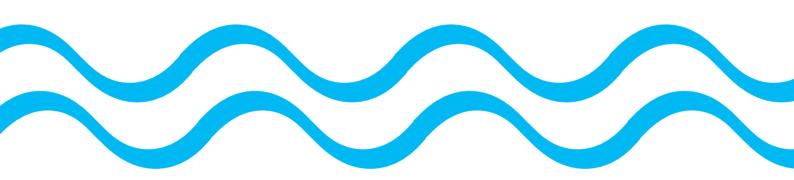
MINIMUM RIVER FLOW REGULATIONS

WITHIN THE EUROPEAN UNION



A comparative study of six countries of the EU









Authors: Vlastimil Karlík, Zuzana Vachůnová, Martin Skalský

Graphic design: typonaut.cz Proofreading: Simon Gill

For more information, please visit: English: www.english.arnika.org

Bosnian/Croatian/Serbian: www.eko.ba, www.czzs.org

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Introduction

hatever we think about the European Union, no one can deny that it has some of the most ambitious environmental goals among all international communities. Moreover, these goals are often backed by effective, well-thought-through legislation.

Two of the most vivid examples are the goals of halting biodiversity loss, backed by the Habitat and Bird Directives [1, 2], and the achievement of good ecological status of all European water bodies, supported by the Water Framework Directive [3] (and relevant daughter directives).

Directives are not directly binding on member states; they have a duty to transpose them into their national legislation, then usually implement the requirements of the directives and report the progress of the implementation to the European Commission. These requirements usually also include a time frame, and if the implementation is not satisfactory, the European Commission can start infringement procedures with the member state in question. Any physical or legal subject within the EU can also complain about deficiencies in implementation to the European Commission or use other appeal mechanisms (e.g. petitions to the European Parliament or complaints to the European Ombudsman).

With all these marvellous legislative achievements, why are the EU's environmental goals in many cases not completed according to the schedule? The loss of biodiversity was supposed to be halted by 2010 [4], now the deadline has been shifted to 2020¹, and good ecological status of all water bodies is supposed to be achieved by 2027². Even if the final deadlines have not yet arrived, the analysis shows that the completion of both these goals is rather unlikely [6, 7].

¹ In May 2011, the European Union adopted a new strategy to halt biodiversity loss in the EU, restore ecosystems where possible, and step up efforts to avert the global loss of biodiversity. The strategy is in line with the commitments made by EU leaders in March 2010 and the international commitments adopted by 193 countries, including the EU and all its Member States, at the conference of the Parties to the Convention on Biological Diversity in Nagoya, Japan, in 2010 [5].

² Set by Arts. 4 and 13 of the Water Framework Directive [3].

As always in cases connected with environmental protection, the key issues are *implementation* and *enforcement*. Strong pressure from businesses, lobby groups, and other sectors often clashes with and undermines environmental measures. Governments often have a tendency to interpret directives in such a way as to compromise with particular interests and find a way to maintain the status quo. To support the implementation process, the European Commission helps to interpret the directives properly by guidance documents regarding specific articles of directives or specific practical issues.

This brochure deals with one such specific issue covered by CIS Guidance Document No. 31 – the issue of ecological (minimum) flow [8]. It is a comparative study not only of how minimum flow is defined in the legislation of selected member states, but also how it is implemented and supervised in practice. In a time of progressing climate change and more frequent occurrence of extreme hydrological conditions – floods and dry periods – this issue will become more and more important.

Water levels and flows in watercourses are influenced by many factors. Some of them are not under the control of people, at least not directly or immediately – climate, geology, or geomorphology – but the others are directly connected with human activities. Watercourses in Europe are under strong anthropogenic pressure and are used by different stakeholders in a variety of ways, some of them conflicting. Flow conditions in rivers can be significantly influenced especially by outtakes and dams, including hydropower stations. As the Water Framework Directive is supposed to support the achievement of good ecological status of rivers and streams, there is a strong need to recognize and acknowledge the term "ecological flow", defined as the "amount of water required for the aquatic ecosystem to continue to thrive and provide the services we rely upon". Unlike "minimum flow", this term applies to flow conditions in both normal and high water level situations, because native aquatic and riparian organisms are adapted to natural variability in the flow at different times of the year. However, the legislation usually pays attention only to the issue of minimum residual flow; therefore this study is also focused on this problem.

The brochure focuses on six selected states of the European Union: the Czech Republic, Germany, Austria, the Netherlands, Finland, and France. There is no country with an identical provision of a determination of the minimum flow; we have selected these

countries carefully on the basis of their different legal culture and hydro-morphological characteristics. Special attention is paid to the Czech Republic, whose Ministry of Foreign Affairs supported the publication of this analysis within the framework of the Transition Promotion Programme, which aims to support democracy and human rights using the Czech Republic's experience with social transition and democratization.

The Czech Republic belongs among those member states where the minimum flow is defined and regularly controlled by the appropriate authorities. Nevertheless, these regulations are frequently flouted by the operators of small hydropower stations. For example, in 2017, checks found out that 13% of the hydropower plants that were monitored did not maintain the minimum flow and decided to impose over 10,000 EUR of fines [9]. (In 2016, the figure was 18% [10], and in 2015, a year of exceptional drought, it was over 29% [11]). How much more alarming could the situation be in countries where the recognition and enforcement of the minimum residual flow is on a much lower level? People without drinking water, the dying out of fish, and the destruction of ecosystems are not uncommon in countries where the hydropower business is more influential than public interests.

Unfortunately, EU funding policies do not always help. An important study by the CEE Bankwatch network [12] identified at least four key impact issues in the projects of hydropower stations financed by EU banks and subsidies in new member states or states aspiring to become EU members in the Balkans.

Downplaying impacts in the planning phase

Small hydropower plants are rarely subject to a full environmental impact assessment. In some of the Balkan countries a shorter environmental study is required but not a full EIA, even in cases of controversial projects located in protected areas, even national parks (e.g. the Lengarica HPP in Albania).

Fish passes

In some cases, fish passes are missing or significantly inadequate. But even if they are appropriately designed, they do not function without some residual flow being maintained.

Residual flow

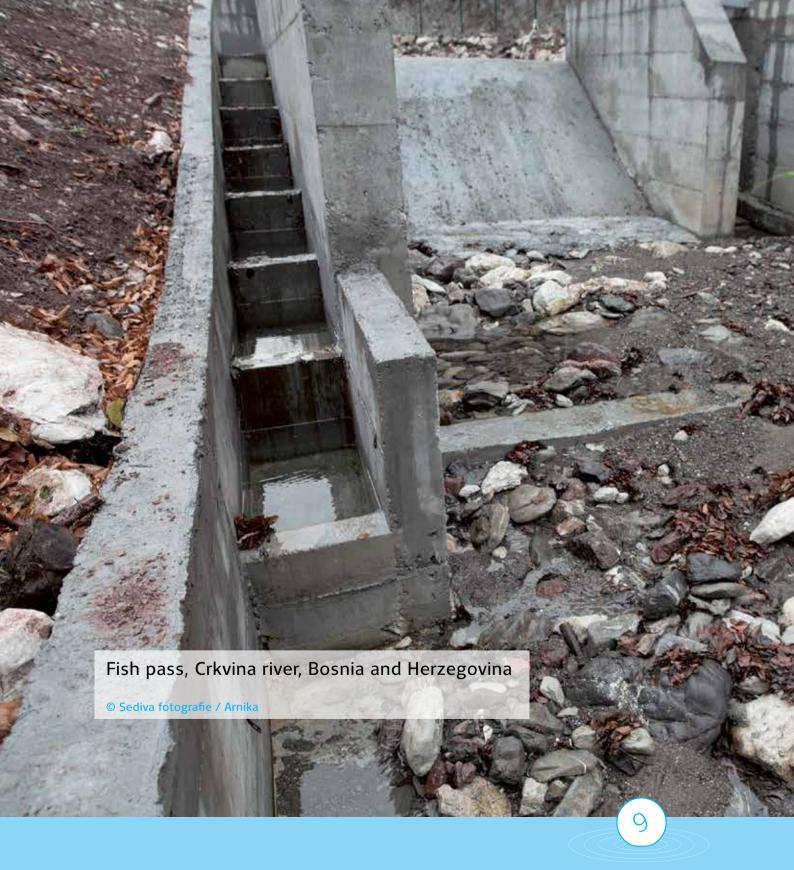
In most cases even minimum requirements are not being followed: growing evidence around the Balkans shows that operators often put the whole river into pipes.

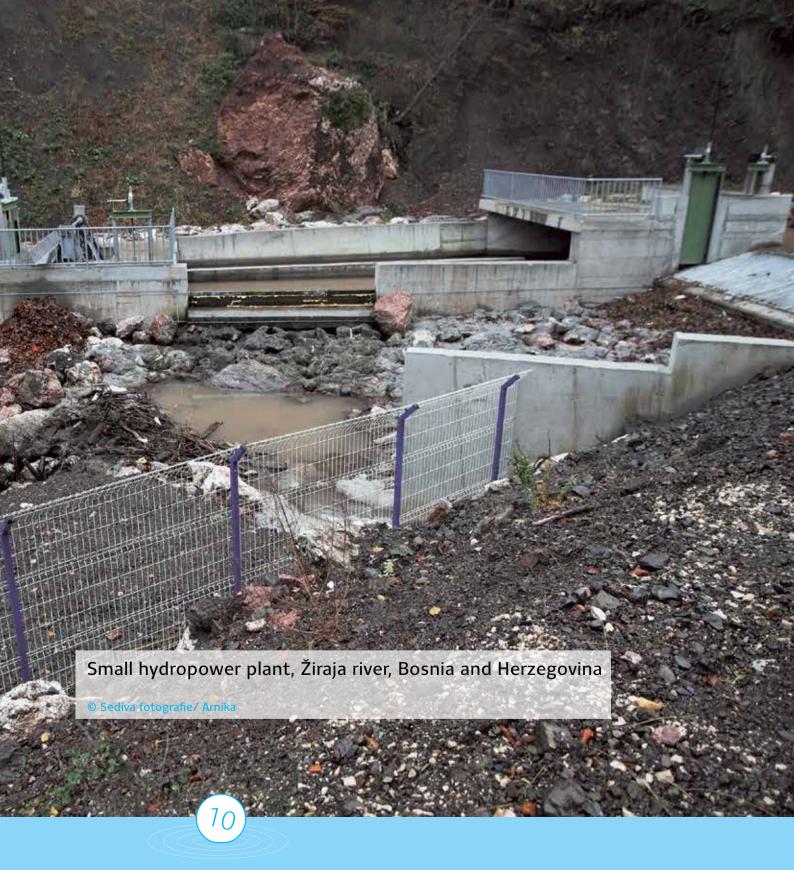
Ancillary infrastructure

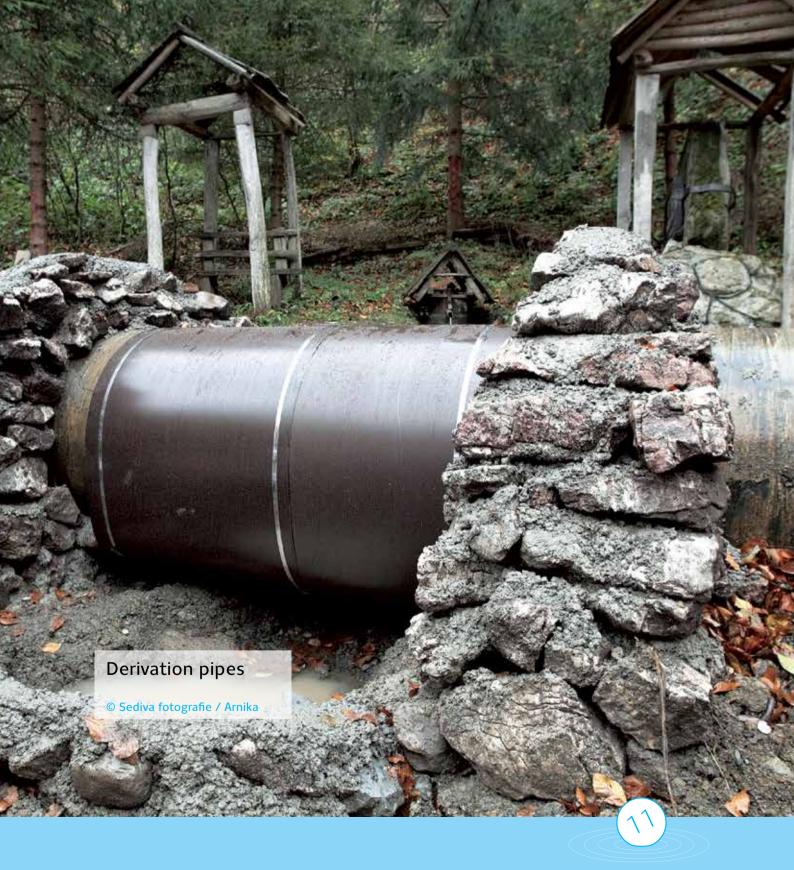
The impacts of ancillary infrastructure such as access roads, transmission lines, and tunnels are often neglected. The impacts are under-reported in environmental impact studies and in any case are limited to the construction phase impacts.

1









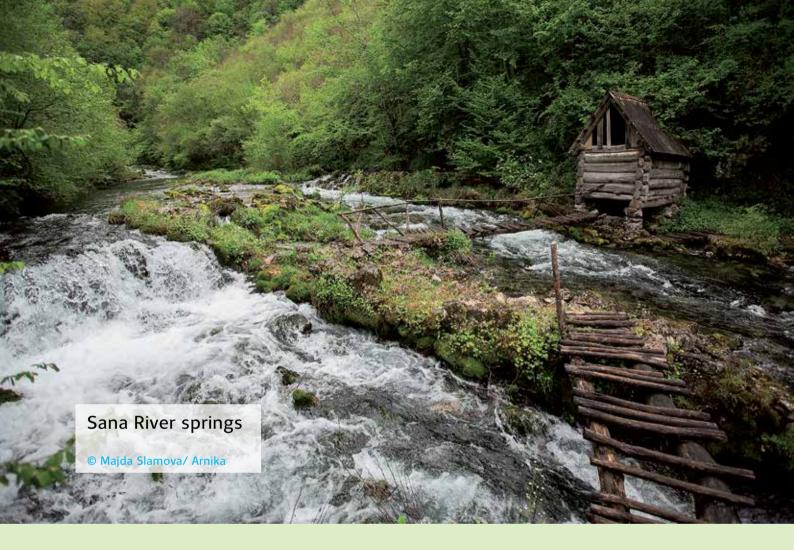
Impacts vs. benefits

Given these impacts, it is questionable how much the benefits of small hydropower projects outweigh the risks. The main benefit is the production of electricity without significant CO2 emissions. However, on a global scale SHPPs contribute less than approximately 2 per cent of total electricity generation. These projects exist in more than 150 countries and are often concentrated in mountain regions, thus having a high potential to disrupt ecosystems that are generally more preserved. In the Western Balkans, between 2001 and 2015, 57 large hydropower plants contributed 97 per cent of hydropower generation, versus 387 small hydropower plants contributing just 3 per cent.

Of course, hydropower plants are not the only problem. There are other users – and new stakeholder groups have been coming into focus just recently. For example, with winters increasingly being without snow and dry periods occurring even in autumn and winter, ski compounds with artificial snow machines represent another potential source of conflicts [13]. Outtakes of water for industry and water treatment facilities, as well as the conservation of ecosystems, can be put under pressure and the need for prioritizing, savings, and the rational management of water is growing.

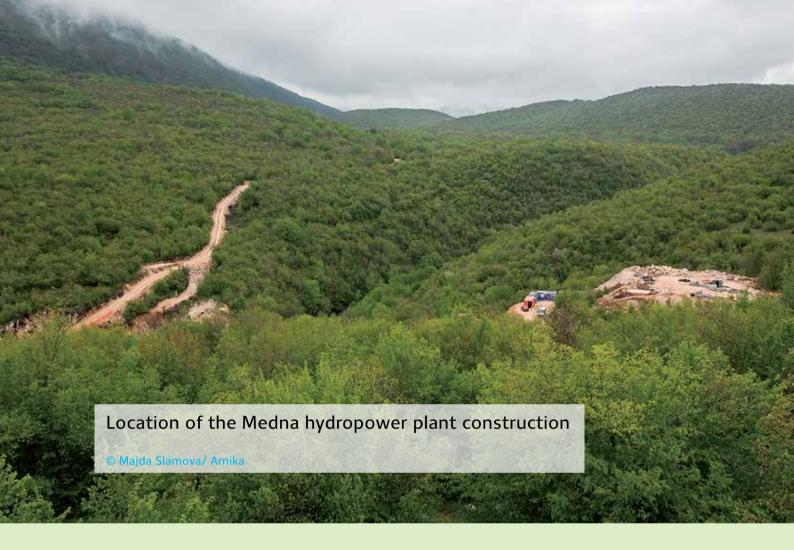
Another issue demanding attention is our land use and changes in the landscape, which contribute to the degradation of water and water-related ecosystems and ecosystem services such as self-cleaning capacity, water retention, and micro-climate regulation. In the past, often ill-advised short-term economic interests led to extensive "ameliorations", the drainage of agricultural land, the elimination of important landscape elements (greenery, balks, bosques, groves, wetlands), the straightening and channelization of rivers, and the acceleration of the surface outflow of water from the landscape. We often destroyed what we desperately need now. Restoration of not only rivers themselves, but entire river landscapes, is something that is called for in industrialized countries. But the issue of not destroying preserved ecosystems in the countries where they are still functioning is of at least the same importance. In Balkan countries, some unique and precious river landscapes are currently being destroyed by irresponsible hydropower plant construction and operation.

It seems that humankind is fighting nature in a silly war on at least two fronts – we are putting the whole climate system out of balance, and at the same time we are destroying the very ecosystems which can help to get us out of this trouble (sometimes pretending we are mitigating climate change – as in the case of first-generation biofuels – but actually, even from the point of view of mitigation, causing more harm than benefits). Let's stop this madness, let's protect and restore natural ecosystems wherever we can. River landscape ecosystems, from this point of view, belong among the most important and at the same time most endangered ones.



The Sana River story

The small Medna hydropower plant located only few hundred metres downstream from the stunning Sana River springs (Republika Srpska, Bosnia and Herzegovina) is an example of an extremely harmful project. This hydropower plant, with a total output of only 5MW, was put into operation in March 2018. Medna is constructed in untouched natural surroundings and the construction of access roads and further in-



frastructure has had a huge impact on the landscape and ecosystems. The constructor used dynamite to build the access road, which affected the groundwater regime and local people lost water from their wells. The once wild and watery river has been piped and irreversibly changed.

The Czech Republic

zech legislation uses the term **minimum residual flow (MRF)**, which is defined as the flow of surface water, which allows general surface water management and the ecological functions of the water flow. It is regulated by the Water Act3 and by the Methodological Instruction issued by the Ministry of the Environment. Since January 2018 the Ministry of the Environment has been preparing a new government regulation that should replace the existing one (see box 2).

The values of the MRF, the way its compliance is monitored, and other measures necessary for the protection of the watercourse are determined by the water authority as a part of a water use permit. The MRF should, if possible, be set for appropriate periods of time (seasonally, monthly, etc.) at varying levels, especially in longer sections of watercourse with impoverished water flows. The MRF value is based on the average daily flows from 1931 to 1980. If this data is not available, data from the period from 1931 to 1960 can be used instead.

In special cases the values may be set higher or lower than the guide values.

Table 1: Cases of higher and lower MRF values

Higher MRF	Lower MRF
Maintaining or improving the quality of surface waters, particularly with regard to the water pollution level.	If this is necessary to safeguard public interests, in particular to ensure the supply of drinking water.
Maintaining favourable living conditions in water, the most important indicators of which are fish and zoobenthos.	If, in periods of drought, the public interest in water supply, especially drinking, is threatened by a temporary lack of water, the water management authority may reduce the value of the MRF for the time necessary to overcome the emergency situation.
Protection and conservation of endangered species and valuable ecosystems or their components which depend on the quantity and quality of the water.	
Maintenance of a balanced groundwater regime so that the loss of water in the watercourse and consequent reduction in the groundwater level does not result in the reduction or elimination of groundwater offtake.	
Prevention of intensive deposition of sediments	
Taking into account the importance of the watercourse for the ecological state of the landscape, i.e. maintaining the balance between the flowing water ecosystem and the surrounding environment.	
Protection of the watercourse as an aesthetic factor in the landscape.	
The maintenance or improvement of conditions for recreation in the water.	

New government regulation pending

Since January 2018 the Ministry of the Environment of the Czech Republic has been preparing a new government regulation. The existing methodological instructions from 1998 are seen as unsatisfactory and do not foresee the need to take into account the impact on biological components and the achievement of good status of surface water bodies in accordance with the Water Framework Directive. The new proposal introduces more hydrological characteristics into the calculation of the MRF and requires different values for what are termed the main and spring seasons. In the case of hydro power plants with a total installed output up to 10 MW the minimum residual flow is set as the flow needed to ensure fish migration. The Ministry of the Environment would also run an online application to make the calculation of MRF values easier for the responsible water authorities.

The proposal of a new approach, of course, generated a broad discussion of its impact, both in terms of nature conservation and also in terms of its impact on water management. Right at the beginning of the search for a new approach, it was clear that it would not be possible to find the ideal balance and satisfy all the stakeholders involved. The MRF issue raises a disagreement between water management and nature conservation and an ideal compromise is hard to find. Hundreds of comments on the proposal from other ministries, regional authorities, and other interest groups were submitted. The proposal is still pending and its future is unclear.

The Czech Environmental Inspectorate

Protection of the environment cannot be effective without functional monitoring and control mechanisms. In the Czech Republic the controlling body is the Czech Environmental Inspectorate, established in 1991 and subordinated to the Ministry of the Environment.

Departments of the Czech Environmental Inspectorate



Inspections are carried out on the basis of:

- Annual plan of regular inspections
- Inspections on request (complaints from citizens, civic initiatives, information in the media, etc.)
- Monitoring of industrial accidents

Competence of the inspectors:

- Enter sites and facilities (with or without prior notification)
- Check documents, make measurements
- Restrict or stop operation of the facility
- Impose fines or take decisions on remedies

Table 2: Competencies of individual departments

	•		_			
	CZ Environmental Inspectorate Competencies	air	water	waste	nature	forest
Supervision	Inspections, reviews, investigations	•	•	•	•	•
Sanctions	Fines on private persons	•	•	•	•	•
	Fines on legal persons	•	•			•
	Restriction or shutting down the operation of facility	•	•		•	•
Measures	Measures to remedy shortcomings	•	•	•	•	•
	Dealing with old environmental burdens		•			
	Documenting the accidents and cooperation on preventing and investigating them	•	•	•		
	Confiscation of rare species					
	Confiscation of animal and goods	•			•	
Fees	Fees for emissions (waster water discharge, underground water use		•			
Statements	Statements and expert opinions for other state authorities	•	•	•	•	•
Suggestions	Dealing with suggestions					

CZ Environmental Inspectorate 2017

396	inspectors
10	regional departments
15,864	monitoring events
40	average monitoring events per inspector
10,249	decisions issued
6,375	expert opinions and statements (EIA)
4,388,652	total sums of fines in euros

Effective environmental inspection

- 1 Covering the whole territory of the country
- 2 Covering all components of the environment
- 3 Regional departments (short distance to travel)
- 4 Sufficient personal capacity
- 5 Plan of controls and ability to react to complaints
- 6 Relevant competence to deal with the issues
- 7 Appropriate mechanism for fines

Small hydropower plants

In 2017 the inspectorate monitored 99 small HPPs and compliance with the minimum residual flow was its main focus. In the event of non-compliance with the minimum residual flow, the operator can be fined up to 19,500 euros. Out of these 99 inspections, in 13 cases (13%) a violation of the Water Act was found and the inspectorate started six administrative procedures and imposed fines with a total amount of 10,000 euros (from 400 up to 3000).

The Dry Dams Project

The Dry Dams Project is an example of effective collaboration between the state administration and the general public. In this case the collaboration has been established between the Czech Environmental Inspectorate and paddlers and nature lovers. Canoeing, kayaking, and rafting have a long tradition in the Czech Republic and it is a very popular summer sport. The Czech canoeing association estimates that up to 630,000 people visit the Czech rivers annually. Thanks to a simple application, they and the general public can help to report a non-compliance with the minimum residual flow values. It only takes a few minutes to take a photo of a dry river bed and upload it to a database. The paddlers that spend a lot of time on the rivers help to save the time and resources of the Inspectorate. In 2017, a total of 15 cases were reported through the Dry Dams Project. In 2018, over 10 cases were reported, of which seven were investigated by the Czech Environmental Inspectorate and in three cases the violation was confirmed.

Germany

The minimum water flow (Mindestwasser rung) is defined as a discharge required for specific surface water and other connected waters in order to comply with the general principles of water management and with the objectives for surface water management.

In addition to the concept of minimum water flow set by law, the minimum water discharge (*Mindestwasserabfluss*) or minimum amount of water (*Mindestwassermenge*) is used in the literature. The minimum water flow is regulated by the Act on Water Management from 2009.

The determined uses of water (i.e. damming or drainage) are permissible only if the minimum water flow is maintained. The competent water authority must take into account the requirements when granting water management permits and may approve the permit application only if the minimum water flow is guaranteed.

The determination always depends on local hydrological conditions and specific ecological requirements and is therefore always dependent on a particular case. For example, it may be necessary not to set static values for the minimum water flow, but to change it according to the season.

Monitoring of compliance

The water authority is required to carry out an inspection in respect of the permit granted, which may be followed by official supervisory measurements. If the minimum flow is not maintained, the authority may impose a fine or cancel the water permit.

Austria

The term used is the ecologically necessary minimum flow (der ökologisch notwendige Mindestabfluss). The minimum flow is regulated in the Water Act (1959), the 2009 National River Basin Management Plan, and the 2010 Environmental Quality Objectives for Surface Waters.

The ecologically necessary minimum flow is determined in relation to the hydro-morphological state of a surface water body as defined by the Environmental Quality Objectives for Surface Waters. The water body is considered in a good condition when specified morphological and hydrological criteria are met, including a minimum water flow that cannot exceed 20% of the annual water level. If the flow is smaller than the average winter flow between October and March and the flow rate is lower than the average annual flow rate between April and September, the threshold value of water abstraction is set to less than 10% of the lowest natural discharge per day.

Monitoring of compliance

Monitoring is carried out by the provincial governments in cooperation with the Federal Ministry of the Environment.

The Netherlands

The situation in the Netherlands is very different from any other European country because of the specific local conditions. The four big river deltas (the Rhine, Meuse, Ems, and Scheldt) in the country make it abundant in water and the yearly precipitation usually exceeds the yearly evaporation.

Therefore there is no formal definition of the minimum ecological flow in the Netherlands. The level of water is regulated by what are called water agreements. These agreements are detailed and contain flow rates (in m³/s) for different conditions in the given locations and under the given circumstances. Their purpose is to ensure sufficient water for all users (navigation, agriculture, drinking water supply, industrial usage of water, etc.). In normal conditions they are applied without any restrictions because there is usually enough water for everybody.

Drought periods

If droughts occur a special rule is applied. This state is called "water shortage ranking" and certain uses take precedence:

- 1. Security (waterfront stability, oxidation prevention, nature protection)
- 2. Drinking water and energy
- 3. Valuable agricultural crops and water for industrial processes
- 4. Shipping, agriculture, and natural values that can easily be restored

During a state of water shortage ranking, a national team coordinates and provides practical advice on behalf of the Minister for Infrastructure and Water. Large streams are run by the special operators of the Ministry, who can be in the field (or sometimes at a distance) 24 hours a day.

Finland

The Finnish legislation does not include **any term related to minimum flow and the- re is no legal requirement related to minimum flow.** Instead, in accordance with the Water Act (587/2011), when deciding whether to grant a project permit, a rule determining the minimum and/or maximum water flow may be part of the permit, if necessary. In addition to the aforementioned law, there are no other official instructions or recommendations, but the legal practice may also be taken into account.

When preparing a request for authorisation, the applicant must include relevant calculations, for example about the effect on water flow. The applicant can freely hire consultants, engineers, and other experts. In the assessment current circumstances should be compared with potential future effects when available information about similar water bodies can be used as a reference. An authorising officer then assesses whether the requirements for authorisation are met. The licensing authority may request an assessment of other public authorities or ask for an external expert opinion, collect other additional materials, or carry out an inspection or a review.

There is no universal calculation or determination method specified. The determination and calculation of any minimum/maximum water flow occurs on the basis of an individual permit application. It is possible to require the minimum flow rate to be set differently depending on the season or time of the year.

Monitoring of compliance

Depending on the permit, it may be required to measure the water flow and to monitor it at a certain time.

The measurement inspection depends on the specific restrictions in the given permit. In any case, the operator is authorised to operate only within the limits set by the permit and any requirements regarding calculation, supervision, etc. may form part of the content of the permit. In the event of non-compliance, the matter may be further discussed in administrative or even criminal proceedings.

France

The terms used in France is **minimum biological flow** (débit minimum biologique) **or sometimes minimum residual flow** (débit minimum résiduel). The Environmental Act defines it as a minimum flow rate guaranteeing the permanent life, circulation, and reproduction of species living in the given waters at the time the waterworks are installed. Provisions related to the minimum biological flow are contained in the Act on Water and the Aquatic Environment (Act No. 2006 of 30 December 2006). It is also codified in the Environmental Code (in Article 214-8)

The calculation of the minimum biological flow is performed by an expert at the expense of the future operator and it represents one of the documents of the application for a permit. The minimum flow rate must not be less than 1/10 of what is called the reference module, which is represented by the average multi-annual flow of the watercourse. The reference module is calculated for a river basin from surveys conducted at different locations.

Monitoring of compliance

The Environmental Code provides a list of experts authorised to carry out inspections. These are performed randomly. Failure to comply with a minimum biological flow constitutes an offence for which a fine of up to EUR 75,000 may be imposed. Additionally, administrative measures can be imposed, ranging from a simple warning to an obligation to carry out necessary works and up to closure of a facility.

Summary table

	The Czech Republic	Germany	Austria
Term and definition:	The minimal residual flow is defined as the flow of surface water which still allows general surface water management and ecological functions of water flow.	The minimal water flow is defined as a discharge required for specific surface water and other connected waters in order to comply with the general principles of water management and with the objectives of surface water management.	Ecologically necessary minimal flow is determined in relation to the hydromorphological state of a surface water body as defined by the Environmental Quality Objectives for Surface Waters.
Regulated by:	Water Act and Methodological Instruction of the Ministry of the Environment	Act on Water Management	Water Act, National River Basin Management Plan, and Environmental Quality Objectives for Surface Waters
Variation by season:	Recommended	Recommended	Yes
Possible higher or lower value	Yes	Yes	Yes
Inspected by:	The Czech Environmental Inspectorate	The relevant water authority	Provincial governments in cooperation with the Federal Ministry of the Environment
In the event of non-compliance:	A fine of up to 19, 500 euros	Fine Cancellation of a permit	Fine Cancellation of a permit

	The Netherlands	Finland	France
Term and definition:	No formal definition exists	No formal definition exists	Minimal biological flow is defined as a minimum flow rate guaranteeing the permanent life, circulation, and reproduction of species living in the given waters at the time a waterwork is installed.
Regulated by:	What are called water agreements regulate the water level. These agreements ensure sufficient water for all users.	In accordance with the Water Act, when deciding whether to grant a project permit, a rule or conditions determining the minimal or maximal water flow may be part of the permit if necessary.	Act on Water and the Aquatic Environment, Environmental Code
Variation by season:	_	Recommended	Recommended
Possible higher or lower value	If droughts occur, certain uses of water can take precedence.	Yes	Yes
Inspected by:	Large streams are run by the special operators of the Ministry for Infrastructure and Water, who are in the field or sometimes at a distance 24 hours a day.	Any requirements regarding calculation, supervision, etc. may be part of the content of the permit.	Random inspection carried out by authorized experts
In the event of non-compliance:	_	Administrative or even criminal proceedings	A fine of up to EUR 75,000 Cancellation of a permit

Resources

- [1] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
- [2] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds
- [3] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.
- [4] Communication from the Commission to the Council and the European Parliament on a European Community biodiversity strategy (* COM/98/0042 final *)
- [5] The EU Biodiversity Strategy, European Union, 2011.
- [6] See e.g.: https://www.eea.europa.eu/soer-2015/europe/biodiversity
- [7] See e.g.: The EU Water Framework Directive: From great expectations to problems with implementation. Centre for Environmental Policy, Imperial College London, London SW7 2AZ, UK. In: Science of the Total Environment 575 (2017) 358–366.
- [8] CIS guidance document no. 31 Ecological flows in the implementation of the Water Framework Directive, European Union, 2015
- [9] http://www.cizp.cz/Inspektori-letos-zkontrolovali-99-malych-vodnich-elektra-ren-13-jich-porusilo-zakon.html
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- [15] Výroční zpráva 2017, Česká inspekce životního prostředí, 2017

About us

Arnika - Citizens Support Centre (Czech Republic)

Established in 1996, the non-governmental organization Arnika has many years of experience promoting information openness, supporting public participation in decision-making, and enforcing environmental justice. Its experts assist various civil society organizations, municipalities, and individuals in solving cases related to environmental pollution and its prevention throughout the Czech Republic. Arnika also participates in international projects focused on environmental protection and strengthening the implementation of the Aarhus Convention in Central and Eastern Europe, the Caucasus, and Central Asia. Arnika is a member of the Green Circle – an association of ecological non-governmental organizations of the Czech Republic, the European Environmental Bureau, and the European ECO Forum.

Contact:

Arnika, Dělnická 13 170 00 Prague 7, The Czech Republic Tel./fax: +420 222 781 471, e-mail: cepo@arnika.org

More information: www.eko.ba / www.english.arnika.org

Center for Environment Banja Luka (Bosnia and Herzegovina)

Founded in 1999, the Center for Environment is a non-profit non-governmental organization dedicated to environmental protection and the promotion of sustainable development through advocacy and civic initiatives. The Center promotes the implementation of the Aarhus Convention, namely free access to information held by public authorities and greater public participation in environmental decision making. It strives to affect relevant environmental policies, raise public awareness of environmental issues, and achieve constructive dialogue and cooperation with stakeholders. It is active mainly in Bosnia and Herzegovina.

Contact:

Center for Environment, Miše Stupara 5, 78 000 Banja Luka, Bosnia and Herzegovina

Tel.: +387 51 433-140, email: info@czzs.org

More information: www.czzs.org, www.rijekebih.org