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**THE REVISION OF THE JOINT QUESTIONNAIRE SECTION ON INLAND WATERS:
IMPROVING DATA COLLECTION ON WASTE WATER RELATED ISSUES**

Paper submitted by Statistics Netherlands¹

Summary

This is the second paper dealing with the revision of the Joint OECD/Eurostat Questionnaire, section Inland Waters. It gives an overview of the latest proposals for the revision of the tables on waste water discharges and waste water treatment.

Low response rates and problems with (international) comparability of data are the major problems identified. The resulting changes and modifications aim at a simplification of the requested data as well as a harmonisation with the concepts and definitions of the European Urban Waste Water Treatment Directive (UWWTD).

The use of new definitions and terminology on waste water, according to the UWWT Directive, is proposed. Also a new classification of waste water treatment plants, based on treatment efficiencies instead of technical criteria, is part of the revision of the tables. Furthermore, the data collection on the origin and destination of discharged pollution is restructured according to a new waste water loading scheme.

1. Introduction and backgrounds

The Joint OECD/Eurostat Questionnaire on the State of the Environment, Section Inland Waters is used since 1981 and aims at providing data on a number of important water indicators that describe the stress on water resources and the influence of human activities on fresh water quality. These indicators are used to evaluate the effects of water policy in the OECD region, in particular the EU region. The questionnaire is sent each two years to all Member States. The data collection focuses on the following items:

- water resources (table 1);
- water abstraction and consumption (table 2 and 3);
- collection, treatment and discharge of waste water (table 4,5 and 7);
- production and disposal of sewage sludge (table 6);
- water quality of selected rivers and lakes (table 8 and 9).

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In recent years, it was recognised that the questionnaire still suffered from poor response, while there was an increased need for data (for further backgrounds: see the other paper on the JQ revision by: M. Amand & R. Montgomery). One of the first steps to improve future response and quality of the data was a revision of the questionnaire.

This paper will focus in particular with the work done so far by the Task Force on Water Statistics on the revision of the JQ tables on waste water and water pollution (tables 4 to 7 of section Inland Waters). The initial proposals were commented by Member States in June 2000, after which draft tables for the JQ 2002 were put forward in May 2001. A final consultation of Member States was carried out via a web-discussion on internet. In August 2001, final draft tables will be submitted for approval in the meeting of Eurostat's Working Group Statistics on the Environment, in September 2001. After that a final approval must be given by the meeting of the OECD Working Group on the State of the Environment in October 2001.

In chapter 2 of this paper, a short description of the scope of the tables 4 to 7 is given. After that, the main problems of the collected data are listed in chapter 3. In chapter 4, the revision of the tables is presented, according to the latest proposals (situation August 2001).

The current JQ 2000 tables as well as the draft JQ2002 tables has been made available in two background documents.

2. Scope of the tables on waste water treatment and discharges

Making statistics on waste water discharges has always been more complicated than making statistics on, for instance, air emissions. There is usually a large difference between the gross emissions and the resulting load on the receiving waters. A part of the discharge is collected in sewer systems and is often treated in waste water treatment plants. This of course benefits the environment, but complicates the data collection. Inventories on waste water related issues require a special format in which the structure of the waste water system is reflected. The Joint Questionnaire section Inland Waters is aiming at collecting such data in its tables 4 to 7 (see Background Document on JQ 2000). In figure 1, a schematic outline of the scope of the currently used tables is given in relation to the structure of the waste water system. The purpose of figure 1 is only to give the major outlines.

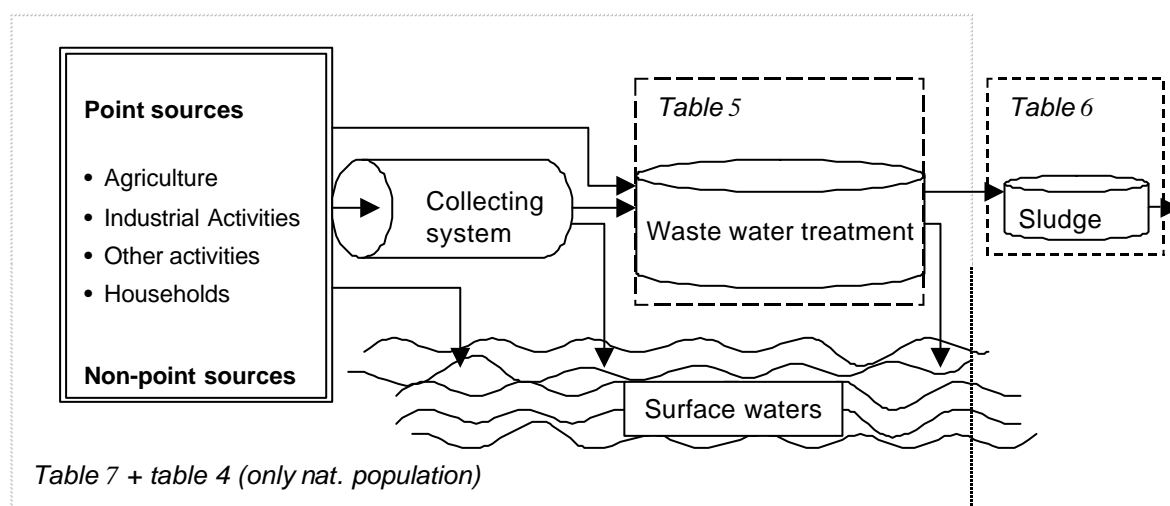


Figure 1. Scope of the JQ tables on waste water treatment and discharges .

Figure 1 shows that table 7 *Generation and discharge of waste water* has the widest scope. The table is divided into two sections. In the first section, titled *Discharges of waste water by source and by sector*, data on the origin of the (gross) yearly discharges are collected. It provides information per economic activity on the discharges of a number of substances/parameters: Volume, Suspended Solids, BOD, COD, Inhabitant Equivalents, total Phosphorus, total Nitrogen, heavy metals and Arsenic. The second section *Discharges by type of sewerage*, gives an overview of the various routes through which the discharges reach the receiving surface water: direct or via a collecting system and/or waste water treatment, resulting in final yearly loads on the surface water. It's important to notice that the scope of the tables is only on discharges to surface waters. Data on infiltration into the ground and loads on ground water must be excluded.

Table 4 *National population connected to waste water treatment plants*, aims at the collection of data on a major indicator: the % of national population that is served by a collecting or sewer system and/or waste water treatment. In order to gain information on the level of treatment, a breakdown into three main types of treatment is included in the format: mechanical, biological and advanced treatment. The table provides essential information on the status and development of a countries waste water system.

Specific information on waste water treatment plants is collected in table 5 *Treatment capacity of waste water treatment plants*. The overall purpose of the table is to give an overview of the installed "hardware", its input, and its output to the surface water. The table distinguishes between 'public sewage treatment', 'independent treatment' as well as 'other waste water treatment' (industrial waste water treatment). Data on the number and capacity of the plants, and annual influents and effluents are asked for. Capacity, influents and effluents must be provided on basis of volume, Inhabitant Equivalents and BOD. Again, a breakdown into mechanical, biological and advanced treatment is made. Moreover, separate data on plants with extra facilities for nutrient removal are collected.

In table 6 *Sewage sludge production and disposal*, data on the amounts of sewage sludge are collected. Sewage sludge is, besides the effluents, the other major output of waste water treatment. The amounts of sludge has to be provided for annual production and disposal, with a breakdown into disposal methods.

For the EU region the major legal backgrounds of tables 4 to 7, is to be found in several Directives. In table 1 the major EU Directives related to each table are listed (Pau-Vall, 1999).

Joint Questionnaire table	Related EU Directives
4. National population connected to waste water treatment plants	Directive 91/271/EC on Urban waste water treatment
5. Treatment capacity of waste water treatment plants	Directive 91/271/EC on Urban waste water treatment
6. Sewage sludge production and disposal	Directive 86/278/EC on the Protection of the environment, and in particular of the soil. Directive 91/271/EC on Urban waste water treatment
7. Generation and discharge of waste water	Directive 96/61/EC on Integrated Pollution Prevention and Control (IPPC) Directive 2000/60/EC Water Framework Directive

Table 1. EU Directives related to the JQ tables

3. Identification of problems with the collected data

3.1 Introduction

In the previous chapter, the general outlines of the tables 4 to 7 were given. The current format was agreed upon in the third revision of the JQ in 1990/1991. In the JQ 1996, a first electronic Excel version of the Inland Waters section was used to facilitate the data exchange and subsequent data processing. In this electronic version, data of previous years were pre-filled in order to reduce the response burden and facilitate the check and correction of time series. Further development resulted in the JQ2000 in a full electronic version, including explanatory notes, a list of definitions, footnotes and flow diagrams.

In 1999, the answers of EU Member States were evaluated by Eurostat. It was concluded that still severe problems were encountered with respect to the collected data. For many items, it was difficult to generate totals for the EU region. The main problems observed were the following (Pau-Vall, 1999):

- poor response on a number of items;
- comparability problems as a result of differences in definitions within the Member States;
- comparability problems with reporting activities under the EU Urban Waste Water Treatment Directive.

Subsequently, the Task Force on Water statistics was set up and started to work on a new revision. During the revision process, the Task Force received many comments and suggestions from Member States, from international experts and from EU DG Environment. The resulting list of major problems is given in the next three paragraphs. More background information can be found in the documents for the Task Force meetings (see references).

3.2 Poor response

Poor response was especially encountered in table 5 and table 7. Some general observations are listed below.

- In table 5, only the item 'Public sewage treatment' was filled in by most of the Member States. Response varied from 100% (number of plants) to 5% (Effluent, Inhabitant Equivalents).
- Data on the items 'Other waste water treatment' and 'Independent treatment' were very poor.
- In table 7, only BOD and Volume were reported frequently (up to 50% response). Data on Suspended Solids, Inhabitant Equivalents, total Phosphorus, total Nitrogen and heavy metals were provided by only a few countries.
- Reporting of emissions from non-point sources was very poor.
- In the second part of table 7, the response on a number of discharge routes was very low. Member States indicated that either these data were not easy accessible because of confidentiality (e.g. industrial waste water) or the data are not available because the discharges are of no or minor importance.

3.3. Definition problems:

- There is no harmonised definition of Inhabitant Equivalent. In most countries it is defined as equalling 60 g BOD per inhabitant per day, but in many cases also 54 g BOD is used or other definitions, based on COD, Nitrogen and/or Phosphorus.
- The classification of waste water treatment plants is interpreted in various ways by Member States. Some countries include the plants with extra facilities for nutrient removal under biological, others under advanced treatment.
- The definition of individual or independent treatment is not clear with respect to the type and size of the treatment.
- In table 7, there exists an inconsistency in definitions of the domestic sector and domestic waste water. It is not clear whether only the waste water from households has to be included or also the waste water from non-industrial activities like services and trade.

- Table 7 aims at collecting data on discharges to inland waters. For many countries it is not possible to provide this data separate from discharges into Marine Waters. They provide the total of discharges.

3.4 Comparability problems with the Urban Waste Water Treatment Directive

In the Urban Waste Water Treatment Directive (UWWTD) and its related reporting formats, a number of definitions on waste water- and waste water related issues, differ from definitions used in the JQ. Besides the disadvantage that MS have to report data in two different ways, it also complicates the comparison of data from the UWWTD reports with those derived from the JQ.

The following major differences were identified.

- Population Equivalent (UWWTD) versus Inhabitant Equivalent (JQ). The Population Equivalent is defined as 'the organic biodegradable load, having a five day biochemical oxygen demand (BOD5) of 60 g of oxygen per day' and includes eventual tourist population. The Inhabitant Equivalent has no strict definition and only considers the resident population.
- In the UWWTD, the different levels of urban waste water treatment are based on objectives (% elimination of pollution or limit values for effluent concentrations), while the classification used in the JQ is based on technical provisions.
- In the UWWTD terminology, the traditional principle that collection and treatment of waste water is a public or collective service, is abandoned. This leads to the use of more general wordings. Some examples of different wording:
 - 'Urban waste water' versus 'Public sewage'.
 - 'Collecting system' versus 'Public sewerage' or 'Public sewer system'.

4. Proposals for revision of the tables

4.1 Introduction

In this chapter, an overview of the revision of the tables 4 to 7 of the JQ 2002 is given, according to the latest proposals. An important condition is that the revised tables and definitions must be feasible not only for EU members, but for the whole OECD region. Moreover, the revised tables should be able to meet the current priority data needs of the OECD and Eurostat. During the revision process, these two conditions were taken into account as much as possible. However, the OECD Working Group on the State of the Environment still has to decide on the final proposals, in October 2001. It could be decided that several items will only be used for data collection in the EU region.

The revision of the tables has the following main objectives:

- Reduction of the response burden on countries by simplification of the requested data.
- Improvement of the consistency and international comparability of the data.

Considering the nature of the revisions, three basic concepts can be distinguished:

1. Adoption of general definitions of the Urban Waste Water Directive
2. Revision of the classification and definitions of waste water treatment plants
3. Restructuring of the waste water scheme, used in table 7

In the next three paragraphs the revision is explained in more detail according to this three basic concepts.

While reading these paragraphs, the Background documents containing the current JQ 2000 and the draft JQ2002 can be consulted.

4.2 Adoption of general definitions of the Urban Waste Water Directive.

Harmonisation of definitions can avoid future problems concerning the comparability of data. Therefore it was decided to adopt the definitions of the UWWT Directive. In table 2 the proposed changes are listed in the following format:

- Description of proposed amendment.
- Relevant definition(s).
- Implementation in JQ tables.

Proposed amendment	Relevant definitions	Implementation in JQ tables
The parameter 'Inhabitant Equivalent' is replaced by 'Population Equivalent'.	<i>Population Equivalent</i> : The organic biodegradable load, having a five day biochemical oxygen demand (BOD5) of 60 g of oxygen per day.	<ul style="list-style-type: none"> • Table 7: <i>Generation and discharge of waste water</i> is asked in terms of Population Equivalents. To facilitate that non-EU members can provide data according to other definitions, a footnote is added to Table 7: <i>For non-EU members: if another definition of Population Equivalent is used, please specify on which parameter and unit it is based. For example: PE(B54) for 54 g BOD/(inh*day) or PE(P2) for 2 g P/(inh*day) (Note: this definition is derived from the CEN-standard).</i> • Table 5: The items capacity, influent and effluent in terms of Inhabitant Equivalents and Volume are dropped from the table. Only BOD is kept. If necessary the P.E value can be calculated from the BOD values, using 60 g BOD/day. Total influent and effluent volumes can be derived from table 7.
For general understanding and explanation of the concepts of the UWWT Directive, a reference to the Directive's waste water definitions is made.	<p><i>Domestic waste water</i>: waste water from residential settlements and services which originates predominantly from the human metabolism and from household activities.</p> <p><i>Industrial waste water</i>: Any waste water which is discharged from premises used for carrying on any trade or industry, other than domestic waste water and run-off rain water. (Remark: the UWWTD definition refers to all activities generating not <i>domestic-like</i> waste water)</p> <p><i>Urban waste water</i>: Domestic waste water or the mixture of domestic waste water with industrial waste water and/or run-off rain water.</p>	<p>The three UWWTD definitions are added to the 'List of definitions'.</p> <p>In Table 7, second section <i>Discharge of waste water by type</i>, the following references are made:</p> <ul style="list-style-type: none"> • <i>WW_4: Total waste water generated by the domestic sector</i> = Domestic waste water • <i>WW_6: Industrial waste water generated</i> = Industrial waste water • <i>WW_7: Total waste water connected to public sewerage</i> = Urban waste water. <p>(for the WW-codes: please consult table 7 and the waste water loading scheme in the Background document JQ2002)</p>
Redefinition of the 'domestic sector'		In Table 7, first section <i>Discharges by sources and sectors</i> , the item 'Domestic sector' is broken down into two items: 'Other activities (Nace 50-93)' and 'Households'.
Harmonisation of wordings and terms on waste water, according to the UWWT Directive	<p><i>Urban waste water treatment</i>: All treatment of urban waste water in Urban waste water treatment plants (UWWTP). UWWTP's are operated by public authorities or private companies whose main activity is waste water treatment.</p> <p><i>Collecting system</i>: Means a systems of conduits which collects and conducts urban waste water. Collecting systems are often operated by public authorities or semi-public associations.</p>	<p>In all tables the current terms are replaced by the equivalent term as used in the Directive.</p> <ul style="list-style-type: none"> • 'Public sewage' is replaced by 'Urban waste • 'Public sewer system' is replaced by 'Collecting system' • 'Public sewage treatment' is replaced by 'Urban waste water treatment'

Table 2 Proposals for revision of tables following the adoption of general definitions used in the Urban Waste Water Treatment Directive

4.3 Revision of the classification and definitions of waste water treatment plants

4.3.1 Revision of the classification of waste water treatment plants

In order to deal with the current problems (see paragraph 3.3), the Task Force on Water Statistics worked out a proposal for a new classification. Given the fact that all Member States have implemented the requirements of the Urban Waste Water treatment Directive in National Legislation, it is not surprising that the new classification is mainly based on the definitions used in the UWWTD. The distinction between the types of treatment is based on the Directive's treatment efficiency requirements for Suspended Solids, BOD, COD, total-Phosphorus and total-Nitrogen. In table 3, the classification is given.

Category	Treatment efficiencies					Count Faecal Colifoms
	TSS	BOD	COD	N	P	
<i>Primary treatment</i>	>50%	>20%				
<i>Secondary treatment</i>		>70%	>75%			
<i>Tertiary treatment:</i>						
Of which for Organic Pollution		>95%	>85%			
Of which for Nitrogen				>70%		
Of which for Phosphorous					>80%	
Of which for Microbiological pollution						<1000 / 100 ml

Table 3 Revised classification of Waste Water Treatment Plants.

The treatment efficiencies refer to the annual mean under normal operating circumstances. Why are treatment efficiencies used as the major distinctive criteria? The fact is that the UWWTD requirements make it possible to choose between either limit values for effluent concentrations or minimal treatment efficiencies. However, the concentration limits are set for a number of capacity classes of treatment plants. Introducing this dimension would lead to a very extensive classification.

The definitions of the treatment types are the following.

- Primary treatment: Treatment of (urban) waste water by a physical and/or chemical process involving settlement of suspended solids, or other process in which the BOD₅ of the incoming waste water is reduced by at least 20% before discharge and the total suspended solids of the incoming waste water are reduced by at least 50%.
- Secondary treatment: Treatment of (urban) waste water by a process generally involving biological treatment with a secondary settlement or other process, resulting in a BOD removal of at least 70% and a COD removal of at least 75% .
- Tertiary treatment: Treatment (additional to secondary treatment) of nitrogen and/or phosphorous and/or any other pollutant affecting the quality or a specific use of water: microbiological pollution, colour etc . The different possible treatment efficiencies ('organic pollution removal' of at least 95% for BOD and at least 85% for COD, 'nitrogen removal' of at least 70%, 'phosphorus removal' of at least 80% and 'microbiological removal') cannot be added and are exclusive.

The definition of tertiary treatment goes beyond the requirements of the Directive, which only considers Phosphorus and Nitrogen removal. In addition, tertiary treatment levels for organic and microbiological pollution are defined. The latter one is determined by the total count of Faecal Coliforms in the effluent. The corresponding limit value of 1000/100 ml is derived from the EC Bathing waters Directive.

Note that an important property of tertiary treatment is already embedded in the definition: the four 'of waste water treatment plant already is counted as tertiary treatment when it only meets one of the four criteria.

The proposed classification is incorporated in the draft JQ 2002 tables 4 and 5. Considering tertiary treatment, in table 4 only 'Total tertiary treatment' is used while in table 5 for Urban waste water treatment only an additional specification of plants with Phosphorus and Nitrogen removal is asked for.

4.3.2 Revision of the definition of independent treatment

In table 4 and table 5, data on 'Independent treatment' are asked for. Independent treatment is currently defined as: *Individual private treatment facilities to treat domestic and other waste water in cases where a public sewerage network is not available or not justified either because it would produce no environmental benefit or it would involve excessive cost. Examples of such systems are septic tanks.*

As already mentioned in paragraph 3.3 there exist some problems with this definition with respect to the type and size of treatment. Further discussion resulted in a new definition in which all difficulties were taken into account:

Independent treatment: Systems of collection, preliminary treatment, treatment, infiltration or discharge of domestic waste water from dwellings generally between 1 and 50 population equivalents, not connected to a urban waste water system. Examples of such systems are...(list to be added). Excluded are systems with storage tanks from which the waste water is transported periodically by trucks to an urban waste water treatment plant. These systems are considered to be connected to the urban waste water system.

In order to obtain more information on the treatment level, a specification of Independent treatment 'of which at least secondary treatment' is added to the Questionnaire tables 4 and 5 . An example list of small treatment systems should make it more easy to provide this data. In the draft JQ2002 tables, this list is given in the footnotes below table 4 and 5. .

4.4 Restructuring of the waste water scheme, used in table 7

In table 7, a waste water scheme is used to illustrate the different waste water discharge routes. The current scheme is given in figure 2. In the scheme, as well as in the corresponding table, the two main sources 'Industry' and 'Domestic sector' are depicted. Via various routes the pollution is discharged.

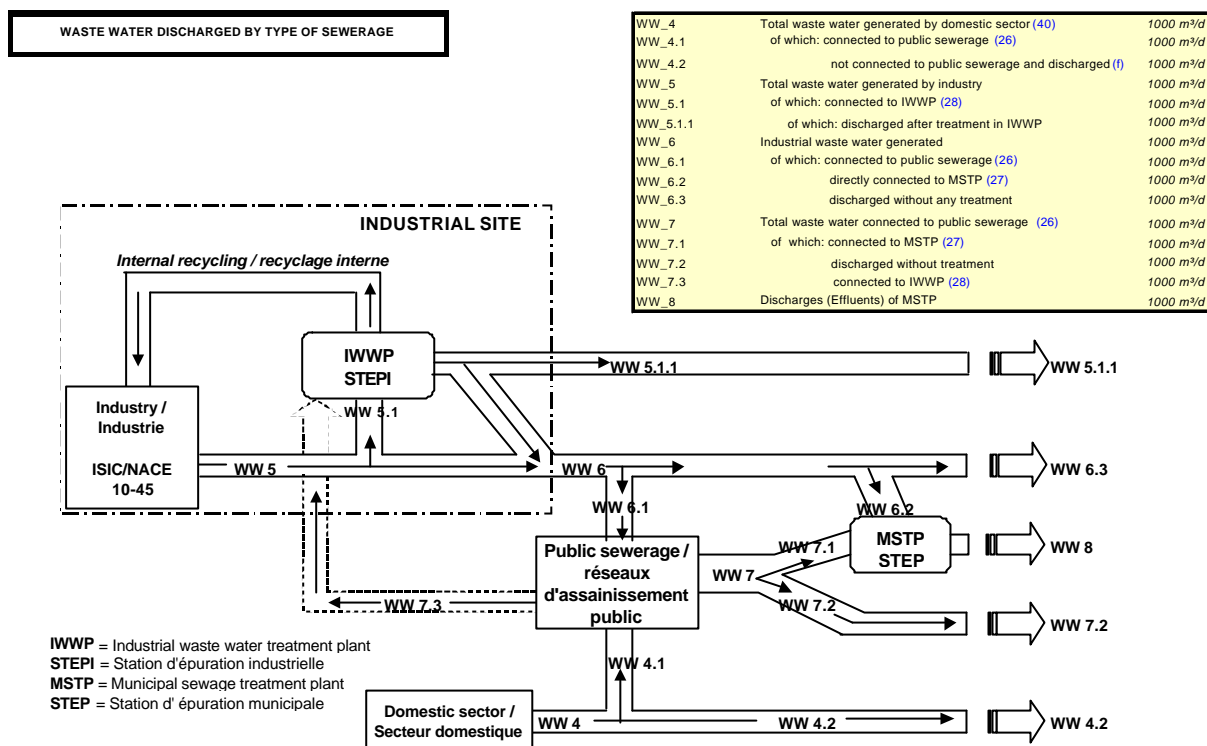


Figure 2. The current waste water loading scheme (JQ2000)

A number of problems were identified considering table 7 and the scheme (see chapter 3.3.). During the revision process also a few new items were proposed. The resulting changes and modifications are listed below.

- Rare discharge routes are removed and aggregated with others (example: Industrial waste water discharged directly on a UWWTP)
- Items with low response caused by confidentiality of data are removed (example: Influents of Industrial Waste Water treatment Plants (IWWP)).
- An item 'Re-use of effluents from urban waste water treatment plants' is added. Especially in the Mediterranean countries this is of growing importance.
- An item 'Direct discharges of domestic waste water after Independent treatment' is added. It is important to distinguish these if possible from the direct discharges of untreated domestic waste water.
- It is indicated in the scheme where eventual data on loads of pollution entering the collecting systems via run-off rainwater and drainage has to be included (figure 3, item WW_6).
- It is indicated that data on discharges from Combined Sewer Overflows and Storm water Overflows can be included under the untreated discharges from the collecting system (figure 3, item WW_6.2).
- The sources and sectors were visualised more clearly in the scheme.
- Direct loads of pollution entering the surface waters via drainage, run-off from soils and direct atmospheric deposition are also visualised in the scheme. However, they are not part of the data collected in table 7.

The revised scheme is given in figure 3. The format of Table 7 was changed accordingly (see Background document on draft JQ2002).

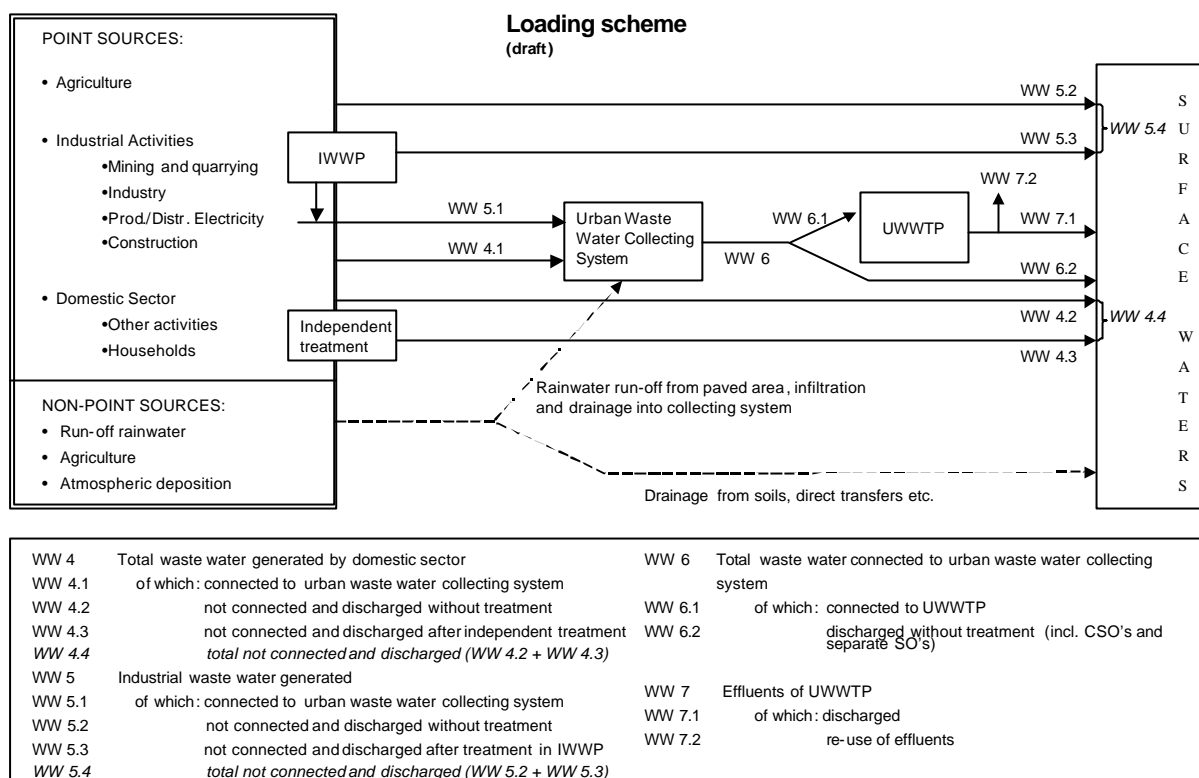


Figure 3. Draft waste water loading scheme (JQ2002)

References:

Amand, M & R. Montgomery (2001): Water indicators and data needs: Revision of the Joint OECD/Eurostat Questionnaire on water resources, abstraction and use. Paper for Joint ECE/Eurostat Work Session (Ottawa, Canada) October 2001.

Pau-Vall, M. (1999): JQ on inland waters: main problems arising from data collection. Eurostat document WATER/99/2. Luxemburg 1999.

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