DOI: 10.2478/jwld-2013-0012

JOURNAL OF WATER AND LAND DEVELOPMENT
J. Water Land Dev. 2013, No. 19 (VII–XII): 23–30
PL ISSN 1429–7426

Available (PDF): www.itep.edu.pl/wydawnictwo; http://versita.com/jwld/

Received 06.06.2013
Reviewed 22.07.2013
Accepted 10.10.2013

A – study design
B – data collection
C – statistical analysis
D – data interpretation
E – manuscript preparation
F – literature search

The effect of effluents from rainbow trout ponds on water quality in the Gowienica River

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For citation: Bonisławska M., Tański A., Mokrzycka M., Brysiewicz A., Nędzarek A., Tórz A. 2013. The effect of effluents from rainbow trout ponds on water quality in the Gowienica River. Journal of Water and Land Development. No. 19 p. 23–30

Abstract

Fish farming and especially rearing and breeding of rainbow trout and carp is one of potential sources of surface water pollution. The study was aimed at assessing the effect of a rainbow trout farm on water quality in the Gowienica River in winter. Temperature, pH, electrolytic conductivity, total suspended solids, dissolved oxygen, BOD_5, COD_{Cr}, alkalinity, water hardness, calcium, magnesium, ammonium-nitrogen, nitrate-nitrogen (III and V) and total phosphorus were determined according to Polish Norms and APHA [1995] in water samples collected in winter up- and downstream the study object. The increment of pollutant concentrations in rainbow trout farm effluents was referred to the requirements in Rozporządzenie MŚ [2006].

Performed studies and literature review show that effluents from the assessed fish farm did not worsen water quality of the river. Increased concentrations of total suspended solids and COD_{Cr} in effluents were noted only in March. According to data from the report on environmental status in zachodniopomorskie province in the years 2008–2011, poor water quality of the Gowienica River is recorded already upstream the rainbow trout farm. Pollution of this stretch of the river may originate from uncontrolled waste water management and from nutrient runoff from fields.

Key words: *indices of surface water quality, rainbow trout ponds, water quality*

INTRODUCTION

Dynamic development of fish farms that produce mainly rainbow trout and carp may result in the pollution of surface waters which feed ponds and at the same time are effluent recipients [SOBOCIŃSKI *et al.* 2003; QUANT *et al.* 2009]. Such fish farms may affect river water quality and seasonally change its flows. On the other hand, the changes may influence the river biodiversity [MADEYSKI 2001; MURAT-BŁAŻEJEWSKA 2001]. Effluents from fish rearing and breeding ponds contain a large percent of nutrients. When flowing through a fishpond, river waters become polluted which means an increase in BOD_5, COD, and in the concentration of nutrients (nitrate-nitrogen, ammonium-nitrogen, total nitrogen, total phosphorus) and suspended solids [SOBOCIŃSKI *et al.* 2003; TELEŻYŃSKI 2004; QUANT *et al.* 2009]. The impact of fish rearing on surface waters depends on many factors, mainly on water intake, fish stock, amount and quality of fodder and on the proportion of fodder to water flow and fish stock [PRĄDZYŃSKA 2004]. Apart from the main, productive role, fishponds retain water in the catchment and mitigate floods during intensive rainfalls [BARSZCZEWSKI, KACA 2012].

Intensive fish farming needs different fodders which, given in appropriate doses, should be highly energetic and easily digestible. A marked progress in fodder production (total abandonment of wet fodder) decreased the amount of nutrients introduced to waters of rainbow trout farms [AMIRKOLAIE 2011; DAVIDSON *et al.* 2013; GORYCZKO 2008]. Literature data [KOSTURKIEWICZ, MURATOWA 1993; JEZIERSKA-MADZIAR 1995] show that 5–20% of fodder of new generation is ingested by fish. Apart from the remains of unused fodder, water is polluted by fish excreta. Therefore, each fishpond should have a water treatment system in a form of commonly used earthen ponds or concrete pools. Such a system enables effective sedimentation of suspended solids, which are then removed [GORYCZKO 2008]. Moreover, the use of a foil in the settling pool which serves as a substratum for algae and invertebrate fauna may increase the efficiency of water treatment [SZLAUER 1996; SZLAUER, SZLAUER 1998].

The Gowienica River is a first-order river of a length of 47.9 km, which flows through Maszewo, Goleniów, Osina and Przybiernów communes in zachodniopomorskie province and discharges to Szczecin Lagoon (Stepnicka Bay). Catchment area of the river is 364.9 km. and river springs are located in a peat valley in Maszewo commune near the villages Burów, Mostów and Pogrzymie. The largest tributary of the Gowienica is the Stepnica River which discharges near Bodzęcin. According to Reports on the environmental status in zachodniopomorskie province in the years 2008–2009 and 2010–2011, waters of the Gowienica River are polluted. High indices of organic pollution were noted in the river along the stretch from Goleniów Forest till the river outlet in the years 2010–2011. Then, the status of the Gowienica River waters was estimated as bad [WIOŚ… 2013]. Despite unsatisfactory water quality of the river, studies carried out in the years 2009–2010 revealed numerous spawning sites of the sea trout (*Salmo trutta* m. *trutta*) in a section from Łoźnica to the river outlet to Stepnicka Bay [TAŃSKI *et al.* 2011]. The river flows through Goleniów Forest which belongs to the special areas of nature protection – Natura 2000.

The aim of the study was to assess the effect of effluents from a rainbow trout farm on water quality in the Gowienica River along the study section.

OBJECT AND STUDY METHODS

Studies were carried out in winter since November 2010 till March 2011. Water for analyses was sampled acc. to the norm [PN-ISO 5667-6: 2003] from the Gowienica River in two sites: I – upstream and II – downstream the fish farm in Łoźnica (zachodniopomorskie province) (Fig. 1).

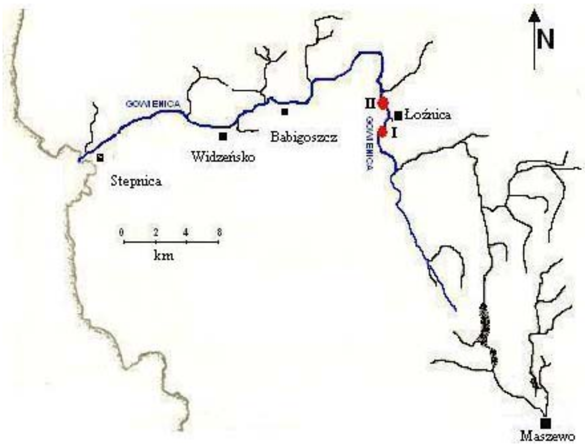

Fig. 1. Catchment basin of the Gowienica River with marked sites of water sampling upstream (I) and downstream (II) the rainbow trout farm in Łoźnica; source: own study

Fish farm is situated on the right of the river in 21+750 – 22+670 km of its course and consists of 10 fish fry basins, 5 rearing basins and additional facilities like: aeration well, pump station, settling tank, sludge plots and effluent clarifier (Fig. 2).

The rainbow trout production in the farm is annual and amounts 80 t of fish of an individual mass from 20 to 330 g. During the study period, fishponds contained ca. 30 t of fish. Farm owner informed that water for farm needs is taken at a rate of 350 $l \cdot s^{-1}$ from the river dammed by a weir in 21+900 km of the river course.

Sampling site I was situated 1500 m upstream the farm in Łoźnica. Backwater from the weir did not reach this site. River in this site was 1.2 m deep and 5.0 m wide. The river channel was regulated, banks were overgrown by shrubs and the bottom was muddy.

Sampling site II was situated 300 m downstream the fish farm. River width was 6.5 m and depth ranged from 0.7 to 0.9 m there, depending on season. Bottom was sandy and muddy. Bands of aquatic vegetation were composed of the arrowhead, curly-leaf pondweed, rushes and, periodically, of duckweeds.

Water flow was measured with the ultrasonic flowmeter during sampling in the upstream site.

Temperature, pH and conductivity were measured in the sampling sites. Then, in the laboratory total alkalinity, total hardness, chlorides, calcium and magnesium were determined in water with titrimetric methods according to Polish Norms and APHA [1995]. Various forms of nitrogen and total phosphorus were determined with colorimetric methods using

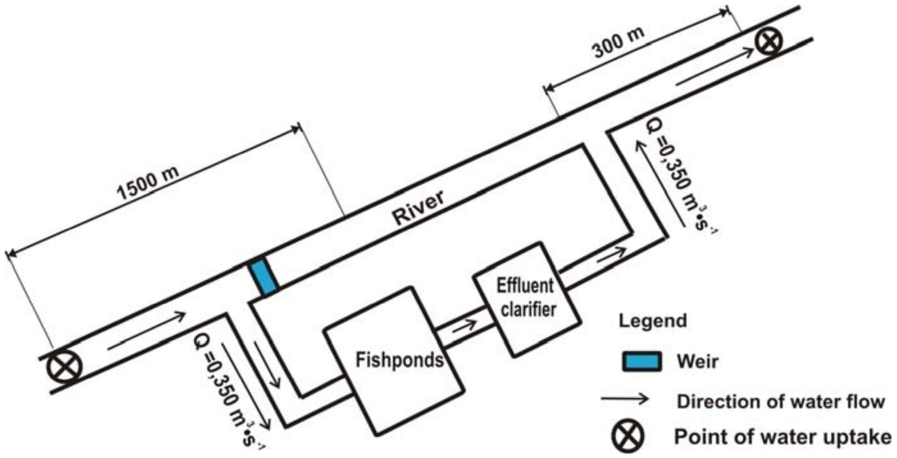

Fig. 2. Detailed scheme of fish farm; source: own study

Spectroquant Pharo 300 spectrophotometer at appropriate wavelengths *λ* (Tab. 1).

Table 1. Analysed water quality parameters and methods of their determination

Parameter	Method	Standard
Temperature, °C	CP-103 Elmetron pH-meter and thermometer	[PN-C-04584:1977]
pH		[PN-C-04540-03:1990]
Suspended solids, mg·dm^{-3}	gravimetric method	[PN-EN 872:2005],
Dissolved oxygen (DO), mg O_2·dm^{-3}	iodometric method	[PN-ISO 5813:1997]
BOD_5, mg O_2·dm^{-3}	method for non-diluted samples	[PN-EN 1899-1:2002]
COD_{Cr}, mg O_2·dm^{-3}	chromate method	[PN-ISO 6060:2006]
Ammonium nitrogen (NH_4^+), mg N·dm^{-3}	indophenol blue method (λ = 630 nm)	[PN-ISO 7150-1:2002]
Nitrate nitrogen (N-NO_3^-), mg N·dm^{-3}	nitrate reduction on a cadmium column, then spectrophotometric determination (λ = 553 nm)	[APHA 1995]
Nitrite nitrogen (N-NO_2^-), mg N·dm^{-3}	colorimetric method with sulphanilic acid and 1-naphtylamine (λ = 553 nm)	[PN-C-045760-6:1973]
Total phosphorus, (P_{tot}), mg P·dm^{-3}	molybdenum blue method (λ = 882 nm)	[PN-EN ISO 6878:2004]
Electrolytic conductivity, μS·cm^{-1}	conductivity meter CC-101 Elmetron	[PN-C-04542:1977]
Calcium (Ca), mg·dm^{-3}	versenate method	[PN-C-04551-01:1981]
Magnesium (Mg), mg·dm^{-3}		[PN-C-04562-01:1975]
Chlorides (Cl^-), mg·dm^{-3}	argentometric method	[PN-C-04617-02:1975]
Alkalinity, mg $CaCO_3$·dm^{-3}	titration against methyl orange	[PN-C-04540-03:1990]
Hardness, mg CO_3·dm^{-3}	titration with EDTA	[PN-ISO 6059: 1999]

According to recommendations in the Directive of the Minister of Environment of 24. July 2006, elevated concentration of suspended solids in both sampling points in November was not considered due to torrential rainfall which delivered a large, single load of suspension.

Values of particular water quality indices were determined in sampling point I (water feeding the fishpond – WZ) and in sampling point II (effluents – WP). The difference in concentrations (WP – WZ) represented an increase of water pollution by the fishpond. Obtained increment of pollutants was compared with the highest allowable increase of concentrations in waters used for rearing and breeding of salmonid and other fish given in annex 9 to the Directive of the Minister of Environment of 24. July 2006 (Dz. U. 2006 nr 137 poz. 984).

RESULTS AND DISCUSSION

Obtained results of parameters characterising physical, thermal and oxygen conditions in the Gowienica River showed a slight increase of temperature by 0.5°C between sites I and II in November, December and February (Tab. 2).

Concentrations of suspended solids ranged from 8 to 50 mg·dm^{-3} in point I and from 10 to 68 mg·dm^{-3} in point II. In every month, river water downstream the fishpond contained more suspended solids which was also reflected in respective mean values (Tab. 2).

A distinct increase of BOD_5 in December and March and of COD_{Cr} in March was found in water downstream the fishpond (Tab. 2). Concentrations of dissolved oxygen varied between 8.31 and 11.04 mg O_2·dm^{-3} in point I and between 8.82 and 11.11 mg O_2·dm^{-3} in point II and did not decrease between the two points – see also mean values (Tab. 2).

pH did not differentiate waters of the two sampling points (Tab. 3). Total alkalinity, however, was always higher in point II than in point I by 5.0 mg $CaCO_3$·dm^{-3} in December up to 20 mg $CaCO_3$·dm^{-3} in February, different were also the respective mean values (Tab. 3).

Table 2. Indices characterising physical status, thermal and oxygen conditions in the Gowienica River – sites I and II

Month and year	Temperature °C	Suspended solids $mg \cdot dm^{-3}$	Dissolved oxygen (DO)	BOD_5	COD_{Cr}
			$mg\ O_2 \cdot dm^{-3}$		
Point I					
11.2010	9.0	50 after rainfalls	8.31	2.34	69.96
12.2010	3.0	8	8.60	1.10	50.12
01.2011	2.5	8	9.99	4.11	64.78
02.2011	4.0	21	11.04	3.18	38.56
03.2011	8.1	42	8.75	2.91	39.51
Average	5.3	19.8	9.34	2.73	52.59
Point II					
11.2010	9.3	68 after rainfalls	8.82	2.20	68.06
12.2010	3.5	10	10.51	2.39	49.10
01.2011	2.5	14	9.75	3.92	57.93
02.2011	4.3	26	11.11	2.98	42.01
03.2011	8.0	50	9.05	3.62	58.37
Average	5.5	25	9.85	3.02	55.10

Source: own study.

Five indices representing ionic content of waters i.e. hardness, calcium, magnesium, chlorides and electrolytic conductivity were similar in points I and II (Tab. 3).

Results of performed analyses and calculated mean values indicate that there was a marked increase in the concentrations of ammonium-nitrogen and a small increase of total phosphorus concentrations in point II (Tab. 4).

Obtained results of physical and chemical analyses of water at the inlet and in effluents indicate that only three parameters (total suspended solids, alkalinity and ammonium nitrogen) increased in waters downstream the fish farm (Tabs 2, 3 and 4). If and to what extent these values pose a risk to fish? To answer this question it was justified to compare the results with recommendations of the Directive of the Minister of Environment of 9. November 2011 on classification of the uniform parts of surface waters and on environmental quality standards for priority substances. The comparison showed that in the whole study period the concentrations of COD_{Cr} was elevated and exceeded (sometimes more than two times) the allowable value of 30 mg $O_2 \cdot dm^{-3}$ (Tab. 2) [Rozporządzenie MŚ… 2011]. Concentrations of total phosphorus in points I and II in particular months and respective mean values of this parameter (0.367 and 0.374 mg $P \cdot dm^{-3}$ in point I and II, respectively) were close to the threshold value of 0.4 mg $P \cdot dm^{-3}$ given in the Directive. Concentrations of other parameters did not exceed recommended values and conformed to the requirements for the I and II class of water quality. Too short study period does not fully reflect water quality of the river. Characteristics of physical and chemical indices made by the Provincial Sanitary and Epidemiological Station in Szczecin in the years 2000–2003 for the needs of legal water documentation showed that waters in the studied stretch of the Gowienica River had the 2nd class of water quality with the exception of COD_{Cr}. Monitoring and classification performed in 2008–2011 showed that water quality at the outlet of the Stepnica to the Gowienica River was unsatisfactory [WIOŚ… 2011; 2013]. An assessment of physical and chemical parameters of the Gowienica River in two sampling points situated

Table 3. Indices characterising acidity and ionic content of water in the Gowienica River – sampling points I and II

Month and year	pH	Alkalinity $mg\ CaCO_3 \cdot dm^{-3}$	Hardness $mg\ CO_3\ dm^{-3}$	Calcium	Magnesium	Chlorides	Electrolytic conductivity $\mu S \cdot cm^{-1}$
				$mg \cdot dm^{-3}$			
Point I							
11.2010	7.63	50.0	157.5	51.70	17.62	19.53	402
12.2010	7.50	72.5	215.0	68.74	7.00	19.53	531
01.2011	7.22	107.5	171.2	47.70	3.95	20.25	574
02.2011	8.00	147.5	210.5	57.90	23.92	21.25	636
03.2011	7.77	120.0	183.8	60.12	18.83	24.85	626
Average	7.62	99.5	187.6	57.23	14.26	21.08	554
Point II							
11.2010	7.66	57.5	160.0	50.30	14.28	19.22	400
12.2010	8.12	77.5	211.5	66.33	10.02	21.30	560
01.2011	7.20	122.5	160.0	45.69	3.65	20.32	572
02.2011	8.15	167.5	215.0	69.94	24.91	28.40	632
03.2011	7.43	130.0	176.3	58.92	18.23	23.08	606
Average	7.71	111.0	184.6	58.24	14.21	22.46	554

Source: own study.

Table 4. Nutrient concentrations in water of the Gowienica River – points I and II

Month	Ammonium nitrogen ($N\text{-}NH_4^+$), mg N·dm^{-3}	Nitrite nitrogen ($N\text{-}NO_2^-$), mg N·dm^{-3}	Nitrate nitrogen ($N\text{-}NO_3^-$), mg N·dm^{-3}	Total phosphorus mg P·dm^{-3}
Point I				
11.2010	0.120	0.046	0.388	0.391
12.2010	0.155	0.024	0.421	0.331
01.2011	0.150	0.036	0.561	0.336
02.2011	0.125	0.019	0.169	0.400
03.2011	0.132	0.040	0.344	0.376
Average	0.136	0.033	0.377	0.367
Point II				
11.2010	0.135	0.043	0.307	0.389
12.2010	0.155	0.021	0.379	0.326
01.2011	0.147	0.037	0.514	0.358
02.2010	0.138	0.018	0.180	0.439
03.2013	0.175	0.042	0.344	0.357
Average	0.150	0.032	0.345	0.374

Source: own study.

downstream the fishpond (in Budzieszewice and at the outlet to Roztoka Odrzańska) indicated less than good status of river waters and ecological status of the river was moderate [WIOŚ… 2011]. The situation did not improve in the years 2010–2011 since the status of water in uniform parts of the Gowienica River (from the outflow from Goleniów Forest to the outlet) was bad [WIOŚ… 2013]. Hence, it appears that waters of the river are polluted both up- and downstream the fishpond. The reason may be in agricultural sources since the river catchment is largely covered by croplands. Another reason of bad status of waters of this river, otherwise attractive for anglers and canoeists, may be inefficient waste water treatment in Łoźnica, which consists of a septic tank of a daily output of 80 m^3·d^{-1} being in bad technical status. Mechanically treated waste waters from this tank flow to a reclamation ditch and then to the Gowienica River [KLITYŃSKI 2007]. Development plans for Łoźnica for the years 2007–2015 [KLITYŃSKI 2007] reveal that many farms in Przybiernów commune (the Gowienica River flows through) have uncontrolled waste water management. Therefore, untreated waste waters are discharged directly into the ground or to nearby ditches from where they reach the river.

These information indicate that fish farm effluents are not the main reason of poor river water quality. Literature data report that the risk associated with effluents from fish farms pertain mainly to increased concentrations of suspended solids, COD, BOD_5 and nutrients (ammonium-nitrogen, total phosphorus and total nitrogen) [SEYMOUR, BERGHEIM 1991; SOBOCIŃSKI *et al.* 2003; QUANT *et al.* 2009]. Elevated concentrations of these components result from fish metabolites, left over fodder and from other pollution sources associated with fish farm functioning. To gain a broader perspective, one should compare these sources of pollution with others like agriculture or industry. In Denmark, organic pollutants from fish (mainly rainbow trout) farming expressed as BOD_5 constitute less than 3% of the total while 66.0% of pollution originates from agriculture, 21.0% from industry and 10% from municipal waste waters. Pollution expressed in total nitrogen concentrations caused by fish farming constitutes less than 1%, by agriculture – 89.0%, by municipal waste waters – 9.0% and by industry – 2.0%. Respective figures expressed in total phosphorus are less than 2.0% for rainbow trout farming, 47.0% for municipal waste waters, 29.0% for agriculture and 22.0% for industry [FES 1992].

In Poland, fish farm effluents may be released to surface waters if they conform to the requirements listed in the Directive of the Minister of Environment of 24th July 2006. Therefore, we tested whether the concentrations of selected substances exceeded the maximum allowable values in waters used for salmonids rearing (Tab. 5).

Mean increments of BOD_5, COD_{Cr}, suspended solids and total phosphorus did not exceed the threshold values given in the Directive. However, particular indices (suspended solids and COD_5) exceeded these values in March (Tab. 5).

Water flow through fishponds is an important element affecting water quality in the river. Flows in the cross-section of the Gowienica River in Łoźnica upstream the fish farm determined with the Kostrzewa method acc. to hydrobiological criterion with the consideration of *k* coefficient for the Lower Odra River

Table 5. Maximum allowable concentrations of substances in waters of the studied section of the Gowienica River used for rainbow trout rearing (WP – farm effluents, WZ – inflowing waters) in view of requirements given in the Directive of the Minister of Environment of 24th July 2006

Index	Required values [Rozporządzenie MŚ… 2006]	Increase of concentration (WP–WZ)					
		November	December	January	February	March	average
BOD_5, mg O_2·dm^{-3}	3.0	0.0	1.3	0.0	0.0	0.7	0.3
COD_{Cr}, mg O_2·dm^{-3}	7.0	0.0	0.0	0.0	3.5	18.9	2.5
Suspended solids, mg·dm^{-3}	6.0	18 – after rainfalls	2	6	5	8	5.2
Total phosphorus mg P·dm^{-3}	0.1	0.0	0.0	0.02	0.04	0.0	0.01

Source: own study.

and Przymorze Zachodnie region were: long-term (1983–1999) minimum flow $SNQ = 0.35\ m^3 \cdot s^{-1}$, long-term mean flow $SSQ = 1.40\ m^3 \cdot s^{-1}$ and base flow $QN = 0.42\ m^3 \cdot s^{-1}$ [LASKOSZ, GABRYŚ 2012]. Flows measured in point I during the study period were: in November 0.79 $m^3 \cdot s^{-1}$, in December 0.85 $m^3 \cdot s^{-1}$, in January 1.02 $m^3 \cdot s^{-1}$, in February 0.90 $m^3 \cdot s^{-1}$ and in March 1.04 $m^3 \cdot s^{-1}$. These measurements confronted with the actual water uptake by fish farm (0.35 $m^3 \cdot s^{-1}$ – information from fishpond owners) indicate that water uptake was smaller than the allowable in the legal water documentation [PŁOWENS 2004] and constituted from 34% (in March) to 44% (in November) of the total flow in the river.

Obtained results indicate that in winter (November – March) when the production of the rainbow trout is two times smaller (30 tons) and feeding fish at low water temperatures is limited to minimum, pollution generated by fish farming is small and does not affect water quality of the studied section of the Gowienica River and hence does not pose a risk to natural reproduction of salmonids which spawn in the river in winter [KESZKA *et al.* 2008; TAŃSKI *et al.* 2011]. Methods of gradual treatment of fishpond effluents in the farm in Łoźnica are applied to limit the effect of fish rearing on river water quality. They consist in the maximum concentration of faeces in a small water volume. For this purpose, "silence zones" are built in pools – zones fenced with a net where water is not mixed by fishes and faeces and fodder remains may settle. Then, highly condensed sediments from these zones are directed to a pumping station, then to a condenser and settling tank. Sediment is later transferred to sedimentation lagoons and, after drying, used as fertiliser. Partly treated supernatant waters are also directed to the lagoons where nutrients are absorbed by vegetation (reed). So treated waters flow free (gravitationally) to the river (Fig. 2).

Five years long studies of QUANT *et al.* [2009] on the effect of a fish farm producing the rainbow trout, carp and sturgeon (100 tons per year) on water quality in the Rega River also showed that, despite a decrease of water quality in farm effluents, the increments of concentrations of analysed parameters were within allowable limits given in the Directive of 24th July 2006.

Present study and the analysis of potential water pollution in the river show that the production of rainbow trout in the winter time does not pose a risk for water quality in the Gowienica River and, as did QUANT *et al.* [2009], one may conclude that potential risk from fish production is small.

The construction of sewerage and sewage treatment plants in Łoźnica, Dzisna and Budzieszewice [KLITYŃSKI 2007] together with proper functioning of fish farm should improve water quality in the studied stretch of the Gowienica River and increase the populations of valuable and protected fish species and hence will contribute to the increase of biodiversity in this river.

CONCLUSIONS

1. Hydrochemical studies of waters of the Gowienica River entering and leaving the fish farm in Łoźnica showed that in the winter time 2010–2011, the increase of concentrations of studied water quality parameters fell within the allowable limits given in the Directive of 24. July 2006 and hence, fish production did not pollute waters downstream the fish farm.

2. An analysis of potential sources of water pollution in the river (up- and downstream the fish farm) showed that fish production did not pose a greater threat to waters of the Gowienica River along the study section. Unsatisfactory water quality of the river is mainly a result of agricultural and municipal pollution.

3. To improve water quality of this river attractive for tourists, one should undertake activities to construct sewerage and sewage treatment plants in communes drained by the river and to pay attention to the protection of valuable fish species living there.

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Wpływ zrzutu wód poprodukcyjnych ze stawów pstrągowych na jakość wody w rzece Gowienicy

STRESZCZENIE

Słowa kluczowe: *jakość wód, stawy pstrągowe, wskaźniki jakości wód powierzchniowych*

Jednym z potencjalnych źródeł zanieczyszczenia wód powierzchniowych jest gospodarka rybacka zajmująca się głównie chowem i hodowlą pstrąga tęczowego i karpia. Celem pracy była ocena wpływu działalności gospodarstwa pstrągowego na jakość wód Gowienicy w sezonie zimowym. W okresie zimowym w pobranych próbkach wody w punktach powyżej i poniżej obiektu oznaczano następujące wskaźniki: temperaturę, pH, przewodność elektrolityczną, zawiesinę ogólną, tlen rozpuszczony w wodzie, BZT_5, $ChZT_{Cr}$, zasadowość, twardość, wapń, magnez, azot amonowy, azot azotanowy (III) i (V), fosfor ogólny – zgodnie z wybranymi Polskimi Normami i zaleceniami APHA [1995]. Określano przyrost zanieczyszczeń w wodach poprodukcyjnych z hodowli pstrągów, który odnoszono do wymogów zawartych w Rozporządzeniu MŚ [2006].

Jak wynika z przeprowadzonych badań oraz z przeglądu literatury, wody poprodukcyjne pochodzące z działalności ocenianego gospodarstwa rybackiego nie wpływały na pogorszenie jakości wody badanej rzeki. Uzyskane w pracy wyniki wykazały przyrost stężenia zawiesin ogólnych i $ChZT_{Cr}$, w wodach poprodukcyjnych tylko w marcu. Zgodnie z danymi zawartymi w raportach o stanie środowiska w woj. zachodniopomorskim w latach 2008–2011, niezadowalająca jakość wód Gowienicy jest notowana już na odcinku powyżej gospodarstwa pstrągowego. Źródłem zanieczyszczeń występujących na tym odcinku Gowienicy może być nieuregulowana gospodarka kanalizacyjna w gminie, jak również spływy składników biogennych z pól.