Ruhrverband
KNOW-HOW, VALUES, WATER

Ruhrverband. We know what water is worth.

At the Ruhrverband, we preserve water for the people in our region.

With our eight reservoirs and 69 sewage treatment plants, we work to make sure that there's enough water of high quality.

With our knowledge about water we safeguard the basis of human life and the protection of nature.

To ensure quality, we continuously monitor the condition of our rivers and lakes.

We try to reach our goals in the most economical manner. Our work is about the wellbeing of people and not about striving for profit.

We use innovative and modern techniques and develop new ideas.

Leisure and recreation along our rivers and lakes and in our forests are a real joy for many people.

Contents

The Ruhr River: providing water and a name to a whole region.

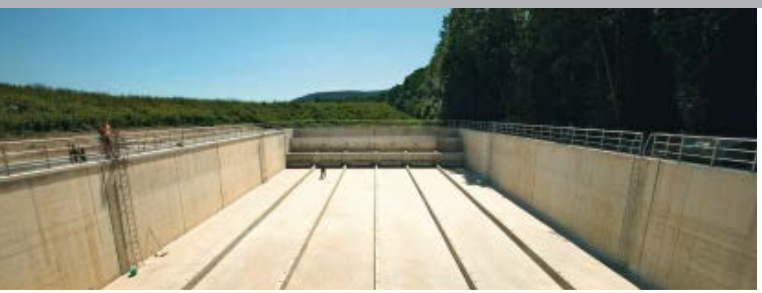
A river of great service.

The Ruhr is the lifeline and name giver for one of the largest conurbations in Europe, the Ruhr area. Around 4.6 million people get their drinking and service water from the Ruhr and its tributaries. The dense population and the high number of commercial and industrial enter prises lead to a water consumption per unit of area in the region which is around seven times higher than the national average.

And yet, the Ruhr is a relatively small river – measuring around 219 kilometres and with a mean runoff of almost 80 cubic metres per second at its mouth into the Rhine. A comparison: The Rhine is 1,233 kilometres long and reaches an average runoff of around 2,300 cubic metres per second before splitting up into its distributaries.

The Ruhrverband is in charge of making sure that the Ruhr can secure the water supply for a whole region. Since 1913, the association has been facilitating a future-oriented water management infrastructure along the Ruhr, based on the Ruhrverband act. To this aim, the Ruhrverband operates around 1,000 water management facilities including eight reservoirs and five impounding lakes in the catchment area of the Ruhr which covers 4,485 square kilometres.

What's so special about it: As a water management company under public law with a cooperative organisational structure, the Ruhrverband always has a holistic view on the region. After all, environmental protection, innovation and sustainability don't stop at city borders.



Stormwater tank (above) and sewage treatment plants (below) help to provide clean water.

River basin management for the catchment area of the Ruhr.

The Ruhrverband fulfils the following tasks:

- sourcing and supplying water for the drinking and service water supply and for hydropower generation,
- managing and balancing the water runoff,
- securing the drainage of floodwater,
- treating wastewater,
- disposing of and utilising the residues generated through sewage treatment and
- determining the water management conditions.

To this aim, the Ruhrverband plans, constructs, finances and operates reservoirs, sewage treatment plants, impounding lakes and stormwater treatment facilities – as a one-stop shop for the entire catchment area of the Ruhr. The Ruhrverband develops and pursues its corporate goals in dialogue with its members: cities, districts, waterworks and the commercial enterprises in the association's area.

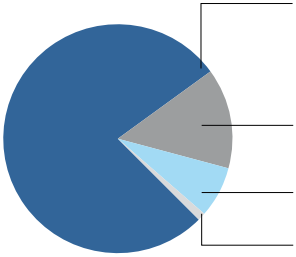
Assuming responsibility for water and people's money.

Cooperatively organised companies such as the Ruhrverband are based on the concepts of partnership, solidarity and common values. One of the association's central values is the active commitment to the common good without striving for corporate profits.

The Ruhrverband's work is financed by its members, the contributions of which are calculated on the basis of their water consumption and the volume and degree of pollution of the wastewater that needs to be treated. The association is thus committed to its members and eventually the people in the region and pledges to use their contributions economically and efficiently.

Compared to other regions, the Ruhr catchment area faces a number of structural disadvantages. Above-average annual rainfall in the lower mountain ranges of the Sauerland region, for instance, generate a significantly higher volume of wastewater per capita, and due to the smaller settlement structure, sewage treatment plants are smaller and need more staff than in other regions. Still, the sewage charges in the Ruhr catchment area correspond to the average charges in North Rhine-Westphalia.

Since 1990, the Ruhrverband is based on an internal structure similar to that of a public limited company. The Ruhrverband's bodies comprise the Assembly of Associates, the Supervisory Board and the Executive Board. The rights and duties of these bodies are laid down in the Ruhrverband act, in the Ruhrverband's statutes, in the Executive Board's rules of procedure and in the rules of procedure for the association's administration.



Assembly of Associates

117 Delegates of the group: independent cities, cities and communities belonging to districts (including owner-operated municipal enterprises) as well as districts

21 Delegates of the group: legally independent water abstractors

11 Delegates of the group: industrial enterprises

2 Delegates of the chambers of agriculture

(December 2010)

Election sequence of the Ruhrverband's bodies

Assembly of Associates

↓

Supervisory Board

↓

Executive Board

The Ruhr originates at Winterberg . . .

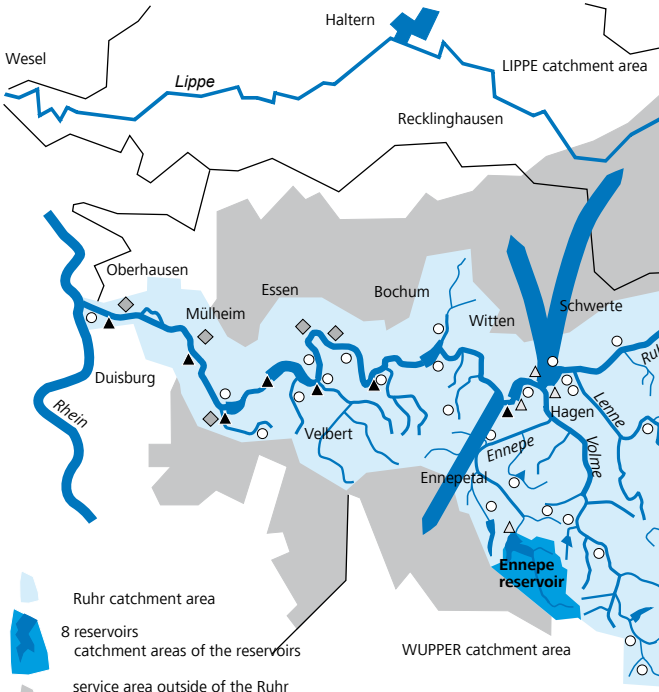
From its source to its mouth.

The Ruhr is one of the six largest tributaries flowing into the Rhine in North Rhine-Westphalia. The river originates north of Winterberg in the Hochsauerland district at an elevation of 674 metres above sea level. The actual source of the Ruhr is situated on the northern slope of Ruhrkopf mountain. After a course of about 219 kilometres, the Ruhr flows into the Rhine in Duisburg at an elevation of 17 metres above sea level.

. . . and flows into the Rhine at Duisburg (above right: course of the Ruhr).

The Ruhr catchment area covers 4,485 square kilometres. The Ruhr's most important tributaries are the Möhne, Lenne and Volme rivers. The total length of all flowing waters in the Ruhr catchment area adds up to 7,000 kilometres. Since the Ruhrverband is responsible for the entire Ruhr catchment area, it can leverage synergies and save costs regarding staff, planning, construction and operation.

Facilities of the Ruhrverband



Ruhr catchment area

8 reservoirs
catchment areas of the reservoirs

service area outside of the Ruhr catchment area

5 impounding lakes

69 sewage treatment plants with total of
550 stormwater treatment facilities

5 repump stations

47 gauging stations

17 waterworks

9 water quality monitoring stations

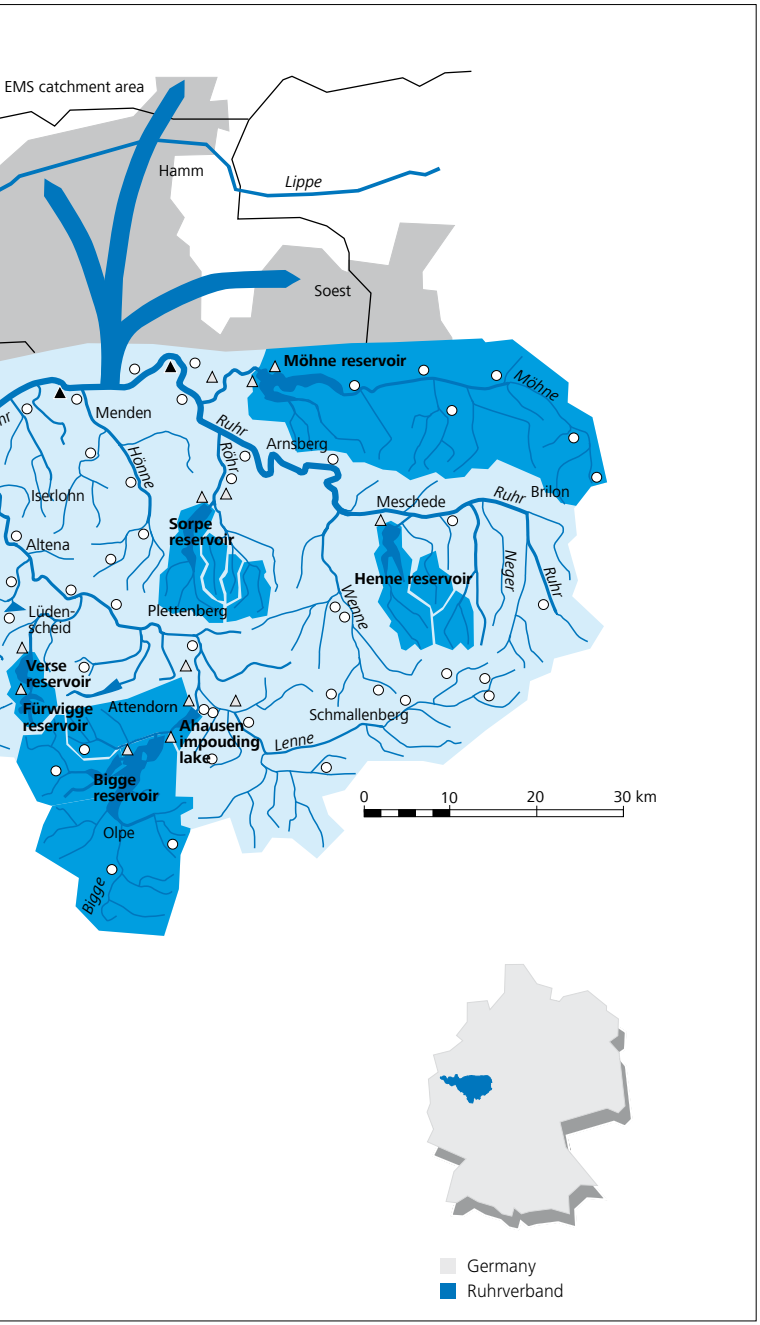
117 pumping stations

118 sewer tunnels

Reservoir	Storage capacity Mio. m^3	Catchment area km^2	Average annual inflow Mio. m^3
Bigge	171.7	287.4	240.2
Möhne	134.5	436.4	192.4
Sorpe	70.4	100.3*	42.2
Henne	38.4	98.5*	57.7
Verse	32.8	23.7	21.6
Ennepe	12.6	48.2	39.2
kl. Talsperren	9.5	47.2	–

Total storage capacity 472.3 Mio. m^3

* including inflow from other sources


EMS catchment area
Hamm
Lippe
Soest
Möhne reservoir
Möhne
Menden
Ruhr
Röhr
Arnsberg
Hönne
Iserlohn
Meschede
Ruhr
Brilon
Sorpe reservoir
Altena
Henne reservoir
Neger
Ruhr
Lüden-scheid
Plettenberg
Wenne
Verse reservoir
Fürwigge reservoir
Attendorn
Schmallenberg
Ahausen impouding lake
Lenne
Bigge reservoir
Olpe
Bigge
0
10
20
30 km
Germany
Ruhrverband

Precious provision from the Ruhr valley.

The waterworks in the Ruhr catchment area supply drinking and service water for 4.6 million people as well as commercial and industrial companies every day. The groundwater in the Ruhr valley is being recharged with river water via trickling tanks, collected in wells and processed into drinking water. This method of "artificial recharge of groundwater" has been in use for over 100 years. For good reasons:

- The Ruhr valley is ideally suited for drinking water abstraction because of its geological structure. An aquiferous layer of coarse gravel covers the dense Ruhr sandstone at a depth of eight to ten metres, which in turn is covered by one or two metres of meadow loam. The groundwater can thus be sourced from relatively low depths and is protected from pollution by the loam.
- The Ruhr flows from East to West directly through the conurbation Ruhr area. Its water thus reaches the place where it is needed in no time.
- The Ruhr's water is of high quality with low hardness.

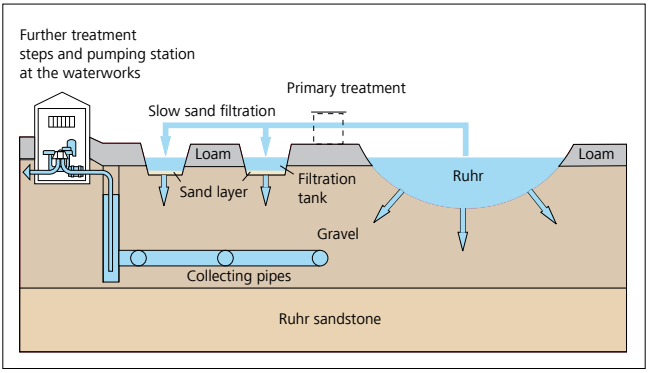


Illustration of drinking water abstraction in the Ruhr valley.

Reservoirs ensure water supply.

Around 600 million cubic metres of water are currently being abstracted from the Ruhr every year. One third of this volume is being exported into the settlement areas along Emscher, Lippe and Wupper. Since the 1970s, water demand in the region is declining – due to the structural transformation of the area leading to less industrial water consumption. Still, the reservoirs of the Ruhrverband will have to balance out the supply of water also in future, as it is subject to strong fluctuations throughout the seasons. This is a challenge to which the Ruhrverband continuously has to live up.

The Bigge Reservoir is one of the Ruhrverband's eight reservoirs.

Control room and mainframe of the reservoir control centre of the Ruhrverband in Essen.

The guidelines of reservoir management are laid down in the Ruhrverband act. It is stipulated, for example, that the runoff may not fall below certain minimum values at selected monitoring cross-sections in the Ruhr, namely at the gauging stations Oeventrop, Villigst, Hattingen and Mülheim. Measuring the runoff at these locations, the Ruhrverband makes sure that the river carries enough water everywhere, thus also in the cities along its lower reaches such as Mülheim, so that the waterworks can abstract enough drinking water.

At the Ruhrverband's reservoir control centre in Essen, these runoffs as well as further information on stormwater levels, water levels and reservoir volumes are being monitored around the clock. If recorded data suggest that the runoffs might fall below the legally binding minimums, water input from the reservoirs is being stepped up to make up for the deficit.

In total, the Ruhrverband's eight reservoirs can store 473 million cubic metres of water. The Ruhrverband uses part of this volume for flood control, in order to be able to reduce the peak runoffs at times of strong rainfall with the aim to tone down the consequences of flooding in the downstream areas.

The Ruhrverband's reservoir management isn't a secret – not at all. At www.ruhrverband.de/fluesse-seen/talsperrensteuerung and www.talsperrenleitzentrale-ruhr.de, up-to-date information on the reservoirs inflow and outflow is constantly available, just as water levels and flow rates, which are being transfered from the gauging stations to the reservoir control centre via remote data transmission. In addition, there's information on the weather situation, webcam images of reservoirs and gauging stations and – as a special service – of the traffic situation on the Ruhr and the impounding lakes.

Clarity on which you can rely.

Wastewater of 2.1 million people and many companies is being generated every day in the Ruhr river basin. This water is polluted with faeces, food remains, dissolved compounds of carbon, nitrogen and phosphorus as well as residues of pre-treated industrial wastewater. With such a high degree of pollution, an inflow into the rivers must be prevented. The water is therefore being collected in the municipal sewerages and treated at the Ruhrverband's sewage treatment plants. The treatment does not only meet all requirements regarding the stipulated limits, it even eliminates pollutants significantly beyond the legal requirements when it comes to oxygen consuming and eutrophicating substances such as phosphorus, chemical oxygen demand, ammonium nitrogen and inorganic nitrogen. The Ruhrverband makes all the necessary investments into the technology of its 69 sewage treatment plants to make sure that each and every one of them will continue to run smoothly during 365 days a year and 24 hours a day, also in future. The result: The degree of pollution in the Ruhr is lower today than ever before.

Rainwater mixed with untreated wastewater channelled off from sealed areas also has to be treated. This is why the Ruhrverband runs about 550 stormwater treatment facilities. They store the rainwater channelled into the sewerage which inevitably mixes with the wastewater and treat it before it is being directed into the waters or lead it to a large extent into the sewage treatment plants once the rain has subsided.

Sewage sludge which needs to be stabilised is generated during the treatment process. At larger sewage treatment plants, this happens in digestion tanks, most of them shaped like an egg. The methane gas generated during this process helps to produce electricity from biomass in an environmentally friendly manner, making up for a significant part of the plants' energy needs. The remaining sewage sludge is being disposed of thermally, mostly at the environmentally friendly sludge incineration plant at Werdohl-Elverlingsen, which is partly owned by the Ruhrverband.

Above: sewage treatment plant Duisburg-Kaßlerfeld,
below: sludge incineration plant Elverlingsen.

Detective work for the sake of water quality.

The outlet values and treatment performance of the sewage treatment plants as well as the water quality in rivers, impounding lakes and reservoirs are subject to permanent monitoring by the chemical and biological cooperative laboratory of the Ruhrverband, the Emschergenossenschaft and the Lippeverband. Analysis of industrial wastewater led into the public sewerage form the basis to calculate the financial contribution for the necessary treatment in the sewage treatment plants. Examinations of solids, for instance as part of construction projects or sewage sludge usage, are also part of the laboratory's monitoring tasks.

Above: examination of water samples with the membrane filter method, below: using UV light to detect bacteria of sanitary relevance.

Sterilisation in so-called autoclaves is part of the examination process in the laboratories of sewage treatment plants.

Thanks to modern instrumental analytics, around 500 organic and inorganic substances can be detected and quantified in waters and solids today. The Ruhrverband publishes the retrieved data and documents in long-term studies the development of trends in its annual Ruhr Water Quality Report. In 2010, this report won the award „best promoted water protection activity" from the International Water Association (IWA) at the World Water Congress for its comprehensive conceptual approach and the extraordinary documentation of a river catchment area.

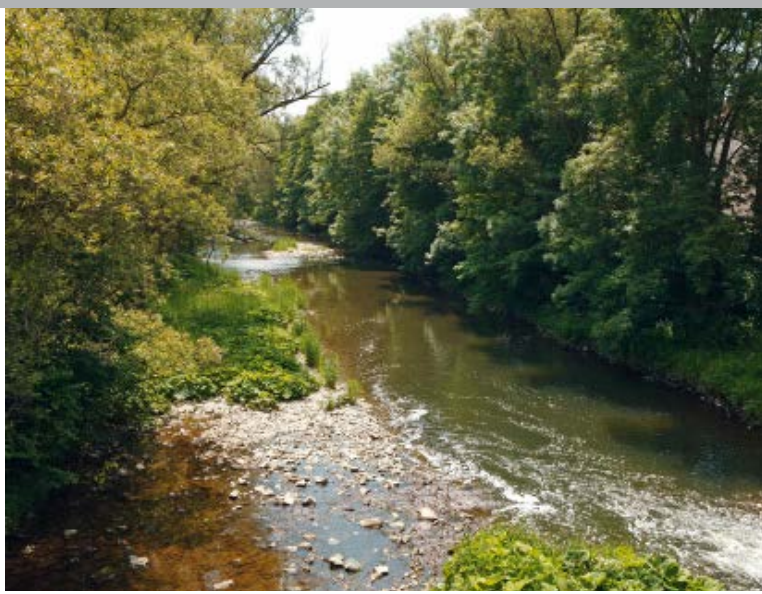
Cleaning walls at the Möhne Reservoir.

Strict standards secure quality.

In 2010 and 2011, the Ruhrverband has successfully completed the voluntary certification process of the Technical Safety Management (TSM) of the German Association for Water, Wastewater and Waste (DWA) for its two business units in wastewater disposal and its business unit reservoirs and impounding lakes. The audits "TSM Wastewater" and "TSM Impoundment" are being repeated every five years in order to ensure consistently high quality as well as supply and disposal security.

In addition to the Technical Safety Management, the monitoring group for machine technology and electrical engineering, certified by the auditing company RWTÜV, as well as the internal improvements as part of the "ecological project for integrated environmental technology" are crucial elements of the Ruhrverband's quality management. The Ruhrverband applies strict standards to the sustainable management of the forests it owns, something which is documented by the audits of the international certification organisation PEFC.

DWA TSM BESTÄTIGT



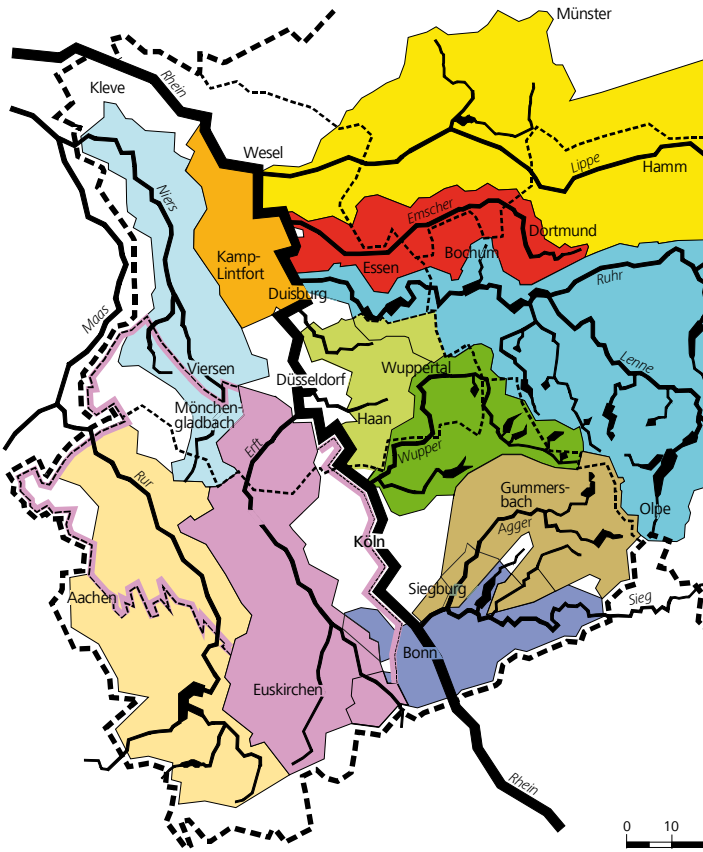
Water associations in North Rhine-Westphalia are committed to the good ecological condition of their waters.

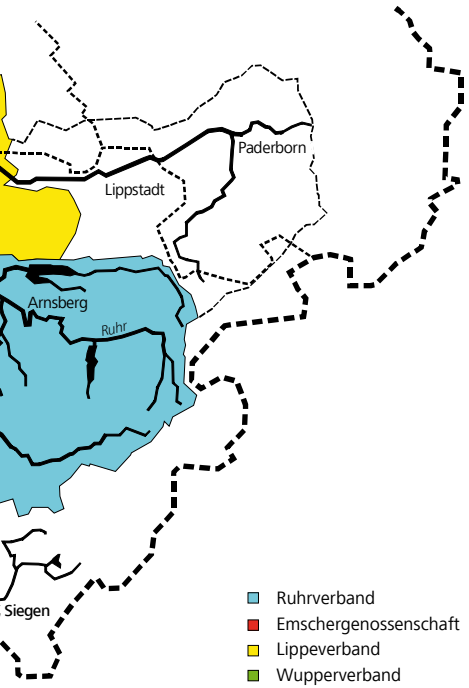
Thinking further: the water associations in North Rhine-Westphalia.

The Ruhrverband counts among the ten largest water associations in North Rhine-Westphalia, which are mostly fulfilling tasks that have been assigned to them by their respective laws (for example the Ruhrverband act). These water associations, founded as self-administrating entities under public law, enjoy a high degree of autonomy regarding all water management issues. Largely unaffected by political limitations, they can intensely pursue their activities in the respective catchment areas. The large water associations in North Rhine-Westphalia, which in January 2006 have formed the working group of water management associations NRW (agw), are committed to an integrated water management based on solidarity and sustainability which serves public interests. The associations of the agw cover around two-thirds of North Rhine-Westphalia, running more than 300 sewage treatment plants with more than 17 million PTs.

They also operate 29 reservoirs and assume responsibility for around 17,500 kilometres of flowing waters.

Water management associations in North Rhine-Westphalia





	km²
Ruhrverband	4488
Emschergenossenschaft	865
Lippeverband	3280
Wupperverband	813
Linksniederrheinische Entw.-Genossenschaft	624
Niersverband	1250
Erftverband	4216
Aggerverband	1092
Bergisch-Rheinischer Wasserverband	551
Wahnbach-Talsperrenverband	1056
Wasserverband Eifel-Rur	2100

Reliable partners with experience.

The ideal organisational structure to fulfil the Ruhrverband's core tasks is that of a corporation under public law. In addition, the Ruhrverband's subsidiaries are the right partners when it comes to tasks and business areas that go beyond the core responsibilities, such as tourism around the reservoirs, economic usage of the reservoirs' hydropower potential, the efficient disposal of sewage sludge as well as engineering and consulting services regarding the sewerage system and wastewater facilities.

Electricity is generated through hydropower at the Ruhrverband's reservoirs and impounding lakes. The Lister- und Lennekraftwerke GmbH (LLK) operates 15 hydropower stations. More than 80,000 people in an area of around 320 square kilometres are being supplied with electricity and more than 70 employees guarantee this safe electricity supply. More information is available at www.llk.de.

The service spectrum of the RWG Ruhr-Wasserwirtschafts-Gesellschaft mbH, a fully-owned subsidiary of the Ruhrverband, ranges from planning for sewerages and sewage treatment plants as well as the operation of sewerages and the examination of water from external sources to the complete construction of water and sewage facilities. It also comprises flood control, water development, reservoir renovation, ecology and fisheries. A qualified team of engineers, business experts, scientists and legal experts offers comprehensive know-how regarding water, environment and construction, based on more than 100 years of the Ruhrverband's experience in water management. More information is available at www.rwg-mbh.com.

In Iserlohn, the RWG operates the central waste management facility ZEA, one of the most modern chemical-physical treatment facilities in Europe to dispose of liquid industrial residues in a cost-efficient manner. Find out more at www.zea-iserlohn.de.

The WFA Elverlingsen GmbH, a joint subsidiary of the Ruhrverband and Mark-E, operates a sludge incineration facility in Werdohl-Elverlingsen. It's a fluidized-bed firing system for the thermal disposal of sewage sludge and coal.

The emerging vapour is used energetically and the flue gas is being cleaned with a highly efficient filter system. The service range comprises the disposal of municipal and industrial sewage sludge, consulting and the development of logistical concepts. More information is available at www.wfa-elverlingsen.de.

LLK Lister- und Lennekraftwerke GmbH

RWG Ruhr-Wasserwirtschafts-Gesellschaft mbH

ZEA Zentrale Entsorgungsanlage Iserlohn

WFA Elverlingsen GmbH

The Ruhr catchment area offers numerous leisure activities.

Recreation on and around water.

Swimming, sailing, rowing, fishing, cycling, hiking – especially in a region so densely populated as the Ruhr area, waters are of significant importance for recreational purposes. The Ruhr and its tributaries as well as the reservoirs and impounding lakes offer numerous possibilities for recreation – be it activity or relaxation. The Ruhrverband supports these activities as far as they can be brought into line with its water-management tasks.

The Ruhr valley bike path, which stretches over 230 kilometres from the Hochsauerland region to Duisburg, is another popular destination as it presents the full diversity of the Ruhr's landscape with all its natural and cultural treasures. The Ruhrhöhenweg hiking path is one of the most popular trails in North Rhine-Westphalia, leading from Winterberg where the Ruhr originates to the river's inflow into the Rhine at Duisburg over a total length of 244 kilometres.

What's special about this hiking trail: It does roughly follow the Ruhr's course, but contrary to the Ruhr valley bike path does not run along the river banks but through the surrounding hills and mountain ranges.

In 2011, the Ruhrverband significantly extended recreational activities on the Möhne, Bigge, Henne and Sorpe reservoirs: The association was the first owner of reservoirs in North Rhine-Westphalia to allow the operation of special drives for electric boats, setting up – in addition – designated areas for electric model boats.

The Ruhr river basin

Catchment area	4,485 km²
Ruhr spring (geodetic height)	674 m.a.s.l.
Ruhr mouth (geodetic height)	17 m.a.s.l.
Ruhr length	219 km
Annual mean precipitation	1,059 mm
Mean runoff (gauging station Hattingen / Ruhr)	app. 70.4 m³/s
Mean annual cumulative runoff at the Ruhr's mouth	2.4 billion m³

Important tributaries	
Lenne, Volme, Möhne, Wenne, Röhr	
Total length of flowing waters in the Ruhr catchment area	app. 7,000 km

Population	
Population in the catchment area	2.07 million inhabitants
thereof connected to sewage treatment plants	around 98.4 %
Securing water supply in an area with	4.6 million inhabitants

Facilities	
5 impounding lakes with a combined volume of	19.1 million m³
8 reservoirs with a combined volume of	462.9 million m³
69 sewage treatment plants with a combined capacity of	3.266 million PTs
and a combined sewage volume (2011) of	363 million m³/year
550 stormwater treatment facilities	
5 repump stations	
9 water quality monitoring stations	
47 gauging stations (partly owned by the Ruhrverband)	
17 hydroelectric power plants	
117 pumping stations	
118 sewer tunnels	

Power generation (averages)	
LLK GmbH	52.6 million kWh/year
Impounding lakes of the Ruhrverband	64.6 million kWh/year
Combined heat and power plants at sewage treatment plants	39.3 million kWh/year
Total power generation	156.5 million kWh/year

Members	
Communities	60
Water abstractors with more than 30,000 m³/year	73
Businesses	389

Employees	
Full-time equivalents	967

Finances: Annual Financial Statement 2011	
Capital assets (at acquisition and manufacturing costs)	EUR 2,862.4 million
Turnover	EUR 286.7 million
thereof member contributions	EUR 266.4 million
Equity ratio	32.2 %
Investments	EUR 26.0 million

Participations/holdings	
Ruhrverband Holding GmbH, Essen	100 %
– Lister- und Lennekraftwerke GmbH, Essen	94.94 %
RV direct participation	5.06 %
– Wasserwirtschaft im Rheinisch-Westfälischen Industriegebiet (Ruhrkohlenbezirk) GmbH, Essen	40 %
– ALLBAU Allgemeiner Bauverein Essen AG, Essen	0.5 %
RWG Ruhr-Wasserwirtschafts-Gesellschaft mbH, Essen	100 %
– RRWT Rhein-Ruhr-Wassertechnik GmbH	50 %
WFA Elverlingsen GmbH, Werdohl	50 %
Hennesee GmbH, Meschede	18.6 %
Touristik GmbH, Möhnesee, Möhnesee-Körbecke	6.9 %
Sorpesee GmbH, Sundern	20 %
Biggesee GmbH, Olpe	16 %
Freizeitzentrum Kemnade GmbH, Bochum	5 %
IWW Rheinisch-Westfälisches Institut für Wasserforschung gemeinnützige GmbH, Mülheim an der Ruhr	2.7 %

December 31, 2011

The Ruhrverband offers tours of sewage treatment plants . . .

You want to find out more?

Further information is available at www.ruhrverband.de. If you have any questions or comments, simply send an email to info@ruhrverband.de or call +49 201/178-0.

Contacting us directly: Simply scan this QR code with your smartphone to get to know the Ruhrverband even better.

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