Water Management and Waste Water Treatment in Germany

Visitors Programme: Green Tech (made) in Germany

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The statutory framework of water management in Europe and Germany
Institutional framework

Self-Government and Water Users

- Cities, Municipalities
  - Municipal Associations
- Inter-Municipal Ass.
- Water Associations
- Dike Associations
- Statutory Ass.
- Associated in
- Industry, Trades, Agriculture
- Individuals

Supreme Water Authorities
- (Land Ministry)

Higher Water Authorities
- (Regional Government)

Lower Water Authorities
- (Cities, Districts, Agencies)

State

- Federal Ministries
- Bund Agencies
  - Bund Institutions

Supervision
- Bases

State Agencies for Water Management

Monitoring and Enforcement

Source: Kraemer & Jaeger, 1998
## Statutory framework in Germany

<table>
<thead>
<tr>
<th></th>
<th>Exclusive competence</th>
<th>Concurrent competence</th>
<th>Competence for framework laws</th>
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</thead>
<tbody>
<tr>
<td><strong>Bund</strong></td>
<td>• Water Framework Directive</td>
<td>• Water Management Act</td>
<td>• Effluent Charges Act</td>
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<td></td>
<td>• Groundwater</td>
<td>• Water Association Act</td>
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<td></td>
<td>• Floods</td>
<td>• Federal Waterways Act</td>
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<td></td>
<td>• Marine Strategy</td>
<td>• Drinking Water Ordinance</td>
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<td></td>
<td>• Surface Water</td>
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<tr>
<td></td>
<td>• Drinking Water</td>
<td></td>
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<tr>
<td><strong>Länder</strong></td>
<td></td>
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<td>• Land Water Acts and implementation of law</td>
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</tbody>
</table>
The EU Water Framework Directive (WFD)

**Objective:** Attaining “good environmental status” for Europe’s rivers, lakes, groundwater bodies and coastal waters by 2015

Source: UBA (2010)
The Implementation of the WFD

River Basin Management Plans

➢ Water management according to the natural unit: the river basin

➢ Responsibility on Laender level

Milestone | Deadline | Work step
--- | --- | ---
Establishment of river basin management plans and programmes of measures. Beginning of first river basin management plan period | Dec. 2000 | Legal transposition

Establishment of river basin management plans and programmes of measures. Beginning of second river basin management plan period | Dec. 2006 | Monitoring programmes ready for implementation

Establishment of river basin management plans and programmes of measures. Beginning of third river basin management plan period | Dec. 2012 | Characterization results

Environmental objectives achieved. Beginning of second river basin management plan period | Dec. 2015 | Implementation of programmes of measures

Implementation of the relevant measures | Dec. 2021 | Period during which Water Framework Directive objectives are to be met

Final deadline for implementation of the Water Framework Directive objectives | Dec. 2027 | Establishment monitoring programmes

Source: BMU (2010)
Good Ecological Status in Germany

In 2015, 10% of the surface water bodies are in good or very good state.

More than half of the water bodies are heavily modified in their flow regime. 3% of these have a good ecological potential.

The main reasons for not reaching the good status are:

• Alterations in the flow regime (regulations on the rivers, interrupted passability)

• Nutrient emissions to water bodies mainly from agriculture

Source: UBA (2015)
Availability and Sources of Water

Water utilisation in Germany in 2007

Total available water resources: 188 billion cubic metres

- 82.8% groundwater
- 14.5% enriched groundwater
- 2.7% water from lakes and reservoirs
- 1% stream water
- 9% water from bank filtration
- 8% spring water
- 9% groundwater

Total water consumption 17.2% (32.3 billion m³)

- Non-public water supply and wastewater disposal 27.2 billion m³
- Public water supply 5.1 billion m³
- Unused 155.7 billion m³

Reclaimed water is not (yet) used in Germany due to abundance of water resources

Uses of Water

- Non-public water supply comprises water uses of industry, agriculture and energy
- 94% of the industrial water demand is covered by own supply

Per-capita water consumption in Germany

- India: 135 L
- Philippines: 165 L
- Canada: 335 L

Comparison of per-capita water consumption on a European level
Data in litres per person and day (status: 2007)

UNDP 2006
Per-capita water consumption in Germany

- Since 1990, average water consumption has decreased by 16% due to changed consumption patterns, the development and use of water-saving fittings and household appliances.

- Water for industry continuously decreases due to changed production processes and increasing self-production.

- However, facilities are under used.
Water Losses

<table>
<thead>
<tr>
<th>Country</th>
<th>% of Water Supply</th>
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<tbody>
<tr>
<td>Germany</td>
<td>6.5 %</td>
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<tr>
<td>England &amp; Wales</td>
<td>15.5 %</td>
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<tr>
<td>France</td>
<td>20.9 %</td>
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<tr>
<td>The Netherlands</td>
<td>7.0 %</td>
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<tr>
<td>Austria</td>
<td>11.0 %</td>
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<tr>
<td>Poland</td>
<td>24.6 %</td>
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</table>

Wastewater disposal in Germany in 2010

Total population 81,750,716

Persons connected to the sewer system
- 78,949,840 (96.57 %)
  - with centralised wastewater treatment 78,238,652 (95.7 %)
  - without centralised wastewater treatment 711,188 (0.87 %)

Persons without connection to the sewer system
- 2,800,876 (3.43 %)
  - with decentralised wastewater treatment 2,779,298 (3.40 %)
  - without decentralised wastewater treatment 21,578 (0.03 %)

Population with wastewater treatment
- 81,017,950 (99.10 %)

Population without wastewater treatment
- 732,766 (0.09 %)

Source: German Federal Statistical Office in wvgw (2015)
Role of municipalities in Germany

- Self government of municipalities is legally ensured.
- Municipalities are obliged to handle wastewater disposal and may manage their drinking water supply.
- Water supply: 40% private, 60% public

Types of enterprise of wastewater disposal 2014
weighted according to the population connected to the sewerage system

- 34% institution under public law
- 16% owner-operated municipal utility and similar company
- 7% ancillary municipal utility
- 8% special-purpose association/water and soil associations/associations instituted on a special statutory basis
- 35% other
Role of municipalities in Germany

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**Types of enterprise in the public water supply 2012**

Shares related to water output

- special purpose associations: 19%
- owner-operated municipal utilities: 9%
- institution under public law: 6%
- mixed public-private companies AG/GmbH (plc, limited liability company): 6%
- ancillary municipal utilities: 5%
- autonomous companies AG/GmbH (plc, limited liability company): 4%
- water and soil associations: 3%
- public-law companies AG/GmbH (plc, limited liability company): 2%
- other private-law utilities: 1%
- 20%
Waste Water Treatment

According to generally accepted best available technology

1. Purification stage: Mechanical processes (adsorption, filtration, stripping) with grill, sand filtration, primary sedimentation tank
2. Purification stage: Microbiological processes, decomposition of organic components (aerobic & unaerobic), elimination of organic Nitrogen & Phosphorus
3. Purification stage: Abiotic-chemical processes (oxidation, precipitation) to further eliminate Phosphorus

97% of the municipal wastewater is treated at highest EU standard: biological treatment with nutrient elimination.

Waste water treatment plants achieved removal of 81% of nitrogen and 91% of phosphorous
Challenge: Micropollution

100,000 compounds are registered in the EU; 25% evaluated for their ecotoxicity (Fent, 2003)

- Personal hygiene products, pharmaceuticals, pesticides, paint
- Potentially toxic or carcinogenic

Which effects do they have?
- Endocrine disruptors

Techniques are known
- Managed aquifer recharge, advanced oxidation techniques, hybrid membrane filtration, bioassays

https://www.youtube.com/watch?v=v8iihsQYOos
Thank you for listening!

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References (1)


References (2)


