24 | 71 | 119 | Medium |
| 763 | Ustroń | 73 | 94 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 764 | Walce | 83 | 51 | 21 | 63 | 104 | 10 | 30 | 50 | Low |
| 765 | Walim | 74 | 88 | 46 | 139 | 232 | 22 | 67 | 111 | Medium |
| 766 | Wałbrzych | 84 | 47 | 34 | 101 | 169 | 16 | 49 | 81 | Medium |
| 767 | Wałcz | 59 | 177 | 122 | 367 | 611 | 58 | 175 | 292 | Low |
| 768 | Wałcz | 85 | 46 | 3 | 9 | 15 | 1 | 4 | 7 | Low |
| 769 | Wapno | 79 | 69 | 27 | 80 | 134 | 13 | 38 | 64 | Low |
| 770 | Warnice | 85 | 46 | 23 | 68 | 114 | 11 | 33 | 54 | Low |
| 771 | Warta | 74 | 90 | 112 | 336 | 560 | 54 | 161 | 268 | Medium |
| 772 | Warta Bolesławiecka | 73 | 96 | 24 | 73 | 121 | 12 | 35 | 58 | Low |
| 773 | Wartkowice | 77 | 76 | 259 | 776 | 1294 | 124 | 371 | 619 | High |
| 774 | Wądroże Wielkie | 80 | 63 | 74 | 221 | 369 | 35 | 106 | 176 | Medium |
| 775 | Wągrowiec | 76 | 78 | 4 | 12 | 19 | 2 | 6 | 9 | Low |
| 776 | Wągrowiec | 65 | 139 | 229 | 688 | 1147 | 110 | 329 | 548 | Medium |
| 777 | Wąsosz | 70 | 109 | 201 | 603 | 1006 | 96 | 289 | 481 | Medium |
| 778 | Węgliniec | 41 | 364 | 590 | 1769 | 2948 | 282 | 846 | 1410 | Medium |
| 779 | Węgorzyno | 76 | 81 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 780 | Wiązów | 86 | 42 | 82 | 246 | 409 | 39 | 117 | 196 | High |
| 781 | Widawa | 66 | 130 | 99 | 296 | 494 | 47 | 142 | 236 | Medium |
| 782 | Widuchowa | 69 | 115 | 127 | 382 | 636 | 61 | 182 | 304 | Medium |
| 783 | Wieleń | 49 | 266 | 271 | 814 | 1357 | 130 | 389 | 649 | Medium |
| 784 | Wielichowo | 74 | 88 | 129 | 387 | 644 | 62 | 185 | 308 | High |
| 785 | Wielowieś | 69 | 113 | 101 | 304 | 507 | 49 | 146 | 243 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 786 | Wieluń | 73 | 92 | 80 | 240 | 399 | 38 | 115 | 191 | Medium |
| 787 | Wieruszów | 61 | 159 | 98 | 293 | 488 | 47 | 140 | 233 | Medium |
| 788 | Wierzbinek | 61 | 162 | 81 | 244 | 406 | 39 | 116 | 194 | Medium |
| 789 | Wierzchlas | 62 | 159 | 24 | 73 | 121 | 12 | 35 | 58 | Low |
| 790 | Wierzchowo | 52 | 234 | 10 | 31 | 52 | 5 | 15 | 25 | not necessary |
| 791 | Więcbork | 67 | 128 | 216 | 648 | 1080 | 103 | 310 | 517 | Medium |
| 792 | Wijewo | 63 | 152 | 65 | 196 | 327 | 31 | 94 | 156 | Medium |
| 793 | Wilczyn | 76 | 81 | 55 | 164 | 274 | 26 | 78 | 131 | Medium |
| 794 | Wilków | 80 | 62 | 44 | 132 | 220 | 21 | 63 | 105 | Medium |
| 795 | Wińsko | 69 | 114 | 262 | 785 | 1308 | 125 | 375 | 625 | Medium |
| 796 | Wisła | 77 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 797 | Wisznia Mała | 81 | 61 | 70 | 210 | 351 | 34 | 101 | 168 | Medium |
| 798 | Witkowo | 67 | 128 | 105 | 314 | 523 | 50 | 150 | 250 | Medium |
| 799 | Witnica | 54 | 214 | 450 | 1350 | 2250 | 215 | 646 | 1076 | Medium |
| 800 | Wleń | 84 | 48 | 34 | 103 | 172 | 16 | 49 | 82 | Medium |
| 801 | Władysławów | 56 | 198 | 43 | 128 | 213 | 20 | 61 | 102 | Low |
| 802 | Włodowice | 58 | 180 | 30 | 89 | 148 | 14 | 42 | 71 | not necessary |
| 803 | Włoszakowice | 57 | 190 | 49 | 146 | 244 | 23 | 70 | 117 | Low |
| 804 | Wodzierady | 66 | 129 | 50 | 150 | 251 | 24 | 72 | 120 | Low |
| 805 | Wodzisław Śląski | 81 | 61 | 33 | 98 | 164 | 16 | 47 | 78 | Medium |
| 806 | Wojcieszów | 83 | 50 | 6 | 17 | 29 | 3 | 8 | 14 | Low |
| 807 | Wola Krzysztoporska | 75 | 84 | 11 | 33 | 55 | 5 | 16 | 26 | Low |
| 808 | Wolsztyn | 65 | 137 | 236 | 707 | 1178 | 113 | 338 | 563 | Medium |
| 809 | Wołczyn | 70 | 109 | 184 | 553 | 922 | 88 | 265 | 441 | Medium |
| 810 | Wołów | 57 | 192 | 279 | 836 | 1393 | 133 | 400 | 666 | Medium |
| 811 | Woźniki | 63 | 148 | 224 | 671 | 1119 | 107 | 321 | 535 | Medium |
| 812 | Wręczyca Wielka | 63 | 152 | 90 | 271 | 452 | 43 | 130 | 216 | Medium |
| 813 | Wrocław | 89 | 33 | 276 | 828 | 1380 | 132 | 396 | 660 | High |
| 814 | Wronki | 53 | 229 | 101 | 303 | 505 | 48 | 145 | 242 | Low |
| 815 | Wróblew | 77 | 78 | 25 | 74 | 124 | 12 | 35 | 59 | Low |
| 816 | Września | 74 | 87 | 128 | 385 | 642 | 61 | 184 | 307 | High |
| 817 | Wschowa | 69 | 114 | 102 | 306 | 510 | 49 | 146 | 244 | Medium |
| 818 | Wymiarki | 44 | 319 | 49 | 147 | 245 | 23 | 70 | 117 | Low |
| 819 | Wyrzysk | 68 | 122 | 273 | 820 | 1367 | 131 | 392 | 654 | Medium |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 820 | Wysoka | 73 | 94 | 74 | 222 | 370 | 35 | 106 | 177 | Medium |
| 821 | Zabór | 64 | 142 | 56 | 168 | 280 | 27 | 80 | 134 | Low |
| 822 | Zabrze | 83 | 52 | 47 | 140 | 234 | 22 | 67 | 112 | Medium |
| 823 | Zadzim | 77 | 77 | 151 | 454 | 757 | 72 | 217 | 362 | High |
| 824 | Zagórów | 68 | 119 | 155 | 466 | 776 | 74 | 223 | 371 | Medium |
| 825 | Zagrodno | 78 | 72 | 63 | 188 | 314 | 30 | 90 | 150 | Medium |
| 826 | Zakrzewo | 66 | 133 | 4 | 11 | 18 | 2 | 5 | 8 | Low |
| 827 | Zakrzewo | 56 | 197 | 97 | 291 | 486 | 46 | 139 | 232 | Low |
| 828 | Zaniemyśl | 71 | 104 | 18 | 55 | 92 | 9 | 26 | 44 | Low |
| 829 | Zapolice | 73 | 92 | 60 | 179 | 299 | 29 | 86 | 143 | Medium |
| 830 | Zawadzkie | 50 | 252 | 136 | 407 | 679 | 65 | 195 | 325 | Medium |
| 831 | Zawidów | 85 | 45 | 1 | 3 | 4 | 0 | 1 | 2 | Low |
| 832 | Zawiercie | 75 | 83 | 13 | 39 | 65 | 6 | 19 | 31 | Low |
| 833 | Zawonia | 59 | 173 | 80 | 240 | 400 | 38 | 115 | 191 | Low |
| 834 | Ząbkowice Śląskie | 81 | 61 | 45 | 134 | 224 | 21 | 64 | 107 | Medium |
| 835 | Zbąszynek | 60 | 170 | 50 | 150 | 250 | 24 | 72 | 120 | Low |
| 836 | Zbąszyń | 60 | 170 | 136 | 407 | 679 | 65 | 195 | 325 | Medium |
| 837 | Zbrosławice | 80 | 65 | 102 | 307 | 512 | 49 | 147 | 245 | Medium |
| 838 | Zduny | 68 | 121 | 91 | 273 | 455 | 43 | 130 | 217 | Medium |
| 839 | Zduńska Wola | 85 | 43 | 6 | 19 | 32 | 3 | 9 | 15 | Medium |
| 840 | Zduńska Wola | 70 | 111 | 41 | 122 | 203 | 19 | 58 | 97 | Low |
| 841 | Zdzieszowice | 80 | 65 | 33 | 98 | 163 | 16 | 47 | 78 | Medium |
| 842 | Zebrzydowice | 76 | 80 | 42 | 125 | 208 | 20 | 60 | 100 | Medium |
| 843 | Zelów | 64 | 145 | 96 | 287 | 479 | 46 | 137 | 229 | Medium |
| 844 | Zębowice | 51 | 243 | 21 | 64 | 107 | 10 | 31 | 51 | not necessary |
| 845 | Zgorzelec | 91 | 24 | 5 | 14 | 23 | 2 | 7 | 11 | Medium |
| 846 | Zgorzelec | 82 | 55 | 98 | 295 | 491 | 47 | 141 | 235 | Medium |
| 847 | Zielona Góra | 59 | 173 | 230 | 690 | 1149 | 110 | 330 | 550 | Medium |
| 848 | Ziębice | 81 | 61 | 124 | 371 | 618 | 59 | 177 | 296 | High |
| 849 | Złocieniec | 70 | 109 | 70 | 209 | 349 | 33 | 100 | 167 | Medium |
| 850 | Złoczew | 67 | 124 | 73 | 219 | 365 | 35 | 105 | 175 | Medium |
| 851 | Złotniki Kujawskie | 77 | 74 | 36 | 109 | 182 | 17 | 52 | 87 | Medium |
| 852 | Złotoryja | 87 | 38 | 1 | 2 | 3 | 0 | 1 | 2 | Medium |
| 853 | Złotoryja | 82 | 57 | 61 | 182 | 303 | 29 | 87 | 145 | Medium |
| 854 | Złotów | 76 | 82 | 5 | 16 | 27 | 3 | 8 | 13 | Low |

| No | Name of commune | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m$^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 855 | Złotów | 63 | 150 | 239 | 718 | 1197 | 115 | 344 | 573 | Medium |
| 856 | Złoty Stok | 72 | 101 | 50 | 151 | 252 | 24 | 72 | 120 | Medium |
| 857 | Zwierzyn | 69 | 113 | 326 | 979 | 1631 | 156 | 468 | 780 | Medium |
| 858 | Żagań | 73 | 93 | 3 | 10 | 17 | 2 | 5 | 8 | Low |
| 859 | Żagań | 61 | 164 | 163 | 489 | 815 | 78 | 234 | 390 | Medium |
| 860 | Żarki | 57 | 189 | 40 | 121 | 201 | 19 | 58 | 96 | Low |
| 861 | Żarów | 78 | 70 | 64 | 193 | 322 | 31 | 92 | 154 | Medium |
| 862 | Żary | 57 | 194 | 167 | 500 | 834 | 80 | 239 | 399 | Medium |
| 863 | Żary | 71 | 105 | 13 | 39 | 66 | 6 | 19 | 31 | Low |
| 864 | Żelazków | 75 | 83 | 42 | 127 | 211 | 20 | 61 | 101 | Medium |
| 865 | Żerków | 73 | 92 | 105 | 316 | 526 | 50 | 151 | 252 | Medium |
| 866 | Żmigród | 66 | 129 | 472 | 1417 | 2361 | 226 | 677 | 1129 | Medium |
| 867 | Żnin | 79 | 66 | 68 | 203 | 338 | 32 | 97 | 162 | Medium |
| 868 | Żory | 80 | 63 | 41 | 122 | 203 | 19 | 58 | 97 | Medium |
| 869 | Żórawina | 87 | 38 | 55 | 164 | 273 | 26 | 78 | 131 | Medium |
| 870 | Żukowice | 81 | 60 | 24 | 72 | 121 | 12 | 35 | 58 | Low |
| 871 | Żytno | 46 | 299 | 21 | 63 | 105 | 10 | 30 | 50 | not necessary |

## Appendix 2. Table differentiation in ISWB of the CN parameter, potential retention divided into scenarios and priority for action.

| No | Name of ISWB | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m$^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 1 | Barycz od Dąbrówki do Sąsiecznicy | 57 | 192 | 1915 | 5745 | 9574 | 916 | 2747 | 4579 | Medium |
| 2 | Barycz od Orli do Odry | 67 | 125 | 265 | 796 | 1326 | 127 | 380 | 634 | Medium |
| 3 | Barycz od Sąsiecznicy do Orli | 66 | 129 | 403 | 1209 | 2014 | 193 | 578 | 963 | Medium |
| 4 | Barycz od źródła do Dąbrówki włącznie | 56 | 196 | 417 | 1252 | 2086 | 200 | 599 | 998 | Medium |
| 5 | Bawół | 62 | 153 | 590 | 1771 | 2952 | 282 | 847 | 1412 | Medium |
| 6 | Bezp. zlew. j. Miedwie, Miedwinka, Dop. z Bielkowa | 77 | 76 | 151 | 452 | 754 | 72 | 216 | 361 | Medium |
| 7 | Biała | 73 | 94 | 122 | 367 | 612 | 59 | 176 | 293 | Medium |
| 8 | Biała | 45 | 311 | 133 | 400 | 666 | 64 | 191 | 319 | Low |
| 9 | Biała Głuchołaska | 80 | 62 | 29 | 87 | 145 | 14 | 42 | 70 | Low |
| 10 | Biała Lądecka | 61 | 165 | 138 | 415 | 691 | 66 | 198 | 331 | Low |
| 11 | Biała Oksza | 64 | 143 | 66 | 197 | 328 | 31 | 94 | 157 | Low |
| 12 | Bierawka z dopływami | 65 | 138 | 464 | 1392 | 2320 | 222 | 666 | 1110 | Medium |
| 13 | Bogacica | 48 | 274 | 303 | 909 | 1514 | 145 | 435 | 724 | Low |
| 14 | Bóbr od Bobrzycy do Kwisy | 54 | 214 | 302 | 905 | 1509 | 144 | 433 | 722 | Low |
| 15 | Bóbr od Kanału Dychowskiego do Odry | 47 | 291 | 144 | 432 | 721 | 69 | 207 | 345 | Low |
| 16 | Bóbr od Kwisy do Kanału Dychowskiego | 65 | 139 | 203 | 608 | 1013 | 97 | 291 | 484 | Medium |
| 17 | Bóbr od Zadrnej do zb.Pilchowickiego włącznie | 84 | 47 | 407 | 1222 | 2037 | 195 | 584 | 974 | High |
| 18 | Bóbr od zb.Pilchowickiego do Żeliszowskiego P. w. | 83 | 51 | 254 | 761 | 1268 | 121 | 364 | 606 | Medium |
| 19 | Bóbr od źródła do Zadrnej włącznie | 77 | 76 | 285 | 854 | 1423 | 136 | 408 | 680 | Medium |
| 20 | Bóbr od Żeliszowskiego Potoku do Bobrzycy | 70 | 108 | 69 | 207 | 345 | 33 | 99 | 165 | Medium |
| 21 | Brda od jez. Charzykowskiego do jez. Kosobudno z jez. Kosobudno | 43 | 341 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 22 | Brda od zb. Koronowo do zb. Smukała ze zb. Smukała | 71 | 103 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 23 | Brda od zb. Smukała do ujścia | 49 | 264 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 24 | Brda od źródeł do jez. Końskiego z jez. Końskim | 38 | 408 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 25 | Brynica od zb. Kozłowa Góra do ujścia wraz ze zbiornikiem | 83 | 53 | 0 | 0 | 0 | 0 | 0 | 0 | Low |

| No | Name of ISWB | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 26 | Brynica od źródeł do zb. Kozłowa Góra | 57 | 191 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 27 | Budkowiczanka | 46 | 294 | 527 | 1581 | 2634 | 252 | 756 | 1260 | Medium |
| 28 | Bystrzyca Dusznicka | 83 | 54 | 137 | 411 | 685 | 66 | 197 | 328 | Medium |
| 29 | Bystrzyca od Strzegomki do Odry | 83 | 54 | 72 | 215 | 359 | 34 | 103 | 172 | Medium |
| 30 | Bystrzyca od zb.Mietkow włącznie do Strzegomki | 81 | 60 | 85 | 254 | 424 | 41 | 122 | 203 | Medium |
| 31 | Bystrzyca od źródeł do zb.Mietków | 76 | 78 | 205 | 614 | 1023 | 98 | 293 | 489 | Medium |
| 32 | Bzura od Starówki do sztucznego koryta przed Łęczycą | 81 | 61 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 33 | Bzura od źródeł do Starówki | 66 | 131 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 34 | Bzura ze Starym Korytem Bzury w Łęczycy do Ucherki bez Ucherki | 83 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 35 | Chełszcząca | 49 | 267 | 17 | 52 | 87 | 8 | 25 | 42 | not necessary |
| 36 | Chodeczka | 69 | 117 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 37 | Cicha Woda | 79 | 67 | 237 | 712 | 1186 | 113 | 340 | 567 | Medium |
| 38 | Cybina | 66 | 129 | 49 | 147 | 245 | 23 | 70 | 117 | Low |
| 39 | Cybinka, Dopł. z Mielesznicy, Dopł. z Grzmiącej | 53 | 221 | 10 | 31 | 52 | 5 | 15 | 25 | not necessary |
| 40 | Czadeczka | 94 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | Medium |
| 41 | Czarna Struga | 54 | 216 | 241 | 724 | 1206 | 115 | 346 | 577 | Low |
| 42 | Czarna Woda | 78 | 70 | 173 | 518 | 863 | 83 | 248 | 413 | Medium |
| 43 | Czarna Woda | 55 | 210 | 233 | 699 | 1164 | 111 | 334 | 557 | Low |
| 44 | Czarna Woda od Karkoszki do Kaczawy | 76 | 79 | 269 | 807 | 1346 | 129 | 386 | 644 | Medium |
| 45 | Czarna Woda od źródła do Karkoszki | 52 | 230 | 457 | 1370 | 2284 | 218 | 655 | 1092 | Medium |
| 46 | Czerna Mała i Czernica | 44 | 317 | 532 | 1596 | 2660 | 254 | 763 | 1272 | Medium |
| 47 | Czerna Wielka od Ziębicy do Bobru | 48 | 272 | 235 | 705 | 1175 | 112 | 337 | 562 | Low |
| 48 | Czerna Wielka od źródła do Ziębiny włącznie | 48 | 278 | 361 | 1083 | 1805 | 173 | 518 | 863 | Medium |
| 49 | Czernica | 51 | 246 | 240 | 720 | 1200 | 115 | 344 | 574 | Low |
| 50 | Czerwona Woda | 83 | 51 | 134 | 401 | 669 | 64 | 192 | 320 | Medium |
| 51 | Czerwony Kanał | 63 | 152 | 379 | 1136 | 1893 | 181 | 543 | 906 | Medium |
| 52 | Debrzynka | 68 | 121 | 44 | 133 | 221 | 21 | 63 | 106 | Low |
| 53 | Dębnica | 56 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 54 | Dobroczna | 77 | 75 | 229 | 687 | 1146 | 110 | 329 | 548 | Medium |
| 55 | Dobrzyca | 56 | 201 | 181 | 543 | 905 | 87 | 260 | 433 | Low |
| 56 | Dojca | 59 | 179 | 245 | 736 | 1227 | 117 | 352 | 587 | Low |
| 57 | Dopł. Metuje (Zidovka, Szybka, Czermnica) | 83 | 54 | 1 | 3 | 5 | 0 | 1 | 2 | Low |
| 58 | Dopł. spod Choronia | 47 | 292 | 35 | 106 | 177 | 17 | 51 | 85 | not necessary |

| No | Name of ISWB | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 59 | Dopł. spod Załomia, Kan. Łąka, Kan. Komarowski | 47 | 284 | 278 | 834 | 1391 | 133 | 399 | 665 | Low |
| 60 | Dopł. z Cielc | 84 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 61 | Dopł. z Łącznej | 49 | 269 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 62 | Dopł. z wyrobiska Turoszów | 90 | 28 | 23 | 69 | 115 | 11 | 33 | 55 | Medium |
| 63 | Dopływ z Łęgów Odrzańskich I, II i III | 50 | 252 | 71 | 214 | 357 | 34 | 102 | 171 | Low |
| 64 | Drama z dopływami | 83 | 53 | 87 | 261 | 435 | 42 | 125 | 208 | Medium |
| 65 | Drawa do wypływu z jez. Lubie | 65 | 135 | 268 | 804 | 1340 | 128 | 385 | 641 | Medium |
| 66 | Drawa od Drawicy do Mierzęckiej Strugi | 49 | 263 | 233 | 700 | 1167 | 112 | 335 | 558 | Low |
| 67 | Drawa od Mierzęckiej Strugi do ujścia | 46 | 292 | 91 | 272 | 454 | 43 | 130 | 217 | Low |
| 68 | Drawa od wypływu z jez. Lubie do Drawicy | 45 | 306 | 119 | 356 | 593 | 57 | 170 | 283 | Low |
| 69 | Drawica | 51 | 240 | 11 | 33 | 55 | 5 | 16 | 26 | not necessary |
| 70 | Dzika Orlica | 80 | 62 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 71 | Flinta | 58 | 185 | 267 | 801 | 1334 | 128 | 383 | 638 | Low |
| 72 | Gąsawka do wypływu z jez. Sobiejuskiego | 76 | 80 | 132 | 395 | 659 | 63 | 189 | 315 | Medium |
| 73 | Gąsawka od wypływu z jez. Sobiejuskiego do ujścia | 62 | 159 | 184 | 553 | 921 | 88 | 264 | 441 | Medium |
| 74 | Gęsia | 53 | 227 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 75 | Głomia | 64 | 145 | 427 | 1280 | 2133 | 204 | 612 | 1020 | Medium |
| 76 | Główna | 65 | 134 | 105 | 314 | 524 | 50 | 150 | 250 | Low |
| 77 | Głuszynka | 71 | 103 | 33 | 99 | 165 | 16 | 47 | 79 | Low |
| 78 | Gniła Obra | 64 | 142 | 241 | 722 | 1203 | 115 | 345 | 575 | Medium |
| 79 | Gostynia | 79 | 68 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 80 | Gowienica do Dopł. z Puszczy Goleniowskiej | 52 | 235 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 81 | Gowienica Miedwiańska | 84 | 49 | 9 | 28 | 46 | 4 | 13 | 22 | Low |
| 82 | Gowienica wraz z Dop z Puszczy Goleniowskiej do uj | 38 | 412 | 6 | 17 | 28 | 3 | 8 | 13 | not necessary |
| 83 | Grabia do Dopł. z Anielina | 69 | 115 | 263 | 789 | 1315 | 126 | 377 | 629 | Medium |
| 84 | Grabia od Dopł. z Anielina do ujścia | 69 | 115 | 230 | 691 | 1151 | 110 | 330 | 551 | Medium |
| 85 | Graniczna | 60 | 172 | 120 | 361 | 602 | 58 | 173 | 288 | Low |
| 86 | Gunica | 55 | 208 | 259 | 778 | 1296 | 124 | 372 | 620 | Low |
| 87 | Gwda do Dołgi | 59 | 178 | 301 | 902 | 1503 | 144 | 431 | 719 | Low |
| 88 | Gwda od Dołgi do zb. Podgaje | 59 | 175 | 137 | 412 | 687 | 66 | 197 | 329 | Low |
| 89 | Gwda od Piławy do ujścia | 57 | 192 | 109 | 326 | 544 | 52 | 156 | 260 | Low |
| 90 | Gwda od zb. Podgaje do Piławy | 54 | 217 | 208 | 624 | 1040 | 99 | 298 | 497 | Low |
| 91 | Ilanka | 52 | 236 | 159 | 478 | 796 | 76 | 229 | 381 | Low |
| 92 | Ina od Krępieli do ujścia | 67 | 124 | 171 | 512 | 853 | 82 | 245 | 408 | Medium |
| 93 | Ina od Stobnicy do Krąpieli | 70 | 110 | 225 | 676 | 1126 | 108 | 323 | 539 | Medium |

| No | Name of ISWB | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m$^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 94 | Ina od źródeł wraz ze Stobnicą | 71 | 102 | 155 | 465 | 775 | 74 | 222 | 371 | Medium |
| 95 | Izera | 83 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 96 | Jemielnica | 59 | 173 | 670 | 2010 | 3350 | 320 | 961 | 1602 | Medium |
| 97 | Jez. Będgoszcz, Dopływ z Żabowa | 87 | 39 | 10 | 31 | 51 | 5 | 15 | 24 | Medium |
| 98 | Jez. Gopło | 80 | 63 | 72 | 215 | 359 | 34 | 103 | 172 | Medium |
| 99 | Jezierzyca | 55 | 206 | 278 | 835 | 1392 | 133 | 399 | 666 | Low |
| 100 | Jędrzychowicki Potok | 84 | 47 | 49 | 148 | 247 | 24 | 71 | 118 | Low |
| 101 | Kaczawa od Nysy Szalonej do Odry | 76 | 82 | 195 | 584 | 973 | 93 | 279 | 466 | Medium |
| 102 | Kaczawa od źródła do Nysy Szalonej | 84 | 49 | 163 | 488 | 813 | 78 | 233 | 389 | Medium |
| 103 | Kamienna | 84 | 49 | 331 | 993 | 1656 | 158 | 475 | 792 | High |
| 104 | Kamionka | 80 | 65 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 105 | Kamionka | 58 | 182 | 28 | 84 | 141 | 13 | 40 | 67 | not necessary |
| 106 | Kanał Bachorza | 80 | 64 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 107 | Kanał Bydgoski i Noteć do Kcynki | 61 | 162 | 982 | 2945 | 4908 | 469 | 1408 | 2347 | Medium |
| 108 | Kanał Cedyński | 64 | 141 | 39 | 116 | 194 | 19 | 56 | 93 | Low |
| 109 | Kanał Grójecki | 62 | 153 | 173 | 520 | 867 | 83 | 249 | 415 | Medium |
| 110 | Kanał Ina | 70 | 108 | 13 | 40 | 67 | 6 | 19 | 32 | Low |
| 111 | Kanał Kościański/Mosiński od Kanału Przysieka Stara do Żydowskiego Rowu | 77 | 77 | 149 | 448 | 747 | 71 | 214 | 357 | Medium |
| 112 | Kanał Luboński | 59 | 175 | 63 | 190 | 317 | 30 | 91 | 152 | Low |
| 113 | Kanał Młyński | 87 | 39 | 26 | 79 | 132 | 13 | 38 | 63 | Medium |
| 114 | Kanał Mosiński do Kani | 78 | 73 | 394 | 1181 | 1969 | 188 | 565 | 942 | High |
| 115 | Kanał Mosiński od Kani do Kanału Przysieka Stara | 66 | 129 | 342 | 1025 | 1709 | 163 | 490 | 817 | Medium |
| 116 | Kanał Mosiński od Żydowskiego Rowu do ujścia | 68 | 118 | 104 | 312 | 520 | 50 | 149 | 249 | Low |
| 117 | Kanał Ostrowo-Gopło | 66 | 132 | 108 | 325 | 542 | 52 | 156 | 259 | Low |
| 118 | Kanał Otok | 54 | 219 | 256 | 769 | 1282 | 123 | 368 | 613 | Low |
| 119 | Kanał Postomski do Rudzianki | 46 | 300 | 241 | 724 | 1207 | 115 | 346 | 577 | Low |
| 120 | Kanał Postomski do ujścia | 52 | 233 | 473 | 1419 | 2365 | 226 | 679 | 1131 | Medium |
| 121 | kanał przerzutowy Nysa - Oława | 86 | 40 | 42 | 126 | 211 | 20 | 60 | 101 | Medium |
| 122 | Kanał Stawnik i Młynówka Sulowsko-Radziądzka | 62 | 158 | 170 | 510 | 851 | 81 | 244 | 407 | Medium |
| 123 | Kanał Ślesiński i Struga Biskupia | 74 | 91 | 238 | 714 | 1190 | 114 | 342 | 569 | Medium |
| 124 | Kanał Wonieść | 74 | 90 | 111 | 332 | 553 | 53 | 159 | 264 | Medium |
| 125 | Kanał Zielona Struga | 66 | 129 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 126 | Kania | 82 | 56 | 117 | 350 | 583 | 56 | 167 | 279 | Medium |
| 127 | Karpina, Karwia Struga, Dopł. z pold. Warnołęka | 45 | 316 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 128 | Kłodawka | 51 | 245 | 146 | 438 | 729 | 70 | 209 | 349 | Low |

| No | Name of ISWB | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 129 | Kłodnica do Kozłówki wraz z Kozłówką | 80 | 63 | 408 | 1225 | 2042 | 195 | 586 | 976 | High |
| 130 | Kłodnica od Kozłówki do ujścia | 67 | 123 | 309 | 926 | 1543 | 148 | 443 | 738 | Medium |
| 131 | Kocinka | 72 | 98 | 95 | 284 | 473 | 45 | 136 | 226 | Medium |
| 132 | Konotop | 53 | 228 | 58 | 174 | 289 | 28 | 83 | 138 | not necessary |
| 133 | Kopel | 77 | 78 | 131 | 394 | 657 | 63 | 189 | 314 | Medium |
| 134 | Krępiel | 74 | 89 | 206 | 618 | 1031 | 99 | 296 | 493 | Medium |
| 135 | Krynka | 80 | 63 | 180 | 541 | 902 | 86 | 259 | 431 | Medium |
| 136 | Krzekna od źródeł do jez. Będgoszcz | 74 | 90 | 49 | 148 | 247 | 24 | 71 | 118 | Low |
| 137 | Krztynia | 57 | 189 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 138 | Krzycki Rów | 57 | 194 | 206 | 617 | 1028 | 98 | 295 | 491 | Low |
| 139 | Kuroch | 69 | 113 | 146 | 438 | 730 | 70 | 210 | 349 | Low |
| 140 | Kurzyca, Dopływ spod Porzecza | 64 | 145 | 53 | 158 | 263 | 25 | 75 | 126 | Low |
| 141 | Kwisa od kliczkówki do Bobru | 46 | 295 | 82 | 245 | 408 | 39 | 117 | 195 | Low |
| 142 | Kwisa od zb.Leśna do Kliczkówki | 74 | 89 | 447 | 1340 | 2234 | 214 | 641 | 1068 | High |
| 143 | Kwisa od źródła do zb.Leśna włącznie | 84 | 49 | 679 | 2036 | 3393 | 325 | 974 | 1623 | High |
| 144 | Lesk | 66 | 130 | 101 | 302 | 503 | 48 | 144 | 241 | Low |
| 145 | Liswarta do Łomnicy | 55 | 206 | 713 | 2139 | 3564 | 341 | 1023 | 1705 | Medium |
| 146 | Liswarta od Górnianki do ujścia | 54 | 213 | 17 | 52 | 87 | 8 | 25 | 42 | not necessary |
| 147 | Liswarta od Łomnicy do Górnianki | 72 | 98 | 224 | 673 | 1121 | 107 | 322 | 536 | Medium |
| 148 | Lubsza od Pstrąga do Nysy Łużyckiej | 49 | 261 | 300 | 900 | 1499 | 143 | 430 | 717 | Low |
| 149 | Lubsza od źródła do Pstąga | 55 | 205 | 451 | 1354 | 2256 | 216 | 647 | 1079 | Medium |
| 150 | Luciąża od zb. Cieszanowice do ujścia z wyłączeniem Strawy | 63 | 146 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 151 | Luciąża od źródeł do zb. Cieszanowice | 64 | 144 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 152 | Lutynia do Lubieszki | 76 | 78 | 289 | 867 | 1444 | 138 | 414 | 691 | Medium |
| 153 | Łarpia | 66 | 132 | 29 | 88 | 147 | 14 | 42 | 70 | Low |
| 154 | Łobżonka | 65 | 137 | 500 | 1500 | 2500 | 239 | 717 | 1196 | Medium |
| 155 | Łomnica | 84 | 48 | 90 | 271 | 452 | 43 | 130 | 216 | Medium |
| 156 | Łomnica z Prądem | 55 | 204 | 189 | 568 | 946 | 90 | 271 | 452 | Low |
| 157 | Łużyca | 57 | 189 | 250 | 750 | 1250 | 120 | 359 | 598 | Low |
| 158 | Mała Ina | 78 | 71 | 177 | 531 | 885 | 85 | 254 | 423 | Medium |
| 159 | Mała Noteć z jez. Pakoskim | 72 | 101 | 299 | 896 | 1493 | 143 | 428 | 714 | Medium |
| 160 | Mała Panew od Lublinicy do zb.Turawa | 50 | 258 | 422 | 1267 | 2112 | 202 | 606 | 1010 | Medium |
| 161 | Mała Panew od Stoły do Lublinicy włącznie | 57 | 190 | 743 | 2228 | 3714 | 355 | 1066 | 1776 | Medium |
| 162 | Mała Panew od zb.Turawa włącznie do Odry | 53 | 230 | 118 | 353 | 589 | 56 | 169 | 282 | Low |

| No | Name of ISWB | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 163 | Mała Panew od źródła do Stoły | 52 | 235 | 962 | 2885 | 4808 | 460 | 1380 | 2300 | Medium |
| 164 | Mała Ślęza | 82 | 55 | 82 | 246 | 410 | 39 | 118 | 196 | Medium |
| 165 | Mała Wełna | 71 | 105 | 398 | 1193 | 1988 | 190 | 570 | 951 | High |
| 166 | Marwicka Struga, Dopływ z jez. Trzemeszno | 72 | 100 | 75 | 226 | 376 | 36 | 108 | 180 | Medium |
| 167 | Maskawa | 72 | 100 | 293 | 878 | 1463 | 140 | 420 | 700 | Medium |
| 168 | Meszna | 72 | 99 | 355 | 1065 | 1775 | 170 | 509 | 849 | High |
| 169 | Miedzianka w granicach państwa | 83 | 53 | 71 | 213 | 355 | 34 | 102 | 170 | Medium |
| 170 | Mierzęcka Struga | 60 | 171 | 173 | 519 | 865 | 83 | 248 | 414 | Low |
| 171 | Miłonka | 85 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 172 | Młynówka Kaszczorska | 58 | 180 | 148 | 445 | 741 | 71 | 213 | 354 | Low |
| 173 | Mogilica | 72 | 99 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 174 | Mogilnica | 76 | 79 | 569 | 1708 | 2846 | 272 | 817 | 1361 | High |
| 175 | Morawa i Krupa | 36 | 452 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 176 | Moszczenica od źródeł do Dopł. z Basiekierza (włącznie) | 81 | 59 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 177 | Myśla od jez. Myśliborskiego do ujścia | 57 | 192 | 390 | 1170 | 1951 | 187 | 560 | 933 | Medium |
| 178 | Myśla od źródeł do wypływu z jez. Myśliborskiego | 73 | 96 | 176 | 529 | 882 | 84 | 253 | 422 | Medium |
| 179 | Ner do Zalewki | 80 | 65 | 176 | 529 | 882 | 84 | 253 | 422 | Medium |
| 180 | Ner od Bełdówki do ujścia | 72 | 100 | 700 | 2101 | 3501 | 335 | 1005 | 1674 | High |
| 181 | Ner od Zalewki do Bełdówki | 67 | 124 | 713 | 2140 | 3567 | 341 | 1023 | 1706 | Medium |
| 182 | Niesób | 67 | 126 | 217 | 651 | 1085 | 104 | 311 | 519 | Medium |
| 183 | Niniwka | 51 | 243 | 55 | 166 | 277 | 26 | 79 | 132 | not necessary |
| 184 | Noteć do Dopł. spod Sadlna | 68 | 119 | 327 | 980 | 1633 | 156 | 469 | 781 | Medium |
| 185 | Noteć od Drawy do Rudawy | 41 | 363 | 190 | 569 | 948 | 91 | 272 | 453 | Low |
| 186 | Noteć od Gwdy do Kanału Romanowskiego | 56 | 196 | 519 | 1557 | 2595 | 248 | 745 | 1241 | Medium |
| 187 | Noteć od jez. Gopła do Małej Noteci | 77 | 75 | 186 | 558 | 929 | 89 | 267 | 445 | Medium |
| 188 | Noteć od Kanału Romanowskiego do Drawy | 51 | 248 | 721 | 2164 | 3607 | 345 | 1035 | 1725 | Medium |
| 189 | Noteć od Kcynki do Gwdy | 62 | 156 | 2016 | 6047 | 10078 | 964 | 2892 | 4820 | Medium |
| 190 | Noteć od Małej Noteci do oddzielenia się Kanału Noteckiego w Antonowie | 73 | 96 | 105 | 316 | 526 | 50 | 151 | 252 | Medium |
| 191 | Noteć od oddzielenia się Kanału Noteckiego w Antonowie do Kanału Bydgoskiego | 55 | 209 | 455 | 1366 | 2277 | 218 | 653 | 1089 | Medium |
| 192 | Noteć od Rudawy do Starej Noteci | 43 | 332 | 256 | 768 | 1279 | 122 | 367 | 612 | Low |
| 193 | Nysa Kłodzka od Różanej włącznie do Ścinawki | 80 | 64 | 318 | 953 | 1589 | 152 | 456 | 760 | High |
| 194 | Nysa Kłodzka od Ścinawki do zb.Topola | 81 | 60 | 294 | 882 | 1471 | 141 | 422 | 703 | Medium |

| **No** | **Name of ISWB** | **Average CN parameter value [-]** | **Potential catchment retention S [mm]** | **potential volume of water in ditches [thou m³] for scenarios** | | | | | | **Priority for action** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | **S1** | **S2** | **S3** | **S4** | **S5** | **S6** | |
| 195 | Nysa Kłodzka od zb.Nysa do Odry | 79 | 68 | 337 | 1011 | 1686 | 161 | 484 | 806 | High |
| 196 | Nysa Kłodzka od zb.Topola wł. do zb.Nysa wł. | 84 | 50 | 110 | 329 | 548 | 52 | 157 | 262 | Medium |
| 197 | Nysa Kłodzka od źródła do Różanej | 77 | 76 | 161 | 482 | 803 | 77 | 231 | 384 | Medium |
| 198 | Nysa Łużycka od EW Gubin do Odry | 52 | 236 | 6 | 19 | 32 | 3 | 9 | 15 | not necessary |
| 199 | Nysa Łużycka od Miedzianki do Żareckiego Potoku | 83 | 54 | 54 | 161 | 268 | 26 | 77 | 128 | Low |
| 200 | Nysa Łużycka od Skrody do EW Gubin | 47 | 284 | 138 | 415 | 692 | 66 | 199 | 331 | Low |
| 201 | Nysa Łużycka od Żareckiego Potoku wł. do Skrody | 54 | 219 | 289 | 867 | 1444 | 138 | 414 | 691 | Low |
| 202 | Nysa od Jerice do Miedzianki | 84 | 49 | 8 | 24 | 39 | 4 | 11 | 19 | Low |
| 203 | Nysa Szalona | 80 | 62 | 345 | 1036 | 1726 | 165 | 495 | 826 | High |
| 204 | Obra od Czarnej Wody do Paklicy | 49 | 266 | 296 | 888 | 1479 | 141 | 424 | 707 | Low |
| 205 | Obra od Kanału Dźwińskiego do Czarnej Wody | 58 | 184 | 594 | 1783 | 2972 | 284 | 853 | 1421 | Medium |
| 206 | Obra od Paklicy do ujścia | 59 | 179 | 139 | 416 | 693 | 66 | 199 | 331 | Low |
| 207 | Obrzański Kanał Południowy | 66 | 128 | 397 | 1190 | 1984 | 190 | 569 | 949 | Medium |
| 208 | Obrzański Kanał Północny i Środkowy | 65 | 139 | 671 | 2014 | 3356 | 321 | 963 | 1605 | Medium |
| 209 | Obrzyca | 51 | 241 | 400 | 1199 | 1999 | 191 | 574 | 956 | Medium |
| 210 | Obszar Dorzecza Ucker w granicach RZGW Sz-n | 72 | 98 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 211 | Ochnia od Miłonki do ujścia | 83 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 212 | Ochnia od źródeł do Miłonki bez Miłonki | 77 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 213 | Odra od Czarnej Strugi do Nysy Łużyckiej | 53 | 229 | 617 | 1850 | 3083 | 295 | 885 | 1474 | Medium |
| 214 | Odra od granicy państwa do wypływu ze zb. Racibórz Górny - Buków | 79 | 67 | 47 | 141 | 234 | 22 | 67 | 112 | Low |
| 215 | Odra od Kanału Gliwickiego do Osobłogi | 74 | 87 | 179 | 536 | 893 | 85 | 256 | 427 | Medium |
| 216 | Odra od Kanału Leśnego do ujścia | 77 | 75 | 185 | 554 | 923 | 88 | 265 | 442 | Medium |
| 217 | Odra od Kanału Wschodniego do Czarnej Strugi | 70 | 110 | 245 | 736 | 1226 | 117 | 352 | 586 | Medium |
| 218 | Odra od Małej Panwi do granic Wrocławia | 76 | 82 | 335 | 1006 | 1677 | 160 | 481 | 802 | High |
| 219 | Odra od Nysy Łużyckiej do Warty | 47 | 285 | 28 | 85 | 142 | 14 | 41 | 68 | not necessary |
| 220 | Odra od Odry Zachodniej wraz z Kan. Leśnym | 70 | 111 | 104 | 313 | 521 | 50 | 150 | 249 | Low |
| 221 | Odra od Osobłogi do Małej Panwi | 66 | 132 | 134 | 402 | 671 | 64 | 192 | 321 | Low |

| No | Name of ISWB | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 222 | Odra od Wałów Śląskich do Kanału Wschodniego | 68 | 119 | 233 | 700 | 1167 | 112 | 335 | 558 | Medium |
| 223 | Odra od Warty do Odry Zachodniej | 54 | 221 | 51 | 154 | 257 | 25 | 74 | 123 | not necessary |
| 224 | Odra od Widawy (gr. Wrocławia) do Wałów Śląskich | 66 | 133 | 222 | 667 | 1111 | 106 | 319 | 531 | Medium |
| 225 | Odra od wypływu ze zb. Racibórz Górny - Buków do Kanału Gliwickiego | 74 | 91 | 411 | 1233 | 2055 | 197 | 590 | 983 | High |
| 226 | Odra w granicach Wrocławia | 90 | 29 | 154 | 463 | 772 | 74 | 222 | 369 | High |
| 227 | Oleśnica | 60 | 172 | 116 | 349 | 582 | 56 | 167 | 278 | Low |
| 228 | Oleśnica | 64 | 145 | 244 | 733 | 1221 | 117 | 350 | 584 | Medium |
| 229 | Olza górna od źródeł do granicy | 80 | 65 | 107 | 322 | 537 | 51 | 154 | 257 | Medium |
| 230 | Olza od granicy do ujścia wraz z dopływami | 80 | 63 | 249 | 746 | 1243 | 119 | 357 | 594 | Medium |
| 231 | Oława od Gnojnej do ujścia | 84 | 49 | 182 | 545 | 908 | 87 | 261 | 434 | Medium |
| 232 | Oława od Krynki do Gnojnej włącznie | 85 | 46 | 85 | 254 | 423 | 40 | 121 | 202 | Medium |
| 233 | Oława od źródła do Krynki | 79 | 67 | 130 | 390 | 651 | 62 | 187 | 311 | Medium |
| 234 | Ołobok | 55 | 209 | 113 | 340 | 566 | 54 | 162 | 271 | Low |
| 235 | Ołobok | 71 | 104 | 556 | 1669 | 2781 | 266 | 798 | 1330 | High |
| 236 | Omulna | 75 | 85 | 10 | 29 | 48 | 5 | 14 | 23 | Low |
| 237 | Opawa z dopływami | 80 | 63 | 30 | 90 | 150 | 14 | 43 | 72 | Low |
| 238 | Orla | 73 | 96 | 160 | 481 | 802 | 77 | 230 | 384 | Medium |
| 239 | Orla od Rdęcy do Baryczy | 68 | 119 | 620 | 1860 | 3101 | 297 | 890 | 1483 | Medium |
| 240 | Orla od źródła do Rdęcy włącznie | 75 | 84 | 658 | 1973 | 3289 | 315 | 944 | 1573 | High |
| 241 | Osobłoga od Prudnika do Odry | 79 | 67 | 59 | 178 | 297 | 28 | 85 | 142 | Low |
| 242 | Osobłoga od źródła do Prudnika | 81 | 62 | 13 | 39 | 65 | 6 | 19 | 31 | Low |
| 243 | Ostrowica od źródeł do wypływu z jez. Będgoszcz | 82 | 57 | 63 | 188 | 313 | 30 | 90 | 150 | Medium |
| 244 | Ostrożnica | 77 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 245 | Oszczynica | 66 | 130 | 147 | 440 | 733 | 70 | 210 | 351 | Low |
| 246 | Parsęta do Gęsiej | 60 | 170 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 247 | Parsęta od Gęsiej do Liśnicy | 51 | 241 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 248 | Pełcznica | 83 | 53 | 85 | 256 | 427 | 41 | 122 | 204 | Medium |
| 249 | Pichna | 73 | 92 | 205 | 616 | 1026 | 98 | 295 | 491 | Medium |
| 250 | Pilica od Dopł. spod Nakła do kanału Koniecpol-Radoszewnica | 56 | 200 | 1 | 4 | 6 | 1 | 2 | 3 | not necessary |
| 251 | Pilica od Kanału Koniecpol-Radoszewnica (włącznie) do Zwleczy | 59 | 179 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 252 | Pilica od Zwleczyny do zb. Sulejów | 56 | 197 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 253 | Piława | 84 | 48 | 240 | 720 | 1201 | 115 | 345 | 574 | Medium |

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|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 254 | Piława | 50 | 257 | 62 | 186 | 310 | 30 | 89 | 148 | Low |
| 255 | Pisia | 73 | 93 | 49 | 147 | 245 | 23 | 70 | 117 | Low |
| 256 | Pliszka od Konotopu do ujścia | 43 | 343 | 51 | 153 | 255 | 24 | 73 | 122 | not necessary |
| 257 | Pliszka od źródeł wraz z Konotopem | 50 | 253 | 6 | 17 | 28 | 3 | 8 | 13 | not necessary |
| 258 | Płonia od Dpoł. spod Myśliborek do jez. Miedwie | 85 | 45 | 75 | 225 | 376 | 36 | 108 | 180 | Medium |
| 259 | Płonia od j. Miedwie do dopł.z Buczynowych Wąwozów | 76 | 81 | 36 | 108 | 180 | 17 | 52 | 86 | Low |
| 260 | Płonia od źródeł wraz z Dopł. spod Myśliborek | 78 | 73 | 66 | 198 | 330 | 32 | 95 | 158 | Medium |
| 261 | Płonia wraz z dop. z Buczynowych Wąwozów do uj. | 53 | 223 | 24 | 72 | 120 | 11 | 34 | 57 | not necessary |
| 262 | projektowany zb. Wielowieś Klasztorna | 54 | 219 | 83 | 250 | 416 | 40 | 119 | 199 | Low |
| 263 | Prosna do Brzeźnicy | 70 | 110 | 749 | 2247 | 3745 | 358 | 1075 | 1791 | Medium |
| 264 | Prosna od Brzeźnicy do projektowanego zb. Wielowieś Klasztorna | 60 | 167 | 711 | 2132 | 3553 | 340 | 1019 | 1699 | Medium |
| 265 | Prosna od Dopł. z Piątka Małego do ujścia | 63 | 147 | 545 | 1636 | 2727 | 261 | 782 | 1304 | Medium |
| 266 | Prosna od Kanału Bernardyńskiego do Dopł. z Piątka Małego | 80 | 63 | 123 | 370 | 616 | 59 | 177 | 295 | Medium |
| 267 | Prosna od projektowanego zb. Wielowieś Klasztorna do Kanału Bernardyńskieg | 73 | 93 | 89 | 266 | 443 | 42 | 127 | 212 | Medium |
| 268 | Prószkowski Potok | 60 | 171 | 83 | 249 | 415 | 40 | 119 | 199 | Low |
| 269 | Prudnik | 82 | 54 | 38 | 114 | 191 | 18 | 55 | 91 | Low |
| 270 | Przemsza do zb. Przeczyce | 75 | 84 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 271 | Przemsza od zb. Przeczyce do ujścia Białej Przemszy wraz ze zbiornikiem | 36 | 452 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 272 | Psina z dopływami | 78 | 71 | 115 | 345 | 575 | 55 | 165 | 275 | Medium |
| 273 | Pszczynka | 79 | 69 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 274 | Pyszna do Dopł. z Gromadzic | 73 | 93 | 206 | 619 | 1032 | 99 | 296 | 494 | Medium |
| 275 | Raczyna i inne Dopł. do zb.szt. Nysy Kłodzkiej | 82 | 55 | 118 | 355 | 591 | 57 | 170 | 283 | Medium |
| 276 | Radew wraz z Chocielią | 55 | 209 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 277 | Radomka | 74 | 89 | 17 | 50 | 83 | 8 | 24 | 40 | Low |
| 278 | Raduń, Krępa | 45 | 316 | 274 | 821 | 1369 | 131 | 393 | 655 | Low |
| 279 | Rega do Starej Regi | 70 | 111 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 280 | Reska Węgorza | 67 | 128 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 281 | Rgilewka | 75 | 86 | 336 | 1008 | 1680 | 161 | 482 | 804 | High |
| 282 | Rokitka | 71 | 105 | 179 | 537 | 895 | 86 | 257 | 428 | Medium |
| 283 | Rów Polski | 76 | 82 | 700 | 2101 | 3501 | 335 | 1005 | 1674 | High |

| No | Name of ISWB | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m$^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 284 | Ruda do zb. Rybnik wraz ze zbiornikiem | 69 | 112 | 241 | 723 | 1205 | 115 | 346 | 576 | Medium |
| 285 | Ruda od zb. Rybnik do ujścia wraz z Potokiem Ciechowickim | 52 | 230 | 227 | 680 | 1133 | 108 | 325 | 542 | Low |
| 286 | Rudna ze zb.Żelazny Most włącznie | 71 | 103 | 279 | 838 | 1396 | 134 | 401 | 668 | Medium |
| 287 | Rurzyca, Dopływ z Rynicy | 69 | 113 | 151 | 454 | 757 | 72 | 217 | 362 | Low |
| 288 | Sama | 75 | 84 | 248 | 745 | 1241 | 119 | 356 | 594 | Medium |
| 289 | Samica | 75 | 84 | 113 | 339 | 565 | 54 | 162 | 270 | Medium |
| 290 | Sąsiecznica | 61 | 160 | 560 | 1680 | 2800 | 268 | 803 | 1339 | Medium |
| 291 | Skora | 80 | 65 | 172 | 516 | 860 | 82 | 247 | 411 | Medium |
| 292 | Skroda | 51 | 249 | 281 | 843 | 1406 | 134 | 403 | 672 | Low |
| 293 | Słubia | 67 | 128 | 19 | 57 | 94 | 9 | 27 | 45 | Low |
| 294 | Smortawa | 61 | 165 | 316 | 947 | 1579 | 151 | 453 | 755 | Medium |
| 295 | Soła od ujścia Wody Ujsolskiej do zb. Tresna | 79 | 66 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 296 | Soła od źródeł do ujścia Wody Ujsolskiej wraz z nią | 85 | 44 | 0 | 0 | 0 | 0 | 0 | 0 | Medium |
| 297 | Stara Noteć | 51 | 240 | 294 | 882 | 1470 | 141 | 422 | 703 | Low |
| 298 | Stara Rega | 53 | 224 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 299 | Stepnica | 81 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 300 | Stobnica | 87 | 38 | 10 | 29 | 49 | 5 | 14 | 23 | Medium |
| 301 | Stobrawa od Kluczborskiej Strugi włącznie do Odry | 63 | 152 | 552 | 1655 | 2758 | 264 | 791 | 1319 | Medium |
| 302 | Stobrawa od źródła do Kluczborskiej Strugi | 74 | 90 | 98 | 293 | 489 | 47 | 140 | 234 | Medium |
| 303 | Stoła | 52 | 234 | 648 | 1943 | 3239 | 310 | 929 | 1549 | Medium |
| 304 | Stradunia | 78 | 71 | 53 | 158 | 263 | 25 | 75 | 126 | Low |
| 305 | Strawa | 83 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 306 | Strumień | 42 | 349 | 188 | 565 | 942 | 90 | 270 | 450 | Low |
| 307 | Strzegomka od Pełcznicy do Bystrzycy | 78 | 73 | 129 | 386 | 643 | 61 | 184 | 307 | Medium |
| 308 | Strzegomka od źródła do Pełcznicy | 81 | 61 | 138 | 415 | 692 | 66 | 199 | 331 | Medium |
| 309 | Studnica | 47 | 282 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 310 | Swędrnia | 72 | 101 | 328 | 983 | 1638 | 157 | 470 | 784 | High |
| 311 | Szczyra | 63 | 149 | 78 | 235 | 392 | 38 | 113 | 188 | Low |
| 312 | Szprotawa | 54 | 214 | 841 | 2522 | 4203 | 402 | 1206 | 2010 | Medium |
| 313 | Szprotawica | 67 | 123 | 299 | 896 | 1493 | 143 | 428 | 714 | Medium |
| 314 | Ścinawa Niemodlińska | 66 | 130 | 259 | 778 | 1297 | 124 | 372 | 620 | Medium |
| 315 | Ścinawka | 84 | 49 | 142 | 425 | 709 | 68 | 203 | 339 | Medium |
| 316 | Ścinawka od źródła do Dobrohosta włącznie | 64 | 143 | 29 | 87 | 145 | 14 | 42 | 70 | Low |
| 317 | Śląska Ochla | 50 | 259 | 356 | 1067 | 1778 | 170 | 510 | 850 | Medium |
| 318 | Ślęza od Księginki do malej Ślęzy | 79 | 67 | 84 | 253 | 422 | 40 | 121 | 202 | Medium |
| 319 | Ślęza od Małej Ślęzy do Odry | 87 | 38 | 94 | 283 | 472 | 45 | 135 | 226 | Medium |

| No | Name of ISWB | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou $m^3$] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 320 | Ślęza od źródła do Księginki włącznie | 81 | 61 | 90 | 269 | 448 | 43 | 128 | 214 | Medium |
| 321 | Średzka Woda | 74 | 89 | 310 | 930 | 1550 | 148 | 445 | 741 | High |
| 322 | Tążyna | 73 | 92 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 323 | Toszecki Potok | 79 | 68 | 73 | 220 | 367 | 35 | 105 | 176 | Medium |
| 324 | Trojanówka | 69 | 115 | 328 | 984 | 1639 | 157 | 470 | 784 | Medium |
| 325 | Tymnica i Pstrąg | 46 | 295 | 219 | 656 | 1093 | 105 | 314 | 523 | Low |
| 326 | Tywa | 75 | 84 | 61 | 182 | 303 | 29 | 87 | 145 | Low |
| 327 | Ukleja | 76 | 80 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 328 | Warcica | 72 | 99 | 27 | 81 | 134 | 13 | 39 | 64 | Low |
| 329 | Warta od Cieku spod Rudnik do Radomki | 65 | 135 | 232 | 695 | 1158 | 111 | 332 | 554 | Medium |
| 330 | Warta od Dopł. spod Kobylnik do Teleszyny | 67 | 123 | 233 | 700 | 1167 | 112 | 335 | 558 | Medium |
| 331 | Warta od Dopł. z Bronikowa do Wierznicy | 58 | 182 | 132 | 396 | 659 | 63 | 189 | 315 | Low |
| 332 | Warta od Dopł.z Uchorowa do Samy | 59 | 180 | 277 | 832 | 1386 | 133 | 398 | 663 | Low |
| 333 | Warta od Grabarki do Dopł. z Bronikowa | 59 | 175 | 45 | 134 | 224 | 21 | 64 | 107 | not necessary |
| 334 | Warta od Kamionki do Obry | 51 | 246 | 221 | 662 | 1103 | 105 | 316 | 527 | Low |
| 335 | Warta od Kanału Topiec do Powy | 58 | 181 | 380 | 1139 | 1898 | 182 | 545 | 908 | Medium |
| 336 | Warta od Kopli do Różanego Potoku | 82 | 54 | 10 | 31 | 51 | 5 | 15 | 24 | Low |
| 337 | Warta od Liswarty do Grabarki | 67 | 122 | 8 | 24 | 40 | 4 | 11 | 19 | Low |
| 338 | Warta od Lutyni do Maskawy | 65 | 135 | 108 | 325 | 541 | 52 | 155 | 259 | Low |
| 339 | Warta od m. Sieradz do zb. Jeziorsko | 72 | 99 | 85 | 255 | 426 | 41 | 122 | 204 | Medium |
| 340 | Warta od Maskawy do Pyszącej | 65 | 135 | 77 | 231 | 384 | 37 | 110 | 184 | Low |
| 341 | Warta od Noteci do ujścia | 55 | 211 | 594 | 1781 | 2969 | 284 | 852 | 1420 | Medium |
| 342 | Warta od Obry do Noteci | 43 | 340 | 54 | 162 | 270 | 26 | 78 | 129 | not necessary |
| 343 | Warta od Ostrorogi do Kamionki | 48 | 277 | 113 | 339 | 564 | 54 | 162 | 270 | Low |
| 344 | Warta od Powy do Prosny | 63 | 146 | 265 | 796 | 1327 | 127 | 381 | 635 | Medium |
| 345 | Warta od Prosny do Lutyni | 61 | 162 | 146 | 439 | 732 | 70 | 210 | 350 | Low |
| 346 | Warta od Pyszącej do Kopli | 64 | 141 | 113 | 340 | 567 | 54 | 163 | 271 | Low |
| 347 | Warta od Radomki do Liswarty | 67 | 123 | 193 | 578 | 963 | 92 | 276 | 461 | Medium |
| 348 | Warta od Różanego Potoku do Dopł. z Uchorowa | 54 | 213 | 117 | 352 | 586 | 56 | 168 | 280 | Low |
| 349 | Warta od Samy do Ostrorogi | 58 | 182 | 180 | 541 | 902 | 86 | 259 | 432 | Low |
| 350 | Warta od Teleszyny do Kanału Topiec | 59 | 174 | 370 | 1110 | 1851 | 177 | 531 | 885 | Medium |
| 351 | Warta od Widawki do m. Sieradz | 67 | 125 | 96 | 289 | 482 | 46 | 138 | 231 | Low |
| 352 | Warta od Wierznicy do Widawki | 69 | 113 | 76 | 229 | 381 | 36 | 109 | 182 | Low |

| No | Name of ISWB | Average CN parameter value [-] | Potential catchment retention S [mm] | potential volume of water in ditches [thou m³] for scenarios | | | | | | Priority for action |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | S1 | S2 | S3 | S4 | S5 | S6 | |
| 353 | Warta od zb. Jeziorsko do Dopł. spod Kobylnik | 63 | 149 | 63 | 188 | 314 | 30 | 90 | 150 | Low |
| 354 | Warta od zb. Poraj do Cieku spod Rudnik | 65 | 139 | 349 | 1048 | 1747 | 167 | 501 | 836 | Medium |
| 355 | Warta od źródeł do Bożego Stoku | 65 | 137 | 192 | 577 | 962 | 92 | 276 | 460 | Medium |
| 356 | Wełna do Lutomni | 70 | 107 | 204 | 611 | 1018 | 97 | 292 | 487 | Medium |
| 357 | Wełna od Dopł. poniżej Jez. Łęgowskiego do ujścia | 65 | 135 | 419 | 1256 | 2094 | 200 | 601 | 1001 | Medium |
| 358 | Wełna od Lutomni do Dopł. poniżej Jez. Łęgowskiego | 72 | 99 | 374 | 1122 | 1870 | 179 | 537 | 894 | High |
| 359 | Widawa od Oleśnicy do Odry | 79 | 69 | 329 | 987 | 1646 | 157 | 472 | 787 | High |
| 360 | Widawa od zb.Michalice włącznie do Oleśnicy | 71 | 102 | 228 | 683 | 1138 | 109 | 327 | 544 | Medium |
| 361 | Widawa od źródła do zb.Michalice | 72 | 99 | 314 | 943 | 1572 | 150 | 451 | 752 | High |
| 362 | Widawka do Krasówki | 63 | 150 | 558 | 1673 | 2788 | 267 | 800 | 1333 | Medium |
| 363 | Widawka od Krasówki do ujścia | 68 | 121 | 305 | 916 | 1527 | 146 | 438 | 730 | Medium |
| 364 | Wiercica ze Starą Wiercicą | 55 | 206 | 539 | 1618 | 2697 | 258 | 774 | 1290 | Medium |
| 365 | Wierzbiak | 78 | 71 | 133 | 400 | 666 | 64 | 191 | 319 | Medium |
| 366 | Wisła od Bładnicy do zb. Goczałkowice wraz z Bładnicą | 74 | 89 | 1 | 2 | 3 | 0 | 1 | 1 | Low |
| 367 | Wisła od Dopł. spod Bogucina do Wdy | 36 | 452 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 368 | Wisła od źródeł do Bładnicy | 75 | 83 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 369 | Witka | 83 | 53 | 44 | 133 | 222 | 21 | 64 | 106 | Low |
| 370 | Wodra | 59 | 173 | 138 | 415 | 692 | 66 | 199 | 331 | Low |
| 371 | Wogra | 71 | 102 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 372 | Wolbórka od Dopł. spod Będzina do ujścia | 76 | 82 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 373 | Wolbórka od źródeł do Dopł. spod Będzina | 68 | 118 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 374 | Wrześnica | 66 | 129 | 227 | 682 | 1136 | 109 | 326 | 543 | Medium |
| 375 | Zalew Szczeciński | 38 | 412 | 0 | 0 | 0 | 0 | 0 | 0 | not necessary |
| 376 | Zb. Jeziorsko | 83 | 51 | 25 | 76 | 126 | 12 | 36 | 60 | Low |
| 377 | Zb. Poraj | 55 | 207 | 38 | 113 | 188 | 18 | 54 | 90 | not necessary |
| 378 | Zgłowiączka od jez. Głuszyńskiego (włącznie) do Strugi | 74 | 87 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 379 | Zgłowiączka od Strugi (włącznie) do Chodeczki (bez) | 62 | 157 | 1 | 2 | 3 | 0 | 1 | 2 | Low |
| 380 | Zgłowiączka od źródła do jez. Głuszyńskiego (bez) | 78 | 70 | 0 | 0 | 0 | 0 | 0 | 0 | Low |
| 381 | Zimnica | 76 | 80 | 134 | 401 | 668 | 64 | 192 | 319 | Medium |
| 382 | Żurawka | 87 | 37 | 45 | 136 | 227 | 22 | 65 | 108 | Medium |