Data Generation on Waste Water Treatment and Water Quality UNSD Tables W4B-W9

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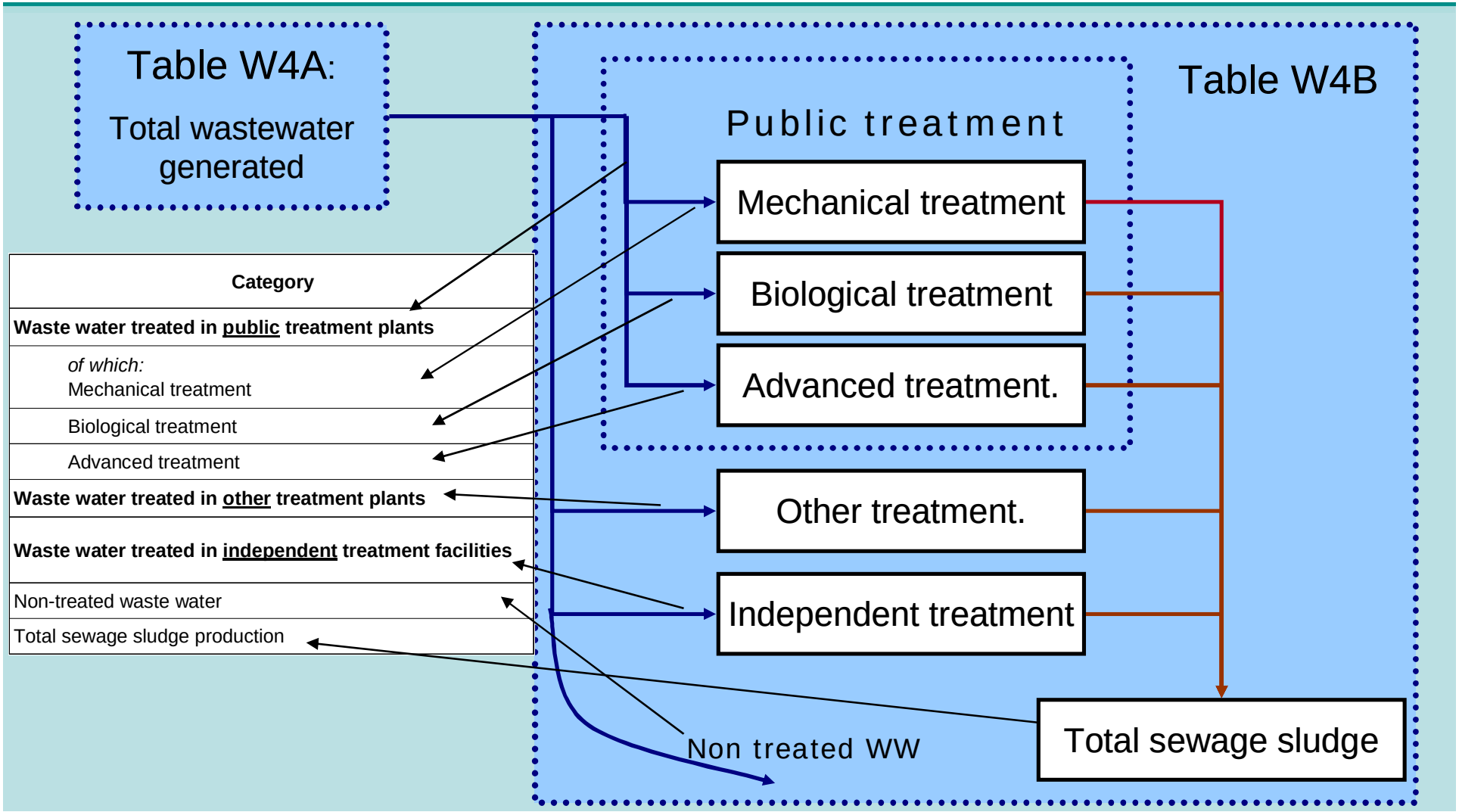
Contents of the presentation

- UNSD tables W4B – W5
  - Tables
  - Terminology
- Austrian examples on wastewater data
- Quality data (UNSD tables W6A - W8A)
- Keeping quality monitoring networks
- Conclusion

Table W4B: Waste Water Treatment

Priority	Category	Unit	1990*
!	**Waste water treated in <u>public</u> treatment plants**	1000 m^3/d	
	of which: Mechanical treatment	1000 m^3/d	
	Biological treatment	1000 m^3/d	
	Advanced treatment	1000 m^3/d	
!	**Waste water treated in <u>other</u> treatment plants**	1000 m^3/d	
	Waste water treated in <u>independent</u> treatment facilities	1000 m^3/d	
!	Non-treated waste water	1000 m^3/d	
	Total sewage sludge production	1000 t	

Table W4B: Waste Water Treatment – Water Scheme



Category
Waste water treated in <u>public</u> treatment plants
of which: Mechanical treatment
Biological treatment
Advanced treatment
Waste water treated in <u>other</u> treatment plants
Waste water treated in <u>independent</u> treatment facilities
Non-treated waste water
Total sewage sludge production

Table W4B: Waste Water Treatment – Definitions, Clarifications

- Public treatment plant:
  - Synonyms: Urban wastewater treatment plant, municipal wastewater treatment plant
  - Operated by official authorities or private companies for local authorities
  - Main purpose: urban waste water treatment

Table W4B: Waste Water Treatment – Definitions, Clarifications

- Mechanical treatment:
  - Physical and mechanical nature
  - Results in decanted effluents and separate sludge
  - (OECD/ESTAT: treatm. efficiencies: TSS >50%, BOD >20%)
- Examples (minimum requirements):
  - Sedimentation
  - Flotation

Table W4B: Waste Water Treatment – Definitions, Clarifications

- Biological treatment:
  - Aerobic or anaerobic micro-organisms
  - Results in decanted effluents and separate sludge containing microbiological mass and pollutants
  - (OECD/ESTAT: treatm. eff.: BOD >70%, COD/TOC >75%)
- Examples:
  - Trickling Filters
  - Activated Sludge
  - with or without nitrification

Table W4B: Waste Water Treatment – Definitions, Clarifications

- Advanced treatment:
  - All treatment processes which are not mechanical or biological
  - (OECD/ESTAT: treatm. eff.: BOD >95% and COD/TOC 85%, N > 70% or P >80% or faecal coliforms < 1000/100 ml)
- Examples:
  - Chemical coagulation
  - Flocculation
  - Stripping
  - Reverse osmosis
  - Ultra-filtration

Table W4B: Waste Water Treatment – Definitions, Clarifications

No double-counting!

Volumes treated in mechanical treatment plants

\+ Volumes treated in biological treatment plants

\+ Volumes treated in advanced treatment plants

= Waste water treated in public treatment plants

Reporting under the highest level of treatment only!

Table W4B: Waste Water Treatment – Definitions, Clarifications

- Other treatment plants:
  - Non-public treatment plants
  - i.e. Industrial waste water plants
- Independent treatment facilities:
  - Individual private treatment facilities
  - Public waste water network is not in place
  - e.g. septic tanks, filtration bed, rootzone systems etc.

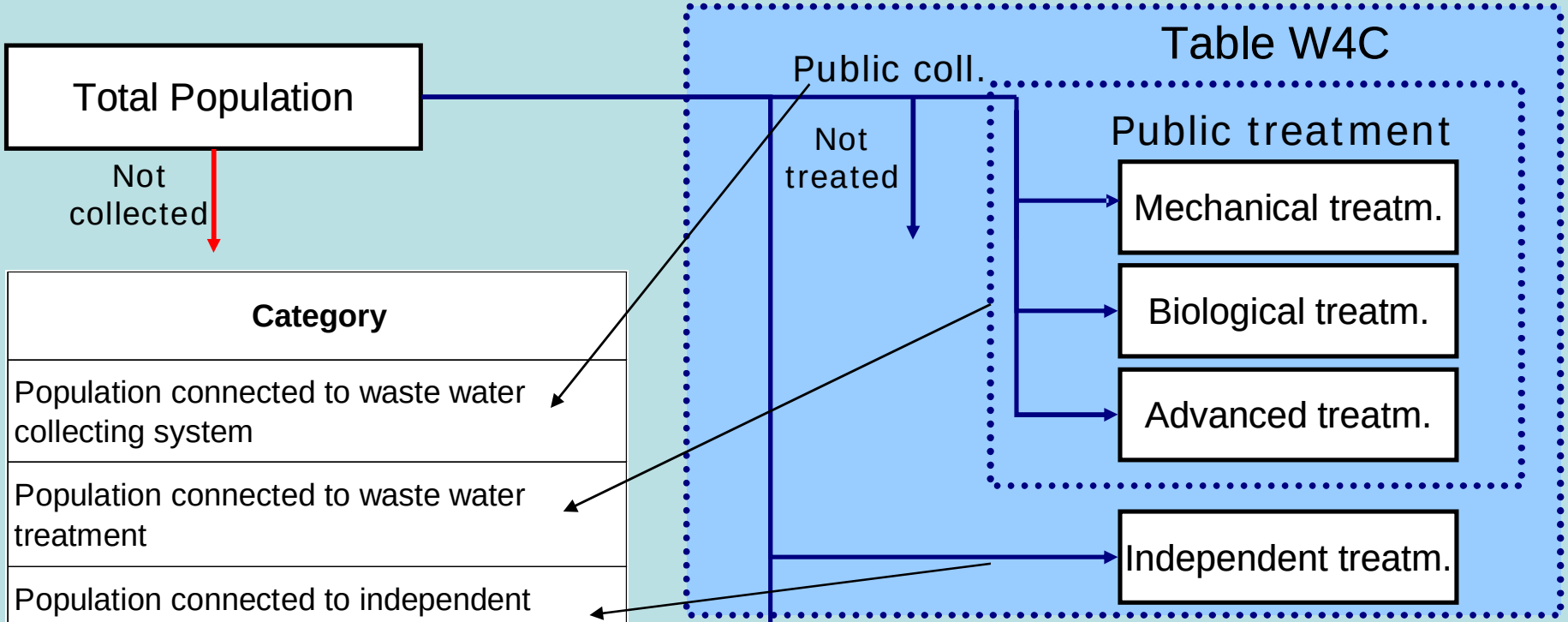
Table W4B: Waste Water Treatment – Definitions, Clarifications

- Total sewage sludge production:
  - Tons dry substance
  - If wet weight – please indicate in footnote

Table W4C: Waste Water Treatment Facilities

Priority	Category	Unit	1990*
!	Population connected to waste water collecting system	%	
!	Population connected to waste water treatment	%	
!	Population connected to independent treatment (septic tanks)	%	
!	**Waste water treatment plants**	number	
	of which: Mechanical treatment	number	
	Biological treatment	number	
	Advanced treatment	number	
!	**Design capacity of waste water treatment plants**	1000 m^3/d	
	of which: Mechanical treatment	1000 m^3/d	
	Biological treatment	1000 m^3/d	
	Advanced treatment	1000 m^3/d	

Table W4C: Waste Water Treatment Facilities– Water Scheme



Category
Population connected to waste water collecting system
Population connected to waste water treatment
Population connected to independent treatment (septic tanks)
Waste water treatment plants
of which: Mechanical treatment
Biological treatment
Advanced treatment

Table W4C: Waste Water Treatment Facilities– Definitions, Clarifications

Derivation from the water scheme

% of population connected to urban waste water collecting system (W4C)

\+ % of population connected to independent treatment (W4C)

\+ % of population connected to other treatment (not asked)

\+ % of population not connected to collecting systems (not asked)

= 100 % of resident population of the country

Table W5: Selected Variables at the City Level

Priority	Category	Unit	1990*
!	City Population	1000	
!	Population connected to waste water collecting system	%	
!	Population connected to waste water treatment	%	
!	Public water supply (ISIC 41):	mio m^3/y	
	of which to Households	mio m^3/y	
!	Waste water generated	1000 m^3/d	
!	**Treated in public treatment plants**	1000 m^3/d	
	of which: Mechanical treatment	1000 m^3/d	
	Biological treatment	1000 m^3/d	
	Advanced treatment	1000 m^3/d	
!	Treated in other treatment plants	1000 m^3/d	
!	**Waste water treatment plants**	number	
	of which: Mechanical treatment	number	
	Biological treatment	number	
	Advanced treatment	number	
!	**Total design capacity of waste water treatment plants**	1000 m^3/d	
	of which: Mechanical treatment	1000 m^3/d	
	Biological treatment	1000 m^3/d	
	Advanced treatment	1000 m^3/d	

Analog information in table

W4C

W3

W4A

W4B

W4C

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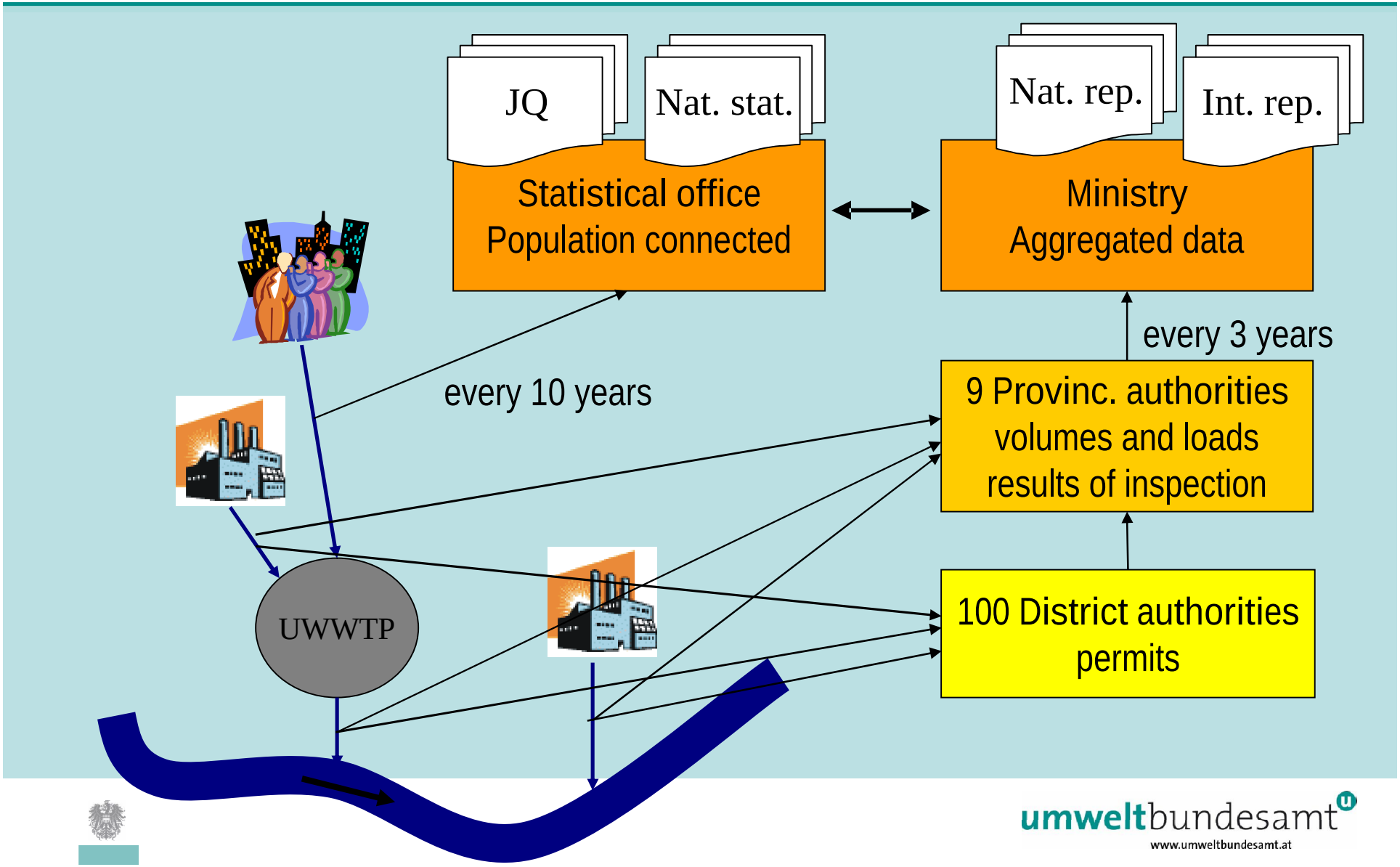
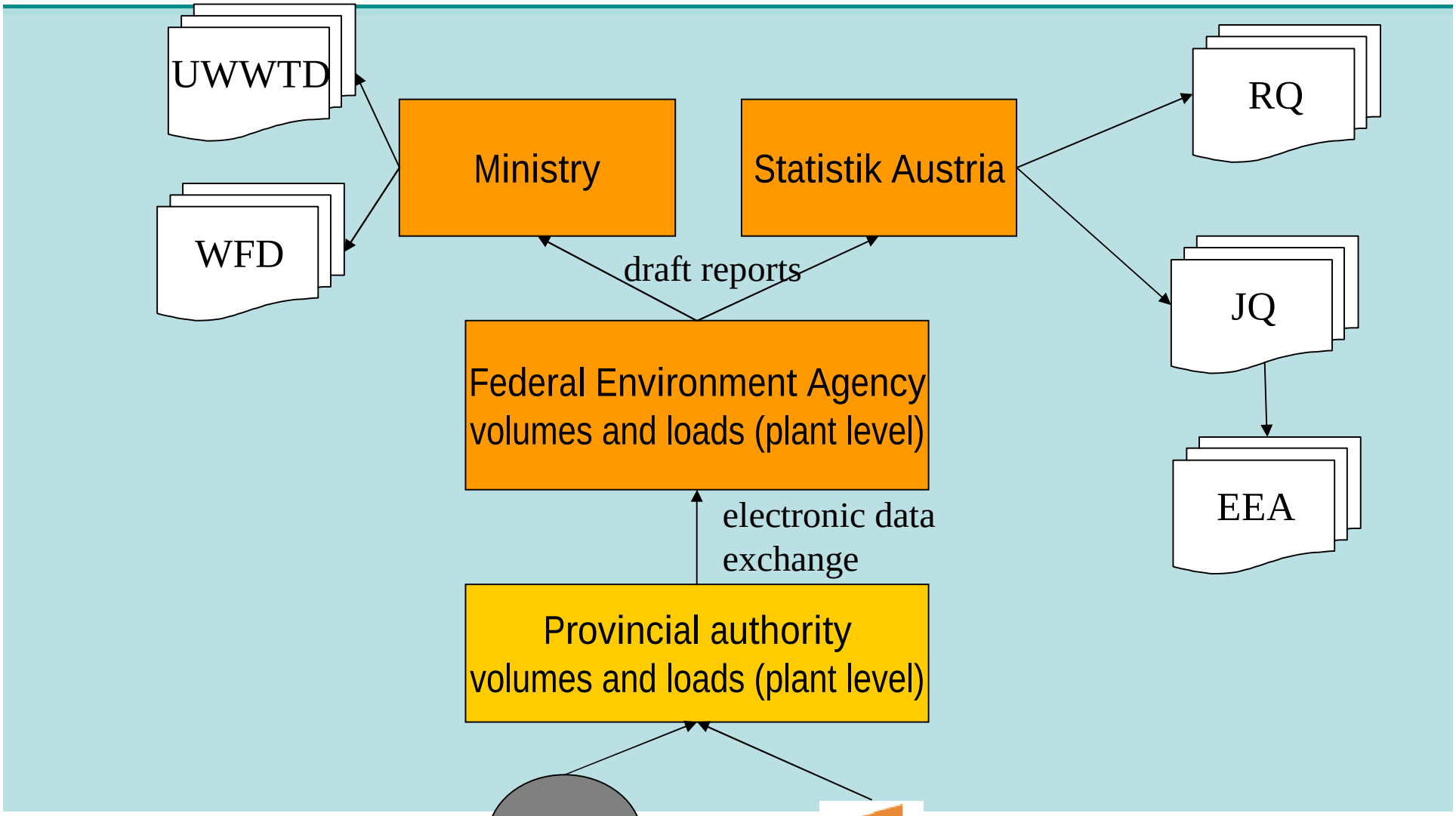
Austrian Waste Water Data

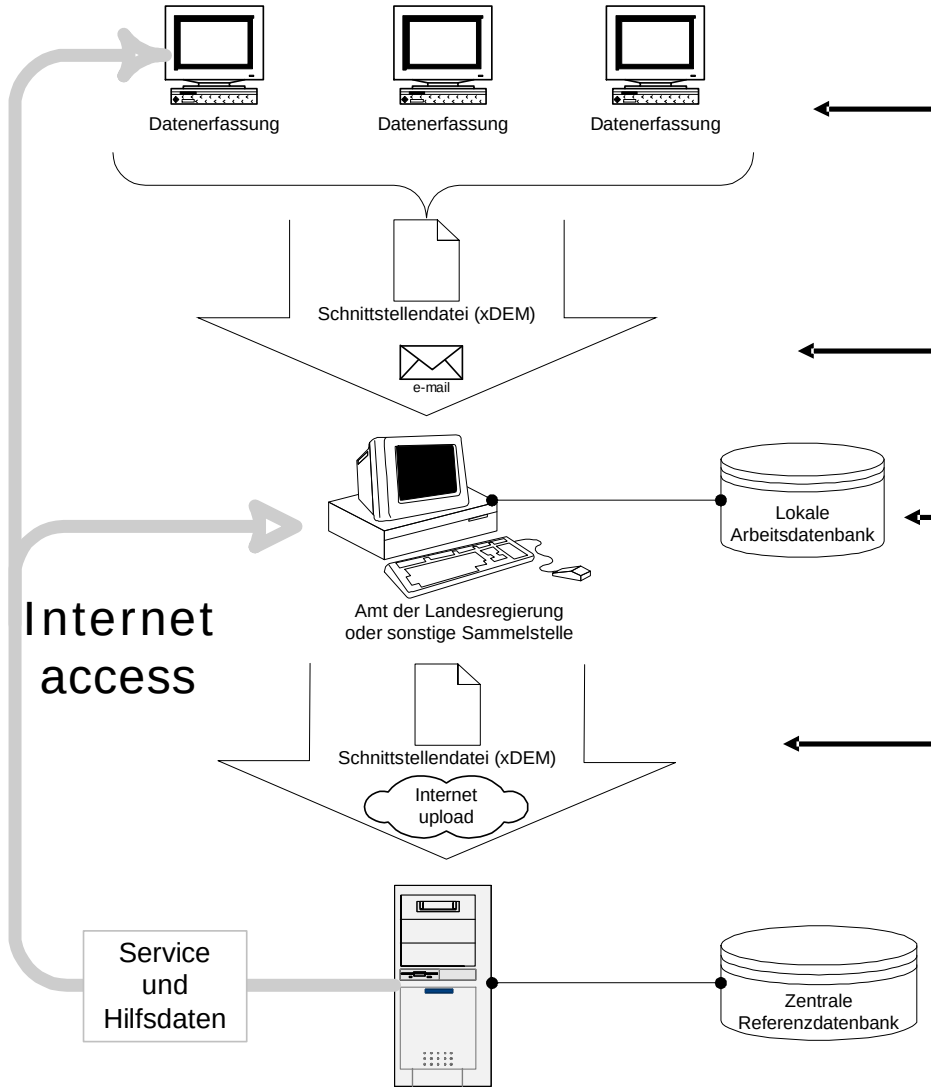
Austrian Example (until 2000)



Austrian Example (after 2000)



Austrian Example – Established Data Flow



Data input by different provincial bodies

Data transfer via email or floppy disc

Data collection and validation by provincial authority

Data transfer via email or floppy disc

Data storage and evaluation by the Federal Environment Agency

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Austrian Example - Requirements

- Answering of the question: What do we need to know?
- Legal basis
- Administration of parameters:
  - Numbering and definition of parameters
  - Mandatory and optional information
  - New information to be collected
  - Information not to be collected in the future
  - Clear definition of parameters (how to measure, frequency of measurements, way of calculation,...)
- Technical agreements for electronic data exchange

Austrian Example – Technical Agreements for Data Exchange

```
REM   Interface Bescheid
IFN   BES
PRG   KEY              besZahl
COL   besZahl          besBetreff       besKurzbezeichnung          besAusstellungsDatum          besAbl
ETR   9-MA58-3418/92   Hauptkläranlage Wien - Simmering   HKA-Wien   1999-02-11   2030-12-31   1
ETR   9-MA58-1393/66   Kläranlage Blumental               KA-Blumental   1966-10-03   0000-00-00   1
REM   ========================================================================
REM   Interface Emittent
IFN   EMI
PRG   KEY              emiLID
COL   emiLID           emiName          emiBundesland   emiEPERID      emiArt          emiEinleiterArt   emiBMN
ETR   9-HKA-Simmering  Hauptkläranlage Wien             9              ~               1                 1
ETR   9-KA-Blumental   Kläranlage Blumental             9              0               1                 1
ETR   9-EMI-10324      Collini Skolnik GmbH             9              1027810324      10                2
ETR   9-EMI-10405      ABW Abbruch-, Boden- und  Wasserreinigungsges.m.b.H.                           9                 104121
REM   ========================================================================
REM   Interface Emittentendaten
IFN   EMIDATA
PRG   KEY              emiLID           parID           emdRefDate
COL   emiLID           parID            emdRefDate      emdValue              emdRemark
ETR   9-EMI-10324      4                2003-10-23      Collini-Skolnik GmbH                Übernahme aus EPER
ETR   9-EMI-10324      6                2003-10-23      1210                  Übernahme aus EPER
ETR   9-EMI-10324      7                2003-10-23      Wien                  Übernahme aus EPER
ETR   9-EMI-10324      10               2003-10-23      1210                  Übernahme aus EPER
ETR   9-EMI-10324      11               2003-10-23      Wien                  Übernahme aus EPER
ETR   9-EMI-10324      107              2003-10-23      16                    Übernahme aus EPER
ETR   9-EMI-10324      108              2003-10-23      23                    Übernahme aus EPER
ETR   9-EMI-10324      110              2003-10-23      48                    Übernahme aus EPER
```

Austrian Example

Improvement of data quality and consistency due to the new system

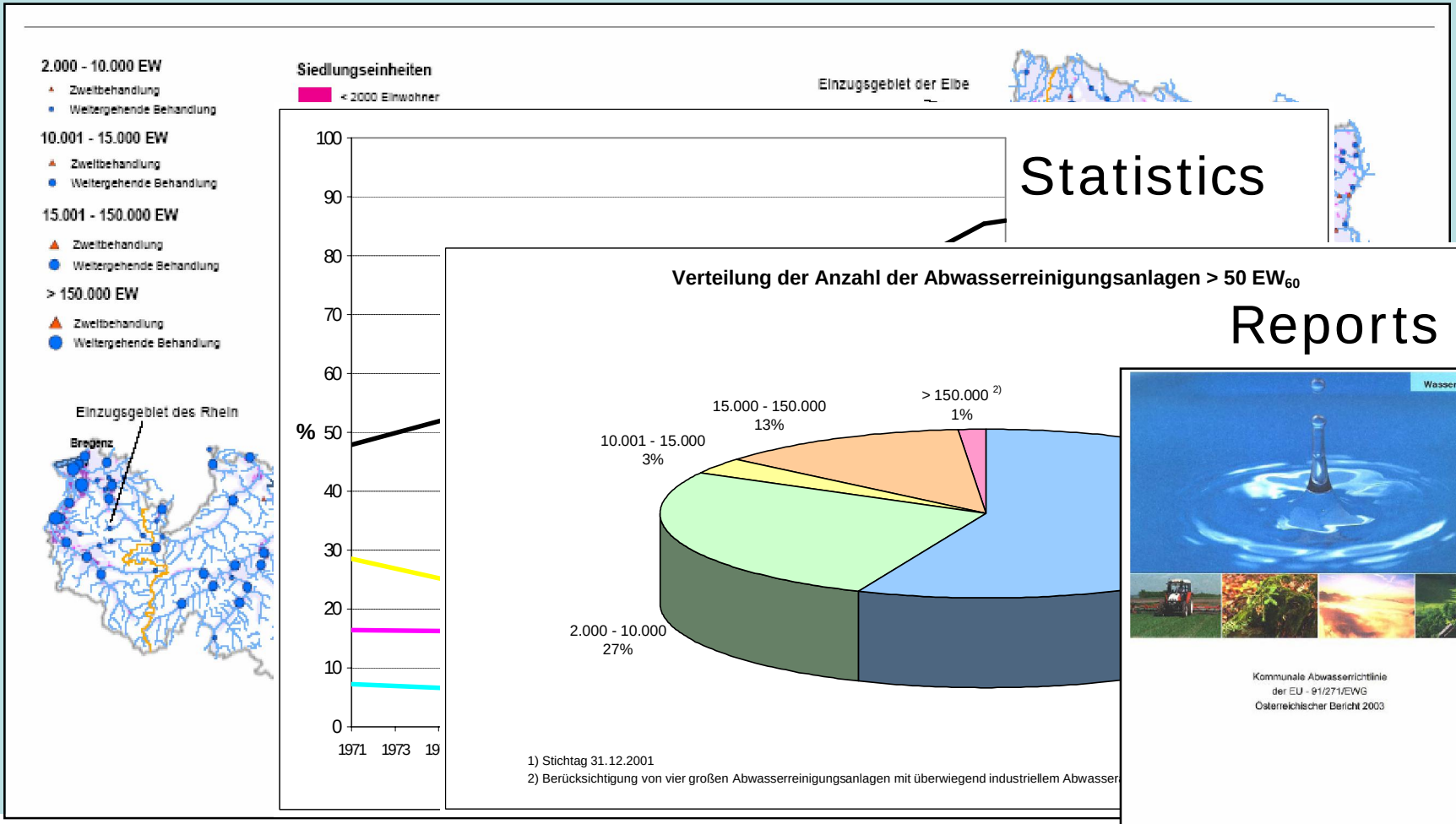
- Federal Environment Agency keeps „reporting data“
- Information about individual plants:
  - UWWTPs >= 2000 p.e. (later down to > 50 p.e.)
  - Spatial information (GIS)
  - Annual loads and volumes
- Annual data collection
- Core parameters: needed for national and international reporting

Austrian example - Conclusion

- „Official national data“ is kept at one single institution
- Agreements for data exchange exist with provincial authorities (law) and Statistik Austria (contract)
- Data is annual data – calculated or checked by provincial experts:
  - Measurements
  - „Plausible“ estimation (indicated in data)
- Information for each treatment plant is kept at national level:
  - Link to other national data (economic data, monitoring data etc.)
  - Different spatial aggregation levels (administrative, catchment areas)
- Missing information is calculated / estimated on national level
- Data is collected electronically
- Responsibility on data collection and validation is with provincial authorities

Austrian Example – Products of new improved data flow

Maps



Waste Water Data - General Conclusion and Recommendations

Waste water data is often a by-product

- Economic needs (e.g. accounting of treated waste water volumes or pollutants)
- Operation of treatment plants (measurements for finetuning of processes)
- Enforcement data:
  - Permitted water discharges
  - Surveillance monitoring (water inspectors, self-monitoring)

Waste Water Data - General Conclusion and Recommendations

Usually the following partners are involved

- Authorities
- National Statistical Institutes
- Operators and their associations
- Environment Agencies
- Universities or other basic research institutions

Waste Water Data - General Conclusion and Recommendations

Requirements for Consistency

- Agreed terminology (glossary, water flow scheme)
- Defined data flows
  - Legal basis (law, contract,...)
  - Defined responsibilities (data producer, data validation, data keeping, administration of parameters...)
  - Identification of information to be kept at national level
  - Defined data collection frequencies
  - Agreements on data exchange formats
- Duplicable calculation methodologies

UNSD Water Quality Tables

Table W6A: Water Quality of Selected Rivers

Name of River A: **Sampling frequency:** **Minimum:** /ye

Name of Measuring station: **Maximum:** /ye

Distan

Table W7A: Water Quality of Selected Lakes

Name of Lake A: **Sampling frequency:** **Minimum:**

Name of Measuring station: **Maximum:**

Prior

! **Surface a**

! **Mean dep**

! **Maximun**

Samplin

Priority

!

!

Table W8A: Water Quality of Selected Coastal Areas

Name of the estuary/coastal location: **Sampling frequency:** **Minimum:**

Name of Measuring station: **Maximum:**

Mean depth: m **Sampling depth:**

Maximum depth: m

Priority	Category	Unit	1990*	1995*	1996	1997	1998	1999	2000
!	Chlorophyll-a (Chl-a)	mg chl-a/l							
!	Biochemical oxygen demand (BOD5)	mg O_2/l							
	Chemical oxygen demand (COD)	mg O_2/l							
	Total phosphorus	mg P/l							
	Total nitrogen	mg N/l							
	Faecal coliform	MPN/100ml**							
	Other, specify ……	……..							

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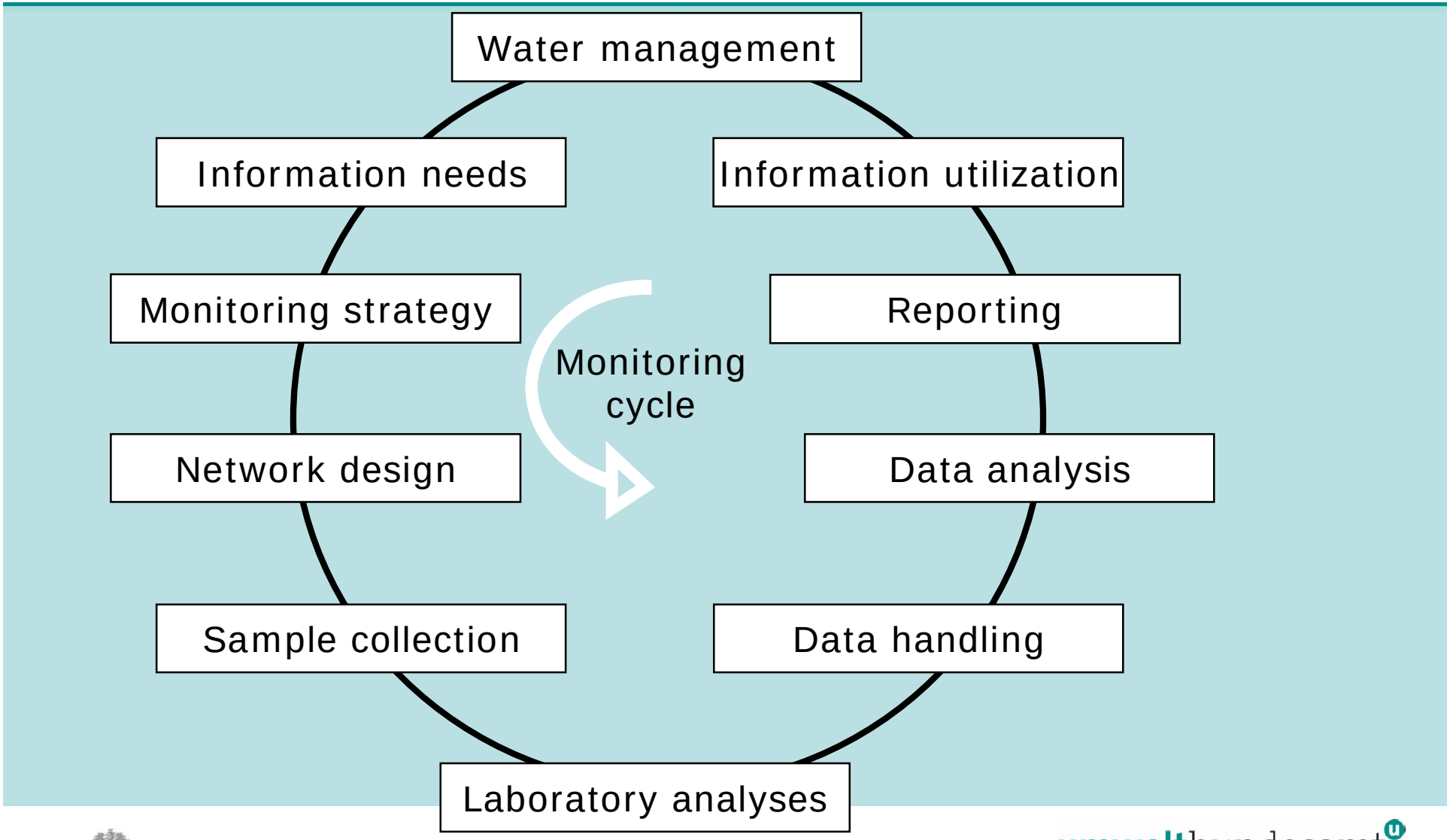
Monitoring of Water Quality

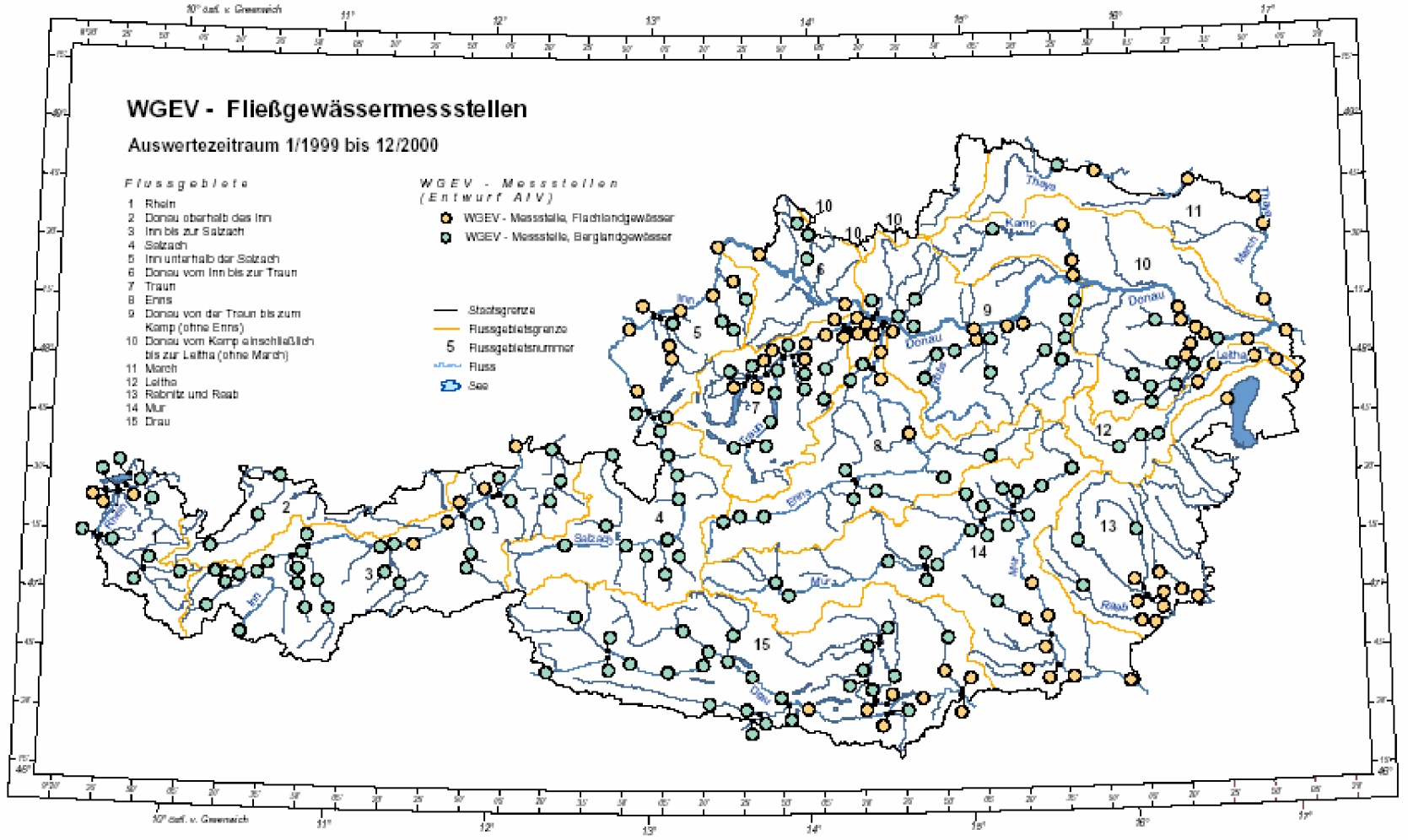


Monitoring of Water Quality

Types of monitoring:

- Strategic monitoring
  - status and trends
  - preliminary surveys
- Testing for compliance
  - water quality standards
  - discharge permits
- Operational monitoring
  - process control
  - early warning

Austrian Water Quality Monitoring System



Datenquelle: Wassergütererhebung in Österreich, Wasserwirtschaftskataster im Bundesministerium f. Land und Forstwirtschaft, Umwelt und Wasserwirtschaft, Ämter der Landesregierungen

Auswertung/Graphik: Umweltbundesamt GmbH, Oktober 2002

Austrian Water Quality Monitoring System

- started 1991
- main goals
  - Show the situation
  - Show trends
  - Show problems (in relation to use)
  - Show results of measures

Austrian Water Quality Monitoring System

Legal Background

- Water Act
- Hydrography Act
- Ordinance on Monitoring Water Quality
- Ordinance on Groundwater Threshold Values
- Ordinance on Water Quality Standards (in prep.)

Austrian Water Quality Monitoring System

Partnerns involved

- Federal authorities
- Provincial authorities
- Private sector

Austrian Water Quality Monitoring System

Publications

- Biannual reports
- State of the environment report
- Water Protection Report
- Internet http://www.umweltbundesamt.at:
  - full version of biannual report
  - on-line queries

Austrian Water Quality Monitoring System

Budget

- Analyses and data transfer
  - 2/3 federal authorities
  - 1/3 provincial authorities
- Selection and establishing sampling sites
  - 100% federal authorities
- Total costs from 1990 to 1999: 25 million Euro
- Costs per year: 2,2 to 2,9 Mio. Euro

Austrian Water Quality Monitoring System

- ~ 2000 Groundwater Monitoring Sites
  - captured springs and springs
  - investigation wells, private wells, industrial wells, water supply wells

  - 250 in karst and fractured groundwater
  - rest in groundwater in porous media

- monitored four times a year

Austrian Water Quality Monitoring System

- 242 Running Waters Sampling Sites
- sampling frequency
  - Ø water chemistry - monthly
  - Ø biological water quality - annually
  - Ø sediments - annually
  - Ø specific rivers - every two weeks
  - Ø special programs - monthly

Austrian Water Quality Monitoring System

About 100 different parameters are monitored

- Block 1: the most important inorganic parameters, e.g. nitrate, nitrite, ammonium, phosphate, boron, alkali metal and alkaline earth metal (e.g. potassium, calcium, magnesium)
- Block 2: heavy metal group (e.g. arsenic, mercury, cadmium) and lightly volatile halogenetic hydrocarbons (e.g. tetrachloroethylene)
- Block 3: pesticide substances (e.g. triazine, phenoxy alkane carbon acids), polycyclic aromatic hydrocarbons, etc.

Austrian Water Quality Monitoring System

Cyclic Procedure

- 6 years
- Groundwaters: 1 year initial monitoring (enlarged set of parameters) + 5 years ‚adapted' monitoring (Block 1 + relevant other parameters)
- Running waters: 2 years initial monitoring + 4 years ‚adapted' monitoring
- + special monitoring campaigns

Austrian Water Quality Monitoring System

Selection of monitoring points

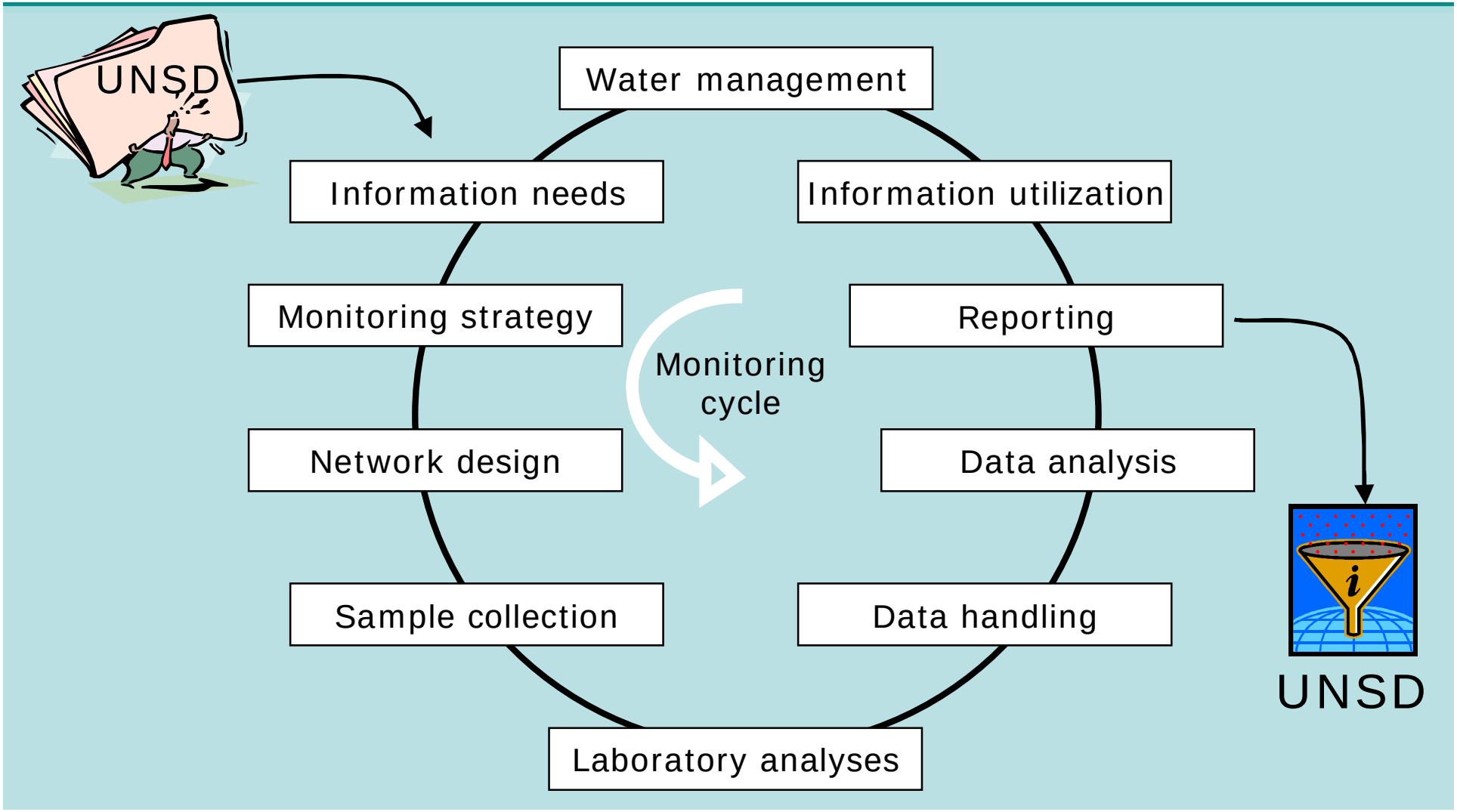
- Representative locations
- Internationally agreed locations (e.g. Danube convention)
- Locations in catchments / water bodies with high anthropogen pressures

Monitoring of Water Quality

Conclusion and recommendations for a taylor made and effective monitoring

- Development of national guidelines
- What do we want to know?
- Monitoring cycle
- Technical equipment: Don‘t go for the best possible if less is sufficient!
- Individual catchment areas aspects
- Transparency of work and access to data is important

Conclusion – Monitoring and UNSD Tables



Thank you very much for your attention!

Michael Nagy