Abiotic and biotic data of the rivers Pinka and Lafnitz 2012 - 2014

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Keywords
stream temperature, riparian vegetation, Pinka, Lafnitz, simulations, benthic invertebrates, fish, climate change, Heat Source, observations

Short description of the dataset/summary

During the project BIO_CLIC abiotic and biotic data of the rivers Pinka and Lafnitz were collected from the year 2012 until 2014, in order to analyse the present state of river morphology, riparian vegetation, riparian microclimate, fish species and benthic invertebrate abundance and diversity. This data was produced to be able to predict the near stream microclimate and stream water temperature until the end of the century, estimate the stress on aquatic organisms and the ability of vegetation to mitigate this stress.

Initially only stream water observations, predictions of the river Pinka and corresponding input data for extreme heat wave events used in Trimmel et al. (2016a) are available for download. Other parts of the data set may be included later after they have been published.

General information

dataset entry ID: FWM_8
name of the dataset: Abiotic and biotic data of the rivers Pinka and Lafnitz 2012 - 2014
full name of the dataset: Abiotic and biotic data of the rivers Pinka and Lafnitz 2012 - 2014
dataset short name: BIO_CLIC
type of dataset: species (taxonomic group) per site database including environmental
Trimmel, Kalny, Dossi, Formayer, Graf, et al.

Data type: Information

Science keywords according to GCMD:
- Atmosphere, Biosphere, Biological Classification, Climate Indicators

ISO topic category according to ISO 19115:
- Biota, Climatology/Meteorology/Atmosphere, Environment, Inland Waters

Technical and administrative specifications

Data format: Others/specify

Operating system: All operating systems

Data language: English

Current access level: Web (public)

Web address: http://data.freshwaterbiodiversity.eu/data/FWM_8-Pinka_Lafnitz/

Is data currently available through GBIF? No

Exchange planned? No

Data in data repository? Yes

Specify repository: Initially only stream water observations, predictions of the river Pinka and corresponding input data for extreme heat wave events used in Trimmel et al. (2016a) are available for download. Other parts of the data set may be included after they have been published.

Do you plan to publish the data on the Freshwater Biodiversity Data Portal? Already published through the Freshwater Biodiversity Data Portal

Update level: Completed, others/specify

Documentation type: Scientific paper, others/specify

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other related websites:
http://bioclic.boku.ac.at/
http://www.wau.boku.ac.at/met/forschungsthemen/atmosphaerische-strahlung/
forschungsbereich-strahlung-energiebilanz-und-bodengebundene-fernerkundung/
forschungsschwerpunkte/strahlungstransport-und-energiebilanz-in-gewässern

Intellectual property rights and citation

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The dataset needs to be requested from dataset creator with specific conditions of use.
river morphology, field study riparian vegetation, field study

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The dataset needs to be requested from dataset creator with specific conditions of use.
stream water temperature, measurements near stream microclimate, measurements

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The dataset is publicly available (data portal, data archive) and can be used

without restrictions, but dataset creator/data contributors must be informed
prior to publication. Data must be acknowledged and cited correctly.

stream water temperature, numerical predictions

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criteria for using this part of the dataset:
The dataset needs to be requested from dataset creator with specific conditions of use.
comments:
fish species and assemblages, sampling

data contributor/owner 5:
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criteria for using this part of the dataset:
The dataset needs to be requested from dataset creator with specific conditions of use.
comments:
benthic invertebrate abundance and diversity, sampling

data contributor/owner 6:
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contact email: herbert.formayer@boku.ac.at
contact institute: Institute of Meteorology, University of Natural Ressources and Life Sciences
criteria for using this part of the dataset:
The dataset needs to be requested from dataset creator with specific conditions of use.
comments:
near stream microclimate, numerical predictions

citation of this dataset:
title and journal (name, number, pages): Abiotic and biotic data of the rivers Pinka and Lafnitz 2012 - 2014
year: 2016
doi: https://doi.org/10.13148/BFFWM8

citation of the metadata:
author(s): Trimmel H., Kalny G., Dossi F., Formayer H., Graf W., Leitner P., Leidinger D., Nadeem I., Rauch H. P., Weihs P. & Melcher A.
year: 2017
doi: https://doi.org/10.15504/fmj.2017.22

dataset related references: reference 1:
author(s): Trimmel, H., Gangneux, C., Kalny, G., Weihs, P.
year: 2016b
doi: https://doi.org/10.1127/metz/2016/0695
reference 2:
title: Der Einfluss der Ufervegetation auf die Wassertemperatur unter gewässertypspezifischer Berücksichtigung von Fischen und benthischen Evertebraten am Beispiel von Lafnitz und Pinka. Journal Österreichische Wasser- und Abfallwirtschaft, 68(7), 308-323
year: 2016
doi: https://doi.org/10.1007/s00506-016-0321-8
reference 3:
author(s): Trimmel, H., Weihs, P., Leidinger, D., Formayer, H., Kalny, G.
title: Can riparian vegetation shade mitigate the expected rise in stream temperature during heat waves in a pre-alpine river? Hydrology and Earth System Sciences, Discussion
year: 2016a
doi: https://doi.org/10.5194/hess-2016-230
reference 4:
author(s): Holzapfel, G., Rauch, H.P.
title: Der Einfluss der Ufervegetation auf die Wassertemperatur der Lafnitz und Pinka. Mitteilungsblatt für die Mitglieder des Vereins für Ingenieurbiologie, Ingenieurbiologie: Neue Entwicklungen an Fließgewässern, Hängen und Böschungen, 1/2015, 4-10
year: 2015

General data specifications

regional coverage of the dataset:
spatial extent of the dataset: catchment
continents: Europe

spatial extent (bounding coordinates):
southernmost latitude [°]: 46.9766
northernmost latitude [°]: 47.5153
westernmost longitude [°]: 15.8115
easternmost longitude [°]: 16.4939
minimum altitude: 240 metres
maximum altitude: 1480 metres
countries: Europe: Austria

world climatic regions according to Köppen:
Group D: continental/microthermal climate

freshwater ecoregions of the world (FEOW) according to WWF:
Europe: Upper Danube

European ecoregions according to Illies (WFD):
Alps (ER4), Hungarian Lowlands (ER11)

ecosystem type: rivers
covered timeframe: 2012 - 2014
**Site specifications**

**coordinate system/grid data:**
- Projected, others: MGL_Austria_GK_M34, Transverse Mercator
- Datum (e.g. WGS84): Bessel_1841

**site coding:**
- Site coding available: yes, alphanumerical
- Number of digits: 12
- Example: L_ROHR_26,08

**number of sites:**
- Exact number of sites: 64

**comments:**
There are two different site codings used:
1. The water temperature simulation dataset uses the side coding distance from mouth (km 89-38, each 500m). Here only the river Pinka is included.
2. In the additional datasets of each research group the data is sorted according to an alphanumerical code denoting the river distance from source of the field survey sample points.

**Climate and environmental data**

**climate related data:**
- Spatial resolution of the data (if not catchment/site related): others/specify
- Others: at reference station
- Available parameters per catchment:
  - Hourly air humidity, air temperature, wind, global radiation
  - Data source: own measurements / regional climate scenarios

**comments:**
The following data are included in the downloadable data set:
1. Hourly air humidity, air temperature, wind, global radiation was recorded at our reference station at an unobstructed site at Pinka DFS 39 (Trimmel et al. 2016a+b);
2. INCA data (Haiden et al. 2011) were compared and adjusted to fit the local site;
3. For future scenarios data was extracted from regional climate scenarios (Radu et al. 2008). The full methodology is described in Trimmel et al. 2016a.

Additional continuous and campaign meteorological measurements were made to characterize the near stream microclimate and energy balance at the river surface, which are not included in the downloadable data (air temperature/air humidity/global radiation/PAR within the riparian vegetation buffer, radiation balance at the river).


**environmental data:**
- Available parameters per catchment:
  - Catchment land cover/land use
  - Data source: own measurements/field study
Abiotic and biotic data of the rivers Pinka and Lafnitz 2012 - 2014

river morphology, riparian vegetation, water temperature measurements
  data source: own measurements/field study/simulations

available parameters per site:
  river length
    data source: field study/ part of simulation input
  distance to source
    data source: field study
  distance to mouth
    data source: field study/ part of simulation input
  stream order (according to Strahler)
    data source: field study
  slope
    data source: part of simulation input, calculated with TTools
  altitude
    data source: part of simulation input, calculated with TTools
  hydrological regime/flow regime
    data source: own measurements/field study
  discharge
    data source: part of simulation results
  current velocity
    data source: part of simulation results
  maximum depth
    data source: part of simulation results
  mean depth
    data source: part of simulation results
  substrate composition
    data source: part of simulation results
  water temperature

physico-chemical data:

stressors influencing the sites:
  reference sites available: yes

<table>
<thead>
<tr>
<th>stressor</th>
<th>restored sites available</th>
<th>data before/after restoration available</th>
<th>stressor gradient available</th>
<th>comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>thermal stress</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

Biological data

biological data origin:
  from sampling,
  BIO_CLIC, Austria

organism group addressed:
  fish, macro-invertebrates (Mollusca, Ephemeroptera, Odonata, Plecoptera, Coleoptera, Trichoptera, Chironomidae), angiosperms (riparian vegetation), invasive species

Sample specifications/sample resolution

fish:
  sample information:
covered timeframe: 1991 - 2013
historical data: yes
palaeo data: no
season: spring, summer, autumn
temporal resolution/frequency of sampling: once pro site
time series data: no
comments: Historical data (not sampled during the project BIO_CLIC) received from BAW Scharfling for the time period: 1991 - 2012.

**taxonomic resolution:**
level: percentage of species level data: 100

**taxonomic coding:**
taxalist according to: BMFLUW 2010

**sample specifications:**
replicate samples: yes
number of samples: 626

specification of method(s) used for sampling and sorting:
Allover, several transects at a total of 17 stretches (626 sampling points in the Lafnitz and 271 in the Pinka) were recorded to characterize the abiotic meso habitats. Beside the abiotic characterization of the habitats, point-abundance electric fish samplings (n = 35) were performed to record the occurring fish species and their life stages in 2012 and October 2013. To describe and analyze temporal trends of fish communities datasets were assembled from different sources (IHG DB) and ATFBASE database (BAW Scharfling). Additionally, fish data from the river Lafnitz was provided by Gerhard Woschitz and Georg Wolfram. Altogether, 52 fish sampling events from external sources were included in the dataset for this study, covering the period from 1991 to 2013 (Guldenschuh 2014).

reference(s): Guldenschuh M., 2014. Longitudinal zonation of habitat parameters and fish species assemblages in the Austrian lowland rivers Lafnitz and Pinka. Masterthesis at the University of Natural Resources and Life Sciences, Vienna.

sample type (e.g. habitat specific samples, composite samples etc.): Habitat sampling 2012 and 2013, additional historic quantitative and qualitative data from 1991 on.

specific sample location (e.g. littoral, profundal, transect, shoreline, hyporheic zone, etc.): All river, from upstream down to the Hungarian border.

**macro-invertebrates:**
sample information:
covered timeframe: 2012 - 2014
historical data: no
palaeo data: no
season: spring, summer, autumn
temporal resolution/frequency of sampling: 4 times in three years
time series data: no
comments: Samples were taken in: May 2012; August 2012; October 2012; March 2014.
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**taxonomic resolution:**
- level: 
- percentage of species level data: 70
- comments: Identification was mainly based on the Screening-Taxa List according to Ofenböck et al. (2010). However, in many cases Ephemeroptera, Plecoptera and Trichoptera taxa could be identified to a lower level, whereas Diptera taxa were mainly identified to family level. The taxonomic composition of each site was quantified using the Regional Zonation Index (RZI) calculated by the software Ecoprof 4.0 (Moog et al., 2013).

**taxonomic coding:**
- taxalist according to: Ofenböck et al. (2010)
- reference(s):

**sample specifications:**
- replicate samples: no
- number of samples: 406
- specification of method(s) used for sampling and sorting:
  - In May and August 2012 lithal substrates were sampled according to the Multi-Habitat-Sampling approach (AQEM-Consortium, 2002) (19 samples Lafnitz and 16 samples Pinka). Twenty pooled samples were taken at each investigation site, whereby each sample represents a 5% share of available habitats in the river section.
  - In October 2012 and March 2014, single-habitat-samples per transects were taken (290 samples Lafnitz). At least 20 sampling units were taken at each site. Choriotope type as well as flow velocity (bottom; near and at 40% of water depth) was documented for each sample.
  - Habitat structures directly linked to the riparian vegetation such as large wood (LW) were sampled separately at all dates if present (58 LW samples Lafnitz and 6 LW samples Pinka). Length, width and volume of each large wood piece were measured to calculate macro-invertebrate densities (Ind/m²) and biomass per square meter.
  - In addition, adults were collected with light traps and sweeping net to support the identification of Ephemeroptera, Plecoptera and Trichoptera species (11 sampling dates Lafnitz and 6 sampling dates Pinka).
  - The screening taxa list according to Ofenböck et al. (2010) was used as reference species list.
- reference(s):

**sample type (e.g. habitat specific samples, composite samples etc.):**
- MHS sampling according to AQEM (2002) in May and August of 2012
- Single habitat sampling in October 2012 and March 2014
angiosperms:  
- Large wood sampling: May 2012; August 2012; October 2012; March 2014  

<table>
<thead>
<tr>
<th><strong>sample information:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>covered timeframe:</td>
<td>2013 - 2013</td>
</tr>
<tr>
<td>historical data:</td>
<td>no</td>
</tr>
<tr>
<td>season:</td>
<td>summer</td>
</tr>
<tr>
<td>time series data:</td>
<td>no</td>
</tr>
<tr>
<td>comments:</td>
<td>Area-wide from source to the Austrian border in a 50m buffer of the river banks.</td>
</tr>
</tbody>
</table>

**taxonomic resolution:**  
level:  
percentage of species level data: 75  
comments: Available in an additional data set.  

**taxonomic coding:**  
taxalist according to: Cejka et al. (2005)  

**sample specifications:**  
replicate samples: no  
number of samples: 1  
specification of method(s) used for sampling and sorting: Definition of areas of same vegetation composition by aerial photographs. Overall height, density and dominating species were recorded in field. Reference species lists were used from Cejka et al. (2005)  
specific sample location (e.g. littoral, profundal, transect, shoreline, hyporheic zone, etc.): Riparian vegetation in a 50 m buffer orographically left and right of the river bank from source to the Austrian border.  

invasive species:  

<table>
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</tr>
<tr>
<td>season:</td>
<td>summer</td>
</tr>
<tr>
<td>time series data:</td>
<td>no</td>
</tr>
</tbody>
</table>

**taxonomic resolution:**  

**taxonomic coding:**  

**sample specifications:**  
comments: Invasive species are included in the angiosperm data set; rough estimation.  

**Other specifications**

**GIS layers, shape files related to the dataset:**  
others/specify: measurement points and sampling habitats  
others/details:
Acknowledgements

This research was part of the project BIO_CLIC and LOWFLOW+ both funded within the Austrian Climate Research Programme (ACRP) by the Klima und Energiefond. The regional climate model data sets used to produce the climate episodes were developed in the ENSEMBLES project supported by the European Commission. The INCA data set was created by the national weather service (ZAMG). Hydrological data and the digital elevation model were provided by hydrographic services, which are part of the Federal Ministry of Agriculture, Forestry, Environment and Water Management and the federal state governmental geoinformation service authorities of Styria and Burgenland. Fish data were provided by Gerhard Woschitz, Georg Wolfram, BAW Scharfling, and federal states Styria and Burgenland. Special thanks are given to the Oregon Department of Environmental Quality, who maintain the model Heat Source and opened the source code for scientific use.

References


Guldenschuh, M., 2014. Longitudinal zonation of habitat parameters and fish species assemblages in the Austrian lowland rivers Lafnitz and Pinka. master thesis at the University of Natural Resources and Life Sciences, Vienna.


Moog, O., Hartmann, A., Schmidt-Kloiber, A., Vogl, R., Koller-Kreimel, V., 2013. ECOPROF Vers. 4.0 Software zur Bewertung des ökologischen Zustandes von Fließgewässern nach WRRL.

