



PAN
POLSKA AKADEMIA NAUK



POLITECHNIKA
BYDGOSKA

Wydział Rolnictwa i Biotechnologii

InHort
SKIERNIEWICE



XXVI Sympozjum Nawadniania Roślin
NAWADNIANIE ROŚLIN
W ŚWIECIE ZRÓWNOWAŻONEGO ROZWOJU
OBSZARÓW WIEJSKICH
ASPEKTY PRZYRODNICZO-PRODUKCYJNE
I TECHNICZNO-INFRASTRUKTURALNE
MATERIAŁY KONFERENCYJNE



XXVI International Symposium on
PLANT IRRIGATION FOR SUSTAINABLE
RURAL DEVELOPMENT
BOOK OF PROCEEDINGS

10-13 czerwca 2025 r.
Bydgoszcz – Fojutowo

XXVI Sympozjum Nawadniania Roślin

**NAWADNIANIE ROŚLIN
W ŚWIELE ZRÓWNOWAŻONEGO ROZWOJU
OBSZARÓW WIEJSKICH**

**ASPEKTY PRZYRODNICZO-PRODUKCYJNE
I TECHNICZNO-INFRASTRUKTURALNE**

MATERIAŁY KONFERENCYJNE

(Stanisław Rolbiecki, Atilgan Atilgan red.)

XXVI International Symposium on Plant Irrigation

**PLANT IRRIGATION FOR SUSTAINABLE
RURAL DEVELOPMENT**

BOOK OF PROCEEDINGS

(Edited by Stanisław Rolbiecki and Atilgan Atilgan)

10-13 czerwca 2025 r.
Bydgoszcz – Fojutowo (Bory Tucholskie)

Opracowanie redakcyjne i techniczne
mgr Aleksandra Górską, mgr inż. Daniel Morzyński

Streszczenia prac wykonano na prawach rękopisu – bez redakcji merytorycznej.
Całkowitą odpowiedzialność za treść streszczeń ponoszą Autorzy

© Copyright
Wydawnictwa Uczelniane Politechniki Bydgoskiej
Bydgoszcz 2025

ISBN 978-83-68285-30-7

Wydawnictwa Uczelniane Politechniki Bydgoskiej
Redaktor Naczelny
dr hab. inż. Marcin Zastempowski, prof. PBŚ
ul. Sucha 9B, 85-796 Bydgoszcz, tel. 52 3749482, 52 3749426
e-mail: wydawucz@pbs.edu.pl <https://wydawnictwa.pbs.edu.pl>

Ark. aut. 4,8. Ark. druk. 5,5.
Zakład Małej Poligrafii PBŚ, ul. Sucha 9B

ORGANIZATORZY

**STOWARZYSZENIE
INFRASTRUKTURA I EKOLOGIA TERENÓW WIEJSKICH**



przy współudziale

**KATEDRY BIOGEOCHEMII, GLEBOZNAWSTWA
I MELIORACJI WODNYCH
WYDZIAŁU ROLNICTWA I BIOTECHNOLOGII
POLITECHNIKI BYDGOSKIEJ IM. J.J. ŚNIADECKICH**



**POLITECHNIKA
BYDGOSKA**

Wydział Rolnictwa i Biotechnologii

**KOMITETU NAUK
AGRONOMICZNYCH
POLSKIEJ AKADEMII NAUK**



**PRACOWNI NAWADNIANIA
ZAKŁADU AGROINŻYNIERII
INSTYTUTU OGRODNICTWA
W SKIERNIEWICACH**



BURMISTRZA BRUS



HYDROLOGICAL POTENTIAL ANALYSIS OF KULPES RIVER FOR IRRIGATION WATER SUPPLY DURING VEGETATION PERIOD

Vilda Grybauskine¹, Gitana Vyciene², Vyngintas Valiunas¹

¹ Lietuvos inžinerijos kolegija, Higher education institution, Faculty of Environmental engineering, Vilda.grybauskiene@lik.tech

² Lietuvos inžinerijos kolegija, Higher education institution, Faculty of Environmental engineering, gitana.vyciene@lik.tech

Keywords: river analogue, irrigation, water resources, vegetation

The ongoing global climate change determines the changing risks caused by various meteorological and hydrological phenomena for economic and social sectors. These conditions have changed both in the past and will change in the future, and the accelerating change of climate phenomena is likely to worsen the situation even more. Agriculture uses 24% of all the water received in Europe. Excessive use of resources increases the likelihood of water shortages during droughts. Still, irrigation in agriculture is critical, although a lot of water is consumed, and without irrigation, the regional economy would experience hardship. This study aims to determine the hydrological characteristics of the Kulpė River and assess the possibilities of using river water to irrigate horticultural fields in years with different water.

As dry periods in Lithuania lengthen and days with high daily temperatures increase, farmers are increasingly forced to irrigate agricultural fields using surface or groundwater resources. First of all, it is necessary to assess the water content of the river based on the collected long-term hydrological data, but this is often difficult to do because the Lithuanian network of water measurement stations is located only on large rivers. Therefore, it is possible to assess the amounts of surface water that a farmer can use without harming the ecosystems of the water body by using only river analogue data. The article aims to evaluate the possibilities of using Kulpė River water to irrigate horticultural farm fields in years with different water content. There is no water measurement stations on the Kulpė River. Therefore, the Daugyvenė River was chosen as the river analogue, and daily discharge data for 2006–2021 were used.

After evaluating the characteristics of the hydrological region, the average annual flow of the Kulpė River was calculated to be $1.18 \text{ m}^3 \cdot \text{s}^{-1}$, and the runoff volume was 36.84 million m^3 . Based on the data of UAB “Šiaulių vandenys”, from $0.24 \text{ m}^3 \cdot \text{s}^{-1}$ to $0.28 \text{ m}^3 \cdot \text{s}^{-1}$ of treated wastewater is discharged into the Kulpė River every month. According to the results of hydrological calculations, in years of average water content, an average of 7.7 million m^3 per day can be used for irrigation, in dry years, an average of 4.6 million m^3 per day, and in wet years. It was found that the flow of the Kulpė River, after evaluating the flow and the treated wastewater discharged, is greater than the necessary environmental flow; therefore, theoretically, water from the Kulpė River can be taken for irrigation of horticultural farm fields throughout the vegetation period.