

# BfG 2030 Strategy – Vision, Mission and Strategic Goals



**BfG** Federal Institute  
of Hydrology

## **Publication details**

### **Publisher:**

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### **Design:**

unicom Werbeagentur GmbH

### **Publication date:**

June 2023

### **Printing:**

Federal Ministry for Digital and Transport  
In-house print shop

### **Quote:**

*Federal Institute of Hydrology (BfG) (2022):  
BfG 2030 Strategy – Vision, Mission and Strategic Goals. Koblenz, 36 pages*

**DOI: 10.5675/Strategie\_2030\_BfG\_EN**

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# Introduction

Dear Reader,

Effective, reliable scientific guidance and research are vital to policy development, the operational management of Germany's federal waterways and water management practice. To meet complex demands, what is needed is knowledge based on many years of experience, combined with forward-thinking scientific expertise that addresses today's societal, political and scientific issues. Besides handling day-to-day affairs, it is crucial that our institute carefully selects the issues that will shape our work over the long term and that it puts in place a forward-looking organisational set-up and resources that are fit for the future. This applies particularly to departmental research, where it is important for us to use our in-house expertise to work on the right topics over the long term, always taking an innovative approach.

We therefore engaged in a systematic process to develop our "BfG 2030" strategy and derived visions, missions and strategic goals for BfG as an institution and for our work. We firmly believe that, by focusing on the topics set out in this document, we are addressing the societal and scientific challenges of the coming years. An integrative, environment-focused mindset has always been part of our DNA, and we have already made a big difference. Now, with our focus on strategic goals, we intend to stay clearly on track in the future, too, taking a targeted approach to meeting the expectations that are placed on us in our various fields of action:

- Specialist and policy advice for the German Federal Government
- Guidance and expert opinions on the operational management of waterways for the German Federal Waterways and Shipping Administration (WSV)
- Guidance for the German federal states on relevant topics
- Research and development
- Contributions to international water policies
- Development of BfG as a public authority in its role as a modern employer that is well equipped with future-proof resources

When developing our strategy, we opted for a rather comprehensive methodical and participative approach. Context analysis was not our only priority. Our employees were also able to participate constructively in the formulation of the strategy. After all, strategic theory can only be successfully embedded and the implementation process brought properly to life when staff identify with the process and the resulting goals to the greatest possible extent.

As we enter the next phase – the implementation of the "BfG 2030" strategy – our aim is to systematically pursue the operational targets and associated measures. We have thus launched a long-term process for developing BfG in its role as a forward-looking scientific institute. Much more importantly, however, we aim to ensure that effective decisions can be taken for the sustainable development of our aquatic ecosystems.



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# Our vision

## In 2030, BfG

- ... operates on an integrative and holistic basis.
- ... provides comprehensive guidance on a sustainable basis.
- ... networks and is networked.

Throughout society, intact aquatic systems are regarded as an important asset that is worthy of protection, since they are a vital resource and offer diverse living spaces and economic areas for humankind and its environment.

Equipped with all the necessary skills and expertise for making a holistic assessment of aquatic systems and their contributing catchments, BfG offers comprehensive specialist and policy advice for major rivers, canals and coastal waters. We are regarded both nationally and internationally as the German federal institute responsible for aquatic ecosystems and are a key player in the network that makes up Germany's scientific landscape dedicated to hydrology. German Federal Government institutions, the German federal states and the EU all call on our expertise to ensure that any required state services of general interest (known as *Daseinsvorsorge* in German) are provided on the basis of standardised specialist criteria and reliable scientific knowledge. We therefore offer the specialist platform for integrating various departmental interests and support institutions at both Federal Government and federal state level in their discourse with scientists and other stakeholders. The International Centre for Water Resources and Global Change (ICWRGC) works closely with BfG on many issues through projects, international committees and a common scientific and methodological approach. The ICWRGC acts at global level, and the German Federal Government draws on ICWRGC expertise when it comes to global issues relating to water policy and formulating its interests.

As a departmental research institute of the German Federal Government, we combine strong research capabilities with a practical approach. We lead the way in terms of hydrological expertise for policy advice and are also integrated into the operational activities of the German Federal Waterways and Shipping Administration. It is within this framework that our highly motivated staff provide their advisory services and thus play a key part in ensuring that significant progress is made in terms of both the environmentally responsible development of aquatic systems and the reliable use of Germany's federal waterways.

Thanks to our fascinating areas of activity and excellent working conditions, BfG enjoys a reputation as an attractive, modern employer. As a public-sector authority that is in tune with the times, we work reliably, transparently and efficiently, and the institute's impact is recognised by society.





## Our mission

What drives us is the societal challenge and legal obligation to restore the good status of our aquatic systems, to have sufficient quantities of good-quality water at our disposal, and to ensure that all aspects of our aquatic systems are sustainable, taking their many different functions into account. Our priority field of action is the major rivers, canals and coastal waters – Germany's federal waterways. Our scientific approach to our work is shaped by professional objectivity, a practical approach and a forward-looking perspective. The aim of our work is to support the resilient, environmentally responsible, near-natural and yet effective development of Germany's federal waterways for various functions within society, including transport, water management and leisure and recreation.

To this end, we advise the Federal Ministry for Digital and Transport (BMDV), the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and, increasingly, other

ministries, too. We offer reliable scientific insights as the foundation for political action in relation to both long-term issues and urgent decisions.

The comprehensive expert advice we provide to the WSV includes the reliable and carefully considered information it needs to make decisions about the operational management of the federal waterways. By applying cutting-edge methods, which we are constantly developing further, we draw up expert reports, monitor progress and continuously collect water-related data that is permanently stored and made available to users at both Federal Government and federal state level and/or to the public. We provide specialist quality assurance services for the WSV's planning and approval procedures and for hydrological and environmentally related measures on Germany's federal waterways.

We consider rivers, floodplains and their contributing catchment areas, including coastal

waters, to be functional systems, which is why we are continuously expanding our essential and overarching understanding of inland and coastal aquatic systems. We do this through our own research and a balanced proportion of external funding – all supplemented by knowledge that emerges thanks to our strong scientific networking. This also includes involvement in university teaching.

An integrative approach is vital when it comes to water-related issues and the major challenges of our times, such as climate change, the contamination of our aquatic systems with various substances, the loss of biodiversity and digitalisation. We play an interdisciplinary role in this respect, making our overarching expertise available to various German federal ministries and the federal states. As a national point of contact and service provider, we also operate water-related data infrastructure.

We represent the German Federal Government on national and international expert committees, which are active across Germany and at river basin, EU and global level.

In addition, the International Centre for Water Resources and Global Change, which is located at BfG, shapes the international initiatives of the United Nations in the interests of German water policy and provides scientific services in collaboration with BfG.

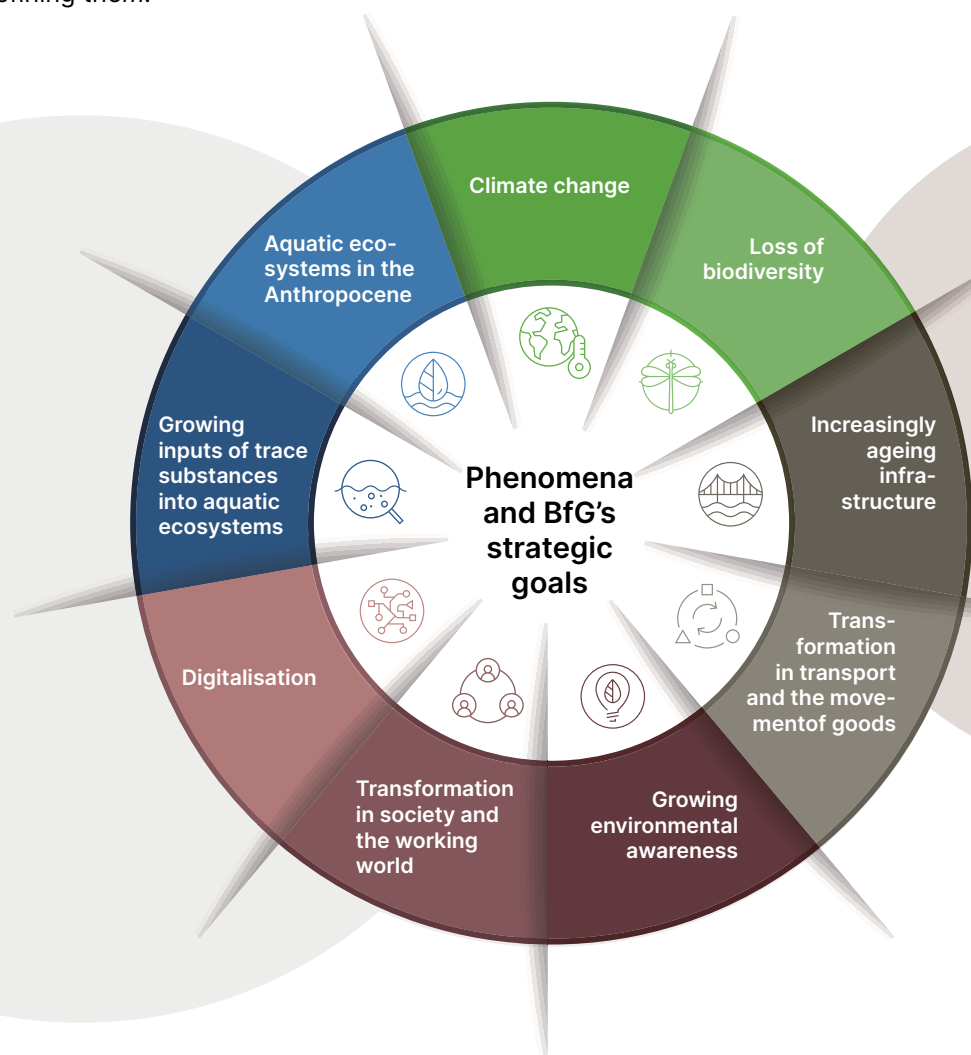
BfG's activities would not be possible without our motivated, highly qualified staff from a range of specialist disciplines, who are networked in various collaborations. We therefore consider a work culture characterised by respect to be a key asset, and reconciliation of work and family life is one of our main priorities. It is with this in mind that we use all possible options to ensure our working conditions are fully in keeping with the times – whether we are working in the office, on the move or from home. We also take a targeted approach to staff development at different levels and offer programmes to ensure our up-and-coming scientific talent can progress. We are aiming to develop our channels and formats to ensure good scientific communication and to gear this more effectively to the relevant target groups. In addition to our knowledge management activities, we are pressing ahead with digitalisation at all levels.

# Societal and scientific phenomena as a challenge and a framework for our strategic goals and operational targets

BfG's scheme of goals and targets is based on nine societal and scientific phenomena, each of which is characterised by particular challenges and a specific framework. For each of these phenomena, BfG has formulated a stand-alone vision and a mission to help us achieve that vision, underpinned by strategic goals and operational targets.

Strategic goals describe a particular status as the intended outcome of work. Designed to be long-term in nature, they are more concrete than the vision but more abstract than the operational target. The BfG departments were involved in defining them.

Operational targets, based on three time frames, will guide the implementation of the strategy. They are derived from the strategic goals and provide a more concrete form of these. Ideally, they should be formulated on the basis of the SMART rule. SMART is an acronym relating to target formulation and stands for Specific (clearly defined), Measurable (e.g. through KPIs), Achievable (or Agreed), Relevant and Time-bound. Overall, when formulating our targets, we opted for a rather comprehensive methodical and participative approach.





## Phenomenon – aquatic ecosystems in the Anthropocene

Anthropogenic degradation of the natural environment has far-reaching consequences for the functioning of ecosystems all round the world. Before the industrial revolution, human impact was restricted to regional level only, but since the start of industrialisation, humans have been the driving force behind changes to global ecosystems. Aquatic ecosystems are a crucial resource in this respect – and this means not only water as an element, but also indirectly in relation to food and energy, for example. Transport corridors “by water” were – and remain – essential for all development activities by human beings. They are therefore greatly affected by intensive anthropogenic stresses. Far-reaching human intervention has a dominant effect on the functionality of most aquatic ecosystems. Examples of such intervention include the substantial input of nutrients, pollutants and particulate matter into aquatic ecosystems on the one hand and increased extraction of

water on the other. Other examples include extensive regulation of river courses – to the point of canalising and damming them – resulting in the loss of the natural river flow regime and floodplain areas. A characteristic feature of the Anthropocene epoch is that the human-induced transformation of water bodies and the associated ecosystems has, in many cases, gone so far that there is a risk that the integrity of the systems will be irrevocably lost.

Improving the status of aquatic ecosystems, e.g. in line with the European Water Framework Directive or the global Sustainable Development Goals (SDGs), while still ensuring that the many usage demands can be met – even in the case of extreme events – poses a major challenge for the management of aquatic ecosystems and their contributing catchments. It is assumed that the changes caused by the significant extent of



the anthropogenic transformation of aquatic ecosystems are only reversible to a limited extent. The federal waterways also exhibit serious deficits in terms of biological and structural diversity, significant changes in the supply of water and associated substances, and a fragmentation of biogeochemical cycles. The large-scale change in land use, resulting from agriculture and urban expansion, for example, has a significant impact on flows of water and substances in the catchment areas and in the waterways themselves.

If the federal waterways are to be used sustainably, the available scope for action must be identified. This means that waterways must be considered as multifunctional aquatic ecosystems. Moreover, conflicts of use must be identified and integrative solution approaches developed.

## Vision

All plans are centred around one key objective – reconciling the habitat function for animals and plants with anthropogenic uses of aquatic systems, including their contributing catchments. The anthropogenic impact on aquatic ecosystems is minimised by handling them sustainably.

## BfG's mission

Our knowledge of key natural and anthropogenic processes means we can understand the human impact on aquatic ecosystems. Using this knowledge as a basis, we evaluate how humans impact the complex interrelationships of ecosystems, identify the potential for development and work out possible responses. We do this by applying innovative methods and long-term analyses. We have a sound grasp of changes in aquatic ecosystems and their contributing catchments and understand the impact these have on the balance of water and associated sediments, contaminants and nutrients, the aquatic structure, water quality, habitats, organisms and biotic communities. We aim to differentiate between anthropogenic and natural effects and use this knowledge to derive effective measures for the development of aquatic ecosystems from both a system and functional perspective. We use our know-how to advise and support the BMDV, the BMUV, other German federal ministries, the WSV, the German federal states and other stakeholders. By doing this, we enable them to take decisions and initiate measures relating to policy, legislation, infrastructure, water management or nature conservation as appropriate to their respective responsibilities.

Moreover, with a focus on environmental radioactivity and the critical infrastructure associated with the waterway network, we support the decision-makers at both Federal Government and federal state level in relation to operational disaster protection. Our services in this area facilitate situation evaluation, analysis, information and other aspects of risk management.

## Strategic goals

1. We recognise fundamental pathways of action between abiotic and biotic components of the complex aquatic ecosystem on various spatiotemporal scales and are able to identify significant material and non-material stressors. This means we can determine detrimental effects on organisms and aquatic communities.
2. Our impact forecasts help highlight and evaluate anthropogenic effects on rivers and floodplains. They therefore also form a robust basis for crisis management in the field of environmental radioactivity and in relation to extreme hydrological events.
3. Our products and concepts are useful tools for developing the waterways, their banks and floodplains and for minimising the effects of human intervention on aquatic ecosystems. They are used by decision-makers at both Federal Government and federal state level and within the context of operational management.



## Phenomenon – climate change

Climate change increasingly poses significant challenges to humanity. Changes in global temperature and rainfall distribution are leading to changes in the water supply. From a usage perspective, this often has detrimental effects on the water, nutrient and sediment budgets and on the biology and morphology of river systems. The change in global atmospheric circulation patterns means that, in central Europe, there is an increasing likelihood of extended periods of dry weather and reduced water levels in the summer on the one hand and extremely heavy rainfall and catastrophic flooding on the other. Climate change and the response of aquatic ecosystems are generally continuous processes, although tipping points in the system can lead to rapid system changes that are hard to reverse. Identifying and communicating such processes is a major challenge for scientists. The challenge for society is to set climate protection goals in a way that ensures tipping points are not reached. Although there has already been something

of a shift in awareness, our society is accustomed to having access to sufficient quantities of top-quality water at all times. Equally, as a society, we want to be protected against extreme events and live in an environment that is intact. As part of its provision of state services of general interest, the Federal Government and federal states have taken action and launched the German Strategy for Adaptation to Climate Change (DAS) in order to tackle foreseeable climate-related changes. At all times, the IPCC's latest knowledge also provides an important framework for action for hydrological issues in Germany.

## Vision

Water bodies as functioning ecosystems and the many diverse uses of aquatic ecosystems for the provision of state services of general interest are safeguarded on a sustainable basis, taking the effects of climate change into account. Adaptive forecasting and climate projection tools provide flexibility when it comes to controlling the management of aquatic ecosystems.

## BfG's mission

We understand and quantify the effects that climate change and the rise in extreme events are having on aquatic systems. We detect relevant changes in the properties and statuses of aquatic ecosystems and other components of the water cycle and are able to identify altered mechanisms of action. We do this by analysing changes in the occurrence, intensity, duration and frequency of extreme events and changes in system statuses. This work also helps identify potential tipping points. Our expertise in evaluating harmful extreme events includes quantifying and taking account of the statistical uncertainties of the measurement, modelling and specific analyses aimed at determining the long-term impact of climate changes through to the end of the century. The results of our interdisciplinary modelling and evaluation work are made available for planning and decision-making processes in relation to river basin management. Our work therefore lays the foundations for preventive, sustainable adaptation to climate change and for coping with climate impacts. The results are used by the German federal ministries, international water schemes, the WSV, the German federal states and users of aquatic ecosystems.



## Strategic goals

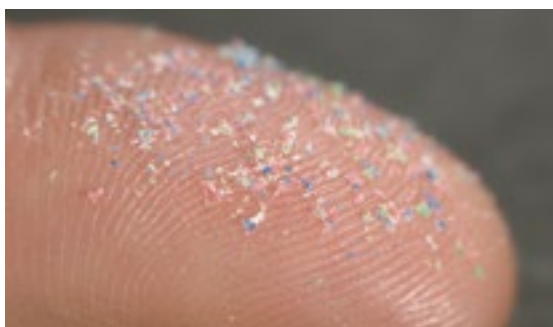
1. Using our state-of-the-art digital measurement, analysis and modelling infrastructure, we are able to analyse and evaluate measurements taken in situ and by means of remote sensing, over a broad range of temporal and spatial scales. We can also assess changes in the properties of aquatic systems, including in relation to extreme statuses.
2. We have both the expertise and the equipment we need to model and estimate the effects of climate change in a scientifically sound way, especially in respect of extreme events.
3. We are expanding our guidance to the German federal ministries and becoming the contact responsible for large rivers in the operational network of authorities of the German Strategy for Adaptation to Climate Change (DAS). We have set up and operate interfaces with stakeholders in the DAS and with institutions that have responsibilities in relation to water.



## Phenomenon – growing inputs of trace substances into aquatic ecosystems

An extremely high number of different chemical substances are currently in use. Even when regulatory approval for particular substances expires, evidence of these substances – which are no longer authorised – can still be found in the environment decades later. In addition, new substances are constantly being synthesised and approved in all areas of life. Examples include drug substances, pesticides, cosmetic ingredients, substances used in technical processes and/or products, building materials, disinfectants, and the

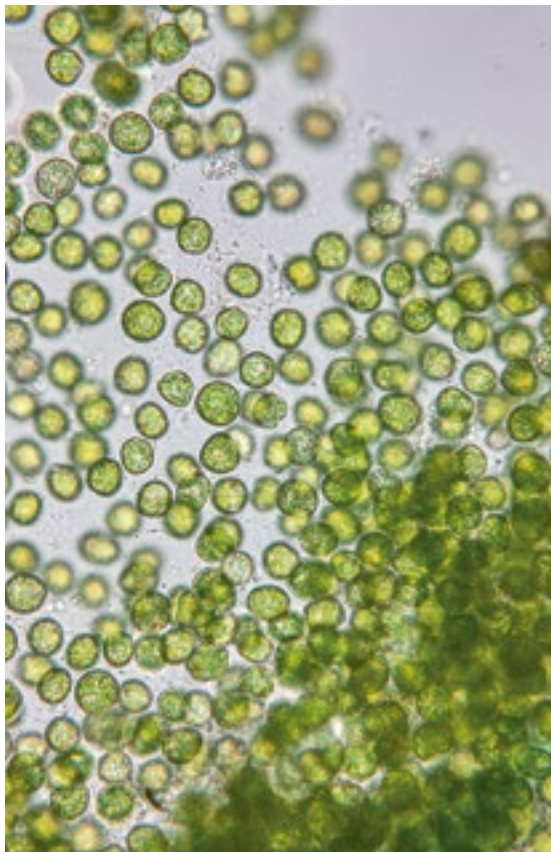
huge sector of food ingredients and additives. The creativity of synthetic chemistry knows practically no bounds. These reasons explain why the number of detectable substances in environmental matrices is constantly rising. What's more, many substances are transformed into new substances during production or use or in the environment. Although these transformation products do not result in a bigger load, they significantly increase the number of detectable substances in the environment.



The anthropogenic substances and their transformation products that get into the environment as a result of urban, industrial and agricultural use can have harmful effects on the aquatic ecosystem and on human beings. Individual substances are not the only concern – combined effects also need to be considered. Even though many sectors have minimal or no involvement in emitting

substances or causing the input of substances, they nevertheless find themselves facing the challenges associated with the input of a wide range of trace substances. Examples of such sectors include drinking water suppliers, wastewater disposal companies and the WSV as the operator of Germany's federal waterways. Alongside the almost incalculable number of different artificial substances in our aquatic systems, inadequacies in relation to analysis, evaluation and forecasting rank amongst the biggest scientific challenges for the future.

The German surface waters regulation (*Oberflächengewässerverordnung*), the EU Water Framework Directive, the German Federal Government's trace substance strategy (*Spurenstoffstrategie*), the German Sustainable Development Strategy and the European Commission's Zero Pollution Action Plan within the framework of the European Green Deal all provide important benchmarks for action.



## Vision

Concepts to prevent inputs of trace substances into aquatic ecosystems have been implemented to the greatest possible extent. Remaining substance pollution of aquatic ecosystems is proactively recorded and evaluated. The input of anthropogenic trace substances is thus substantially reduced.

## BfG's mission

To tackle the conflicts of use set to arise as a result of changing environmental conditions more effectively and allow for sustainable use of Germany's federal waterways, we use our skills to identify, evaluate and perform long-term analysis on trace substances. This means it will be possible to counter the impact on the water, nutrient, contaminant and sediment budgets and the negative effects on habitats and biotic communities even more effectively in the future. By using specially developed chemical and effect-related analytical methods, we are putting the monitoring and evaluation of aquatic ecosystems and support for maintenance and upgrading measures on Germany's federal waterways on a new footing. We align our expertise with methods that we use to continuously determine concentrations, loads and the potential effect of anthropogenic trace substances in rivers, canals and coastal regions. Based on our findings and working in collaboration with our partners at national and international level, we design concepts for dealing with contaminated materials and offer guidance to the BMDV, the WSV, the BMUV, the EU and the German federal states so that appropriate measures can be taken to reduce – or put a complete stop to – the input of problematic trace substances. We are therefore helping rid the environment of pollutants so that the 2030 zero pollution targets can be achieved.



## Strategic goals

1. To monitor aquatic systems and review the efficiency of measures, we have developed chemical and effect-related methods for the long-term monitoring of water, suspended matter, sediments and biota. We can also identify transformation products and their biotic and abiotic formation in the water cycle.
2. We are driving forward the development of dispersion and transport models and using robust approaches to forecast the progression and prevalence of trace substances in aquatic systems.
3. We have ecotoxicological evaluation concepts, methods and models at our disposal for recording the bioavailability and accumulation of relevant trace substances and their impact on aquatic organisms.
4. We have also developed concepts for measures in relation to both point source and diffuse pollution that are aimed at reducing the input of (eco)toxicologically relevant trace substances into aquatic ecosystems, taking account of the entire water cycle.



## Phenomenon – loss of biodiversity

Biodiversity means the variety of species and ecosystems and their genetic variety. Biodiversity loss has accelerated over recent decades, and this is primarily due to human activities. This is true of our aquatic ecosystems, too. Changes in aquatic structures, inputs of pollutants and nutrients, the input and migration of invasive neobiota and the effects of climate change are all key influencing factors that are responsible for the decline in biodiversity. The loss of biodiversity also goes hand in hand with a decline in the ecosystem services of aquatic systems – services that are a vital foundation for human life.

In 1992, with the aim of halting the loss of biological diversity, the international community resolved, within the context of the UN Convention on Biological Diversity, to devise strategies at national level to conserve biodiversity. At European level, the EU Biodiversity Strategy for 2030 was also drawn up. In Germany, the National Strategy on Biological Diversity (NBS) was launched with the aim

of stopping the loss of biodiversity, taking ecological, economic and social aspects into account. Germany's Sustainable Development Strategy, schemes introduced by the Federal Government, such as "Germany's Blue Belt" programme and a scheme to protect insects, and German legislation designed to protect nature and the environment all provide a national framework for measures to reduce the loss of biodiversity.



Against this backdrop, the challenge facing the whole of society also very much applies to the aquatic ecosystems used as Germany's federal waterways. What is needed here is the proactive development and implementation of innovative measures to bring about the desired conservation of biodiversity – and even to increase it if possible. An important aspect of this involves conserving or restoring suitable habitats that are as diverse as possible and making the necessary areas available for this. If promising measures are to be put in place and aquatic ecosystems managed in a sustainable way, wider and deeper understanding of the complex abiotic and biotic interactions throughout the aquatic ecosystem is absolutely vital.

## Vision

The aquatic ecosystems boast the kind of resilient species and habitat diversity that is typical for such an environment. Innovative management of aquatic ecosystems has led to an increase in biodiversity.

## BfG's mission

We help to conserve, regenerate and develop near-natural aquatic, bank and floodplain structures. We actively apply our specialist knowledge to help habitats and native species – especially endangered ones – flourish and to limit the spread of invasive neobiota. We carry out long-term monitoring across Germany, using innovative measurement and evaluation methods specifically designed for the purpose. We conduct research into the complex interactions of abiotic and biotic system components and into the link between biodiversity and ecosystem functions. This gives us insight into the effects of key anthropogenic and natural influencing factors on biodiversity, and we have the methods to evaluate these factors. With the aim of

promoting and protecting the diversity of species and habitats, we develop practical concepts to support the operational management of waterways and advise decision-makers on policy and water management.

## Strategic goals

1. We conduct advanced, innovative long-term monitoring of aquatic habitats, organisms and biotic communities in Germany's federal waterways and the associated water-dependent land ecosystems.
2. We have identified factors that have a significant influence on biodiversity. We have knowledge of many of their effects – not only on organisms and biotic communities, but also on the ecosystem functions of the waterways, their banks and their floodplains.
3. Using our proprietary robust biodiversity evaluation processes, we give decision-makers and people with responsibility options for taking action and concepts for measures that contribute to increased biodiversity on Germany's federal waterways.





## Phenomenon – digitalisation

Digitalisation, which is working its way into almost every aspect of society, is forging ahead continuously. The digital transformation is one of the key factors that defines a modern economy and cutting-edge science. Digitalisation is very considerably boosting the efficiency and innovative strength of modern society.

The German Federal Government has been aware for a long time that digitalisation is essential and was quick to recognise the benefits it would bring. It is aiming to push the development of public administration in this direction by means of various measures, including the E-Government Act (EGovG).

Burgeoning digitalisation has brought with it a growth in demand and need as regards the availability of captured data. This is relevant in respect of internal and external reporting obligations and the stipulations of Germany's Freedom of Information Act, the Environmental Information Act and the Federal Government's Open Data Strategy.

Given the increase in digitalisation, solution approaches are also being developed to make the automated evaluation and further linking of data possible. In addition to data evaluation, developments are increasingly being observed that are resulting in largely automated processes and autonomous (measurement) systems becoming part of everyday practical applications.

When it comes to the digital development of a public authority, cutting-edge, high-performance infrastructure is key. This is described, for example, in the German Federal Government's IT architecture guideline and the IT strategy of the German Federal Information Technology Centre (ITZ Bund). It is also vital to protect this infrastructure in terms of IT security, as required by the EU's General Data Protection Regulation. Protecting and safeguarding data against misuse are therefore key goals of the German Federal Government as it pursues a policy of consolidation in relation to IT. The increasing complexity of

systems is another reason why information security must be ensured. The Federal Government's cybersecurity strategy provides an interministerial strategic framework.

In the open-source sector, too, there will be an increase in requirements and activities in the future, some of which will be aimed at reducing existing critical dependencies on individual manufacturers to give users control and the ability to act in the digital arena. Open-source solutions can offer a sustainable benefit when it comes to handling, storing, processing and evaluating data. Increasingly centralised services are vital for modern-day data management – it is only when these are in place that knowledge can be acquired, safeguarded and shared.

## Vision

Cutting-edge, secure digital systems and tools that are capable of communicating globally are available, thereby enabling effective, safe and participatory workflows at the highest technical level – always under the responsibility of people and to their benefit.

## BfG's mission

When working with and continuously developing digital systems and tools, we identify opportunities to boost our performance and expand our expertise on an ongoing basis. We consider the risks, take a forward-looking approach as we pursue the latest technical options available – up to and including artificial intelligence processes – and implement these options effectively within the framework of government requirements and the rapidly advancing development of big data and open-source solutions. At BfG, we ensure that our specialist digital procedures, applications and business processes are state of the art. We also ensure we meet the



requirements applicable to the modern-day management of centralised services and the associated specialist IT. We meet society's increasing need and demand for information in line with the FAIR principles (FAIR = Findable, Accessible, Interoperable, Reusable) for both people and computers.

## Strategic goals

1. We have developed our IT expertise to a very high level. Our IT architecture and IT operations are based on the latest standards. Our professional application development, data analysis and data, model and metadata management provide the foundations for our internal and external networking.
2. We develop autonomous systems and thus contribute to the monitoring of aquatic ecosystems with cutting-edge methods at all times.
3. Digital procedures and processes are automated, structured and seamless. We have put in place standardised, documented data sharing, along with the necessary interfaces for further developing existing processes. We have established service-based, contemporary architectures and automated processes to ensure the necessary quality and integrity of our products.



## Phenomenon – increasingly ageing infrastructure

Good transport infrastructure has always been one of the key requirements for a functioning society. To ensure the transport system can continue performing well, substantial parts of the current infrastructure need to be modernised – or, at the very least, extensive maintenance work must be carried out.

When it comes to the upkeep and modernisation of waterways, the WSV has a challenge to face – ensuring that operations can continue without interruption, while also supplying durable, environmentally responsible and resilient infrastructure. There is another challenge, too – gearing parts of the waterway infrastructure to usage interests that extend beyond freight transport alone in the future, such as for the purposes of leisure and recreation.

The upgrading, construction and maintenance of the country's federal waterways constitute a sovereign function of the German

Federal Government (Federal Waterways Act, WaStrG). The German Federal Transport Infrastructure Plan 2030 (BVWP 2030) is a framework programme that spans multiple modes of transport and an important planning tool for transport infrastructure. It addresses both the existing networks and new construction and upgrading projects for different modes of transport. Fundamental requirements for protecting surface and groundwater systems are regulated at European and national level by a combination of various provisions. For example, the German Federal Water Act sets out provisions governing the development of aquatic systems, water management planning and flood protection. The modernisation of increasingly ageing infrastructure aims to ensure the functionality of waterways and must also be environmentally responsible. This environmental sustainability is ensured in various ways, including the relevant EU legislation, such as the Construction Products Regulation

(CPR). When modifying and dismantling infrastructure, the resilience of the ecosystem and the forecast climatic and societal changes must also be taken into account.

There is also a growing need for river information services (RIS guidelines) for inland navigation – not from a construction perspective, but from the point of view of transport logistics. These guidelines contain information relating to transport and traffic. They need to be standardised and harmonised both nationally and internationally. This also applies to the relevant geodata – compatibility needs to be ensured when preparing and retaining this data.

## Vision

The performance of Germany's federal waterways is based on transport infrastructure of an environmentally responsible and future-oriented design that ensures it can react flexibly to changes in climate and society.

## BfG's mission

We apply our expertise to support the up-keep and modernisation of environmentally responsible, well-performing, resilient waterway infrastructure, with due consideration of the complex functions of aquatic systems, ecological water development goals and the

wide-ranging claims on its use. Our approach involves looking at the entire life cycle of the infrastructure, from its installation through to its maintenance and ultimate removal. We also factor in predicted climatic, societal and legislative changes. The guidance we provide to the BMDV, the WSV and the German federal states is based on state-of-the-art science and technology and helps with the practical implementation of scientific knowledge, technological innovations and regulatory requirements.

## Strategic goals

1. Our advice and research services are particularly geared towards a transport infrastructure that exhibits long-term resilience.
2. We increasingly pursue fundamental work of a specialist and conceptual nature geared towards the environmentally responsible upgrading (including dismantling and replacement) and maintenance and operation of waterways.
3. By evaluating the environmental compatibility of building structures across their entire life cycle, we can equip policy-makers and managers to regulate the use and recycling of construction products, with a view to ensuring that solutions are sustainable.
4. We are increasingly committed to developing innovative monitoring concepts for hydraulic structures and advocate for the implementation of these.





## Phenomenon – transformation in transport and the movement of goods

Changes in general societal, economic and climatic conditions, combined with rapid technical advances, mean that the transport and movement of goods sectors are undergoing a dynamic transformation worldwide. As is to be expected in a globalised economy, this transformation is seeing the demand for goods and the production of goods grow in terms of both volume and diversity. There are also greater requirements relating to transport distances, capacities and speeds. These developments, combined with an increasing need to handle available resources more sustainably and the growing opportunities presented by the advance of digitalisation, are changing the infrastructure requirements for all transport modes and the associated multimodal transport.

Waterways and shipping also face a considerable and continuous need to adapt as a result of this ongoing change.

Ships have become much bigger and more powerful. Increasingly, therefore, operators of access routes to ports need to ensure that, as far as possible, these ports can be accessed by fully laden ships of all classes. The predicted increase in extreme events, particularly as a result of climate change, and the associated detrimental impact on the transport mode's reliability are posing huge challenges for the entire shipping industry. Overall, there is a growing need for modernisation so that digital processes can be used to support shipping, logistics and the operation of Germany's federal waterways.

However, maintaining the capacities of the waterways so that shipping remains competitive, or even improving those capacities, is not the sole concern. It is also important to factor in environmental protection from the perspective of both legal and societal requirements. This environmental protection

needs to be taken into consideration in relation to both shipping operations and the associated logistics on the one hand and rivers in their function as habitats on the other. If Germany's federal waterways are to be used sustainably, they must be understood as multifunctional systems. Resulting conflicts of use must be identified and integrative solution approaches developed.

## Vision

Waterborne transport is optimised in regard to society's growing – and sometimes conflicting – requirements. The performance of the waterways is continuously developed with a view to providing networked infrastructure for all modes of transport. Multimodal concepts are geared towards the changing needs of society.

## BfG's mission

We support policy-makers in their federal transport route planning that increasingly takes all modes of transport into account and factors in influences relating to both the environment and transport costs. We consider the natural environment as well as technical, economic and sociopolitical conditions, and take account of aspects of climate protection

and possible options for adapting to climate change. We help improve the environmental compatibility of shipping and the waterway system and contribute to multimodal transport concepts across Europe. We engage in technical dialogue with leading scientific institutes, shipping and environmental associations, and the loading industry. Through this approach, we combine innovation with practical relevance.

## Strategic goals

1. We proactively ensure that input relating to climate change and the environment is integrated into strategic transport and activity planning in the BMDV portfolio.
2. We develop new methods and strategies for the future-oriented assessment of parameters relevant to waterways and supply medium to long-term forecasting products for the optimised and sustainable operation of Germany's federal waterways.
3. We are aware of the key impacts that shipping has on the environment – especially as regards the emissions of pollutants and noise, the environmental effects of these and the distribution of organisms. Decision-makers and stakeholders make use of our proposals to reduce such impacts.





## Phenomenon – growing environmental awareness

In the late 20th century, the detrimental effects of industrialisation and globalisation became increasingly apparent. As a result, people in many countries round the globe became much more aware that preserving and restoring an intact environment is vital for both present and future generations. This led to a growth in environmental policy at global, European and national levels – examples include EU environmental legislation, which has been tightened up since the 1990s, the UN Agenda 2030, which was adopted in 2015 and includes 17 global Sustainable Development Goals, and German strategies and programmes to boost sustainability. The various political and legislative measures had a dual aim – firstly, to counteract the rise in environmental pollution and secondly, to make the use of natural resources and human economic activity more sustainable. For example, the introduction of the German Sustainable Development Strategy created

a national framework for protecting nature and the climate more effectively in the future, for alleviating human hardship and for making society more cohesive, with the aim of ensuring that the environment, the economy and society offer quality of life for future generations, too. This also means introducing an appropriate package of measures to make our own administration sustainable (EMAS). As part of these political and societal developments, aquatic systems and their contributing catchments were regarded as holistic systems whose ecosystem functions need to be protected and/or restored through integrated, environmentally responsible management. Since aquatic systems – and Germany's federal waterways in particular – are under a great deal of pressure from users, tackling and resolving conflicting interests poses a significant challenge for those responsible for policy and management.

## Vision

The high environmental awareness that is prevalent in society is also reflected in the way aquatic systems and their contributing catchments are handled. Solutions for the environmentally responsible development of our aquatic systems are always a high priority in social dialogue.

## BfG's mission

Through our specialist knowledge and guidance, we contribute to the environmentally responsible use of aquatic systems. Where there are conflicting interests and competing demands on the relevant areas, we devise integrative approaches and proposed solutions. Using science and technology as a basis, we acquire deeper knowledge of the interactions in and along aquatic systems and of the valorisation of ecosystem services. We advocate for an environmentally aware mindset when it comes to policy and management and provide the political decision-makers and those responsible for management of aquatic systems with the knowledge and tools they need to take action. We also offer them comprehensive advice at the planning stage. With our professional independence and scientific approach, we provide those responsible with reliable decision-making tools and offer transparency for stakeholders.

As part of our daily work within BfG, too, we implement measures to make both our infrastructure and work processes sustainable and environmentally friendly.



## Strategic goals

1. We support the development of waterways with the aim of making them self-regulating aquatic systems that are as close to their natural state as possible, and thus contribute to the implementation of legal requirements and national and international schemes.
2. We are stepping up our policy advice to the BMDV and other German federal ministries, the German federal states and international water programmes – all of which will have an increased need for guidance relating to water in the future – with the aim of pursuing the environmentally friendly and integrated development of aquatic systems.
3. We contribute to the protection of the environment and the climate by actively encouraging our staff to think and act in an environmentally aware way and ensuring BfG is climate-friendly and environmentally responsible.



## Phenomenon – transformation in society and the working world

Society in general has evolved as a result of demographic change, global migration and national and international cultural influences. As employers compete for staff, they need to change their priorities to ensure they remain an attractive employer. Technological change demands unceasing outlay – in terms of both money and effort – if organisations are not to be left behind when it comes to technical equipment and infrastructure.

All these factors pose wide-ranging challenges for public-sector institutions, too. These challenges include a drop in applicant numbers for both scientific and central administrative roles, diverse, demanding requirements such as society's values and expectations, legal conditions and employees' personal needs. Optimum working conditions and good equipment and facilities are therefore a must. In some cases, employees and society have even higher expectations of

public-sector institutions than they do of the private sector, especially when it comes to the reconciliation of work and family life.

Transparency and networking are called for – and this means that we as an authority must be open about our processes and decisions and clearly document them both internally and externally. Business processes that always run smoothly and compliance are also vital, including in crisis situations. Highly motivated staff working together in collaborative networks – whether in the office, on the move or from home – expect excellent and reliable equipment and continuous further training. International networking and collaboration are a given.

## Vision

Every individual can contribute their skills in an increasingly digitalised and globalised job market, in line with their physical and intellectual capabilities and irrespective of their (ethnic) background, gender or age. The employee's personal needs and skills are in harmony with the employer's requirements (work-life integration).

## BfG's mission

We put a great deal of effort into staff recruitment, development and management and create working conditions that take account of the changes in demographic and digital development and the increasing complexity of the working world. We make sure staff can develop their full potential. We foster a working culture based on respect and a strong sense of identity – and this is reflected in the decisions, actions and conduct of each and every individual. We comply with legal and

authority-specific requirements that are enshrined in our mission statement and relate, for example, to equal opportunities, inclusion, diversity, and occupational health and safety. Our communication culture and the training courses we offer are important building blocks for designing flexible working-time models and for acquiring and transferring specific specialist knowledge.

We ensure the age demographic of our workforce is balanced and have a level of staff turnover that is necessary to ensure innovation in a research sector with fixed-term R&D projects. Furthermore, knowledge management, the development of up-and-coming talent, and lifelong learning are all crucial issues for research institutes.

Thanks to our staff's expertise and our state-of-the-art, sustainable infrastructure, we are able to adapt quickly to changing conditions and work in national and international networks, thus enabling us to analyse and evaluate complex correlations.



With our forward-looking disaster and continuity management, we minimise the impact of catastrophic events and crises on both our staff and the operations of BfG. Our strategic orientation, our general organisational conditions, and our management and business culture are all in tune with one another, ensuring that we remain an attractive employer.



## Strategic goals

1. We help our employees achieve a good work-life balance and create a working environment that fully utilises the opportunities offered by advancing digitalisation and features both flexible working-time models and a pleasant working atmosphere. This also strengthens our attractiveness as an employer, which helps us recruit top talent.
2. Our organisational structures are optimised to make sure that the various competences of the different specialist departments can be efficiently networked for integrative tasks.
3. Communication about BfG's services is more acutely focused on the relevant target groups and dramatically changing consumption habits in relation to information and communication.
4. We have established a disaster and continuity management concept that includes both preventive and reactive measures to protect our staff and make our business processes more resilient (fail-safe).

# Notes about the strategy implementation process

In the next phase – the implementation of the “BfG 2030” strategy – our aim is to systematically pursue the operational targets and associated measures. We believe it is essential that our staff identify with the targets as much as possible during the implementation stage – this is just as important as it was when the strategy was being developed. We are therefore planning to transfer responsibility for the operational targets in line with internal responsibilities. This is the only way in which strategic theory can be embedded and the implementation successfully accomplished.

The target framework must firstly be sufficiently matched with resources and measures so that the target system can be finalised in the form of a balanced scorecard (BSC). Key performance indicators (KPIs) for monitoring the implementation process must be agreed. Ongoing control by the management team is to be established with the help of strategic controlling in conjunction with the necessary control tool.

It is envisaged that the targets will be reviewed after approximately three to five years. Adjustments may be required if new findings are made or general conditions change.



# BfG at a glance

As the German Federal Government's scientific institute specialising in hydrology, water use, water quality, ecology and the protection of aquatic ecosystems, we work on long-term issues and urgent recommendations for the Federal Ministry for Digital and Transport (BMDV), the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and other ministries. As a federal departmental research institute, we support the near-natural and, at the same time, effective development of the federal waterways for a variety of functions within society – transport, the environment, water management, and leisure and recreation. Working together with the Waterways and Shipping Administration (WSV) and the German federal states, our aim for the coming years is to expand the scientific principles for the integrative, sustainable development of the waterways and put these into practice. Since 2011, BfG's Scientific Advisory Board has provided quality assurance support for the strategic direction of our research

## Interdisciplinary collaboration

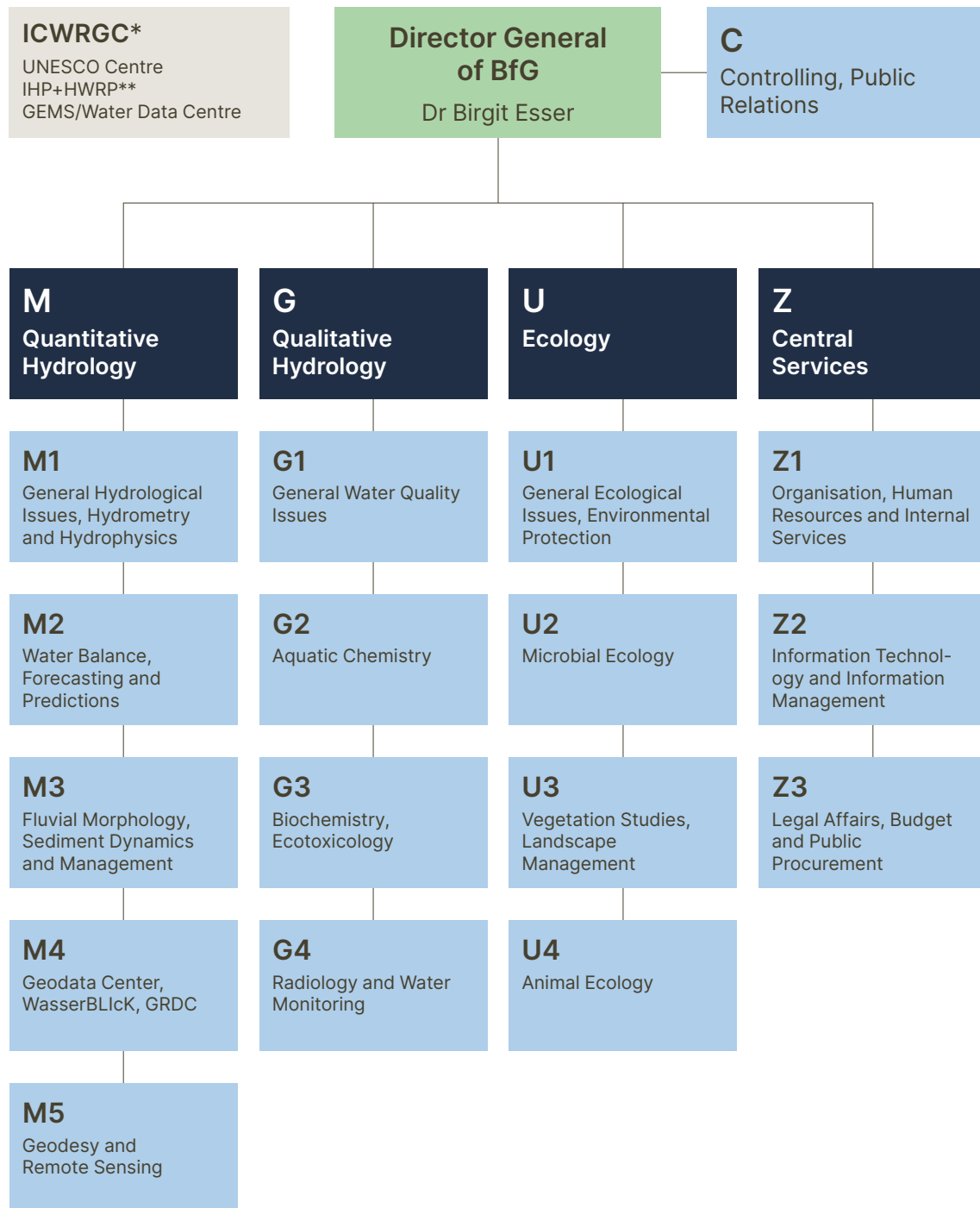
We employ scientists from more than 50 specialist disciplines in our laboratories and research facilities. BfG has three divisions, subdivided into 13 departments. Key areas of focus include the natural sciences of biology, chemistry, hydrology and geosciences. In total, we have more than 450 employees from a wide range of disciplines. We also play a part in fostering up-and-coming scientific talent (internships, bachelor's and master's dissertations, doctorates) and provide vocational training in a range of professions.

## International networking

Three international units are also located within BfG. In July 2014, the International Centre for Water Resources and Global Change (ICWRGC), which was set up by the German Federal Government under the auspices of UNESCO, started its work in Koblenz. UNESCO water centres combine expertise in individual countries or regions, serving as international reference platforms for sharing knowledge and methods. A national committee is in charge of the German contribution to the UNESCO Intergovernmental Hydrological Programme (IHP) and the WMO Hydrology and Water Resources Programme (HWRP). The IHP/HWRP secretariat, which was integrated into the ICWRGC in Koblenz in 2014, manages both programmes. The Global Runoff Data Centre (GRDC) works under the auspices of the World Meteorological Organization (WMO).

## Organisation chart

■ Division  
■ Department



\* International Centre for Water Resources and Global Change

\*\* Secretariat for the UNESCO IHP/ WMO HWRP National Committee chaired by the Federal Foreign Office

As of June 2023.

# List of abbreviations

CPR	EU Construction Products Regulation
BfG	Federal Institute of Hydrology (Bundesanstalt für Gewässerkunde)
BMDV	Federal Ministry for Digital and Transport (Bundesministerium für Digitales und Verkehr)
BMUV	Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz)
BSC	Balanced scorecard
BVWP	Federal Transport Infrastructure Plan 2030 (Bundesverkehrswegeplan)
DAS	German Strategy for Adaptation to Climate Change (Deutsche Anpassungsstrategie an den Klimawandel)
DNA	Deoxyribonucleic acid
EGovG	E-Government Act (E-Government-Gesetz)
EMAS	Eco Management and Audit Scheme
EU	European Union
EC	European Commission
FAIR	Findable, Accessible, Interoperable, Reusable
R&D	Research and Development
GRDC	Global Runoff Data Centre
HWRP	Hydrology and Water Resources Programme
ICWRGC	International Centre for Water Resources and Global Change
IHP	Intergovernmental Hydrological Programme
IPCC	Intergovernmental Panel on Climate Change
IT	Information Technology
ITZ Bund	Federal Information Technology Centre (Informationstechnikzentrum Bund)
KPIs	Key Performance Indicators
NBS	National Strategy on Biological Diversity (Nationale Strategie zur biologischen Vielfalt)
RIS	River Information Services
SDGs	Sustainable Development Goals
SMART	Specific, Measurable, Achievable (or Agreed), Relevant and Time-bound
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
WaStrG	Federal Waterways Act (Bundeswasserstraßengesetz)
WMO	World Meteorological Organization
WSV	Federal Waterways and Shipping Administration (Wasserstraßen- und Schifffahrtsverwaltung des Bundes)

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