Accessibility and data quality issues for selected indicators

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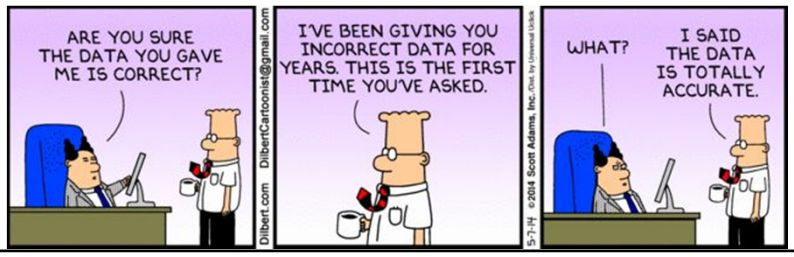
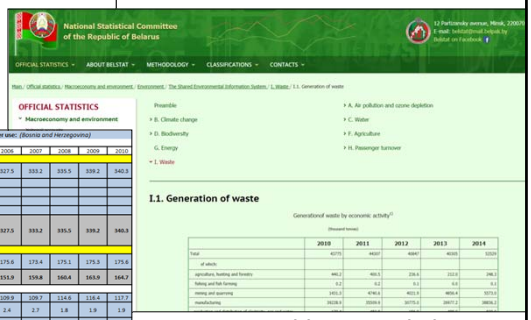


Content of the presentation

1. Accessibility of the national data
2. Why data quality and metadata matter?
3. Quality assurance in environment statistics
4. Conclusions and points for discussion

Access to data in different ways

Interactive forms



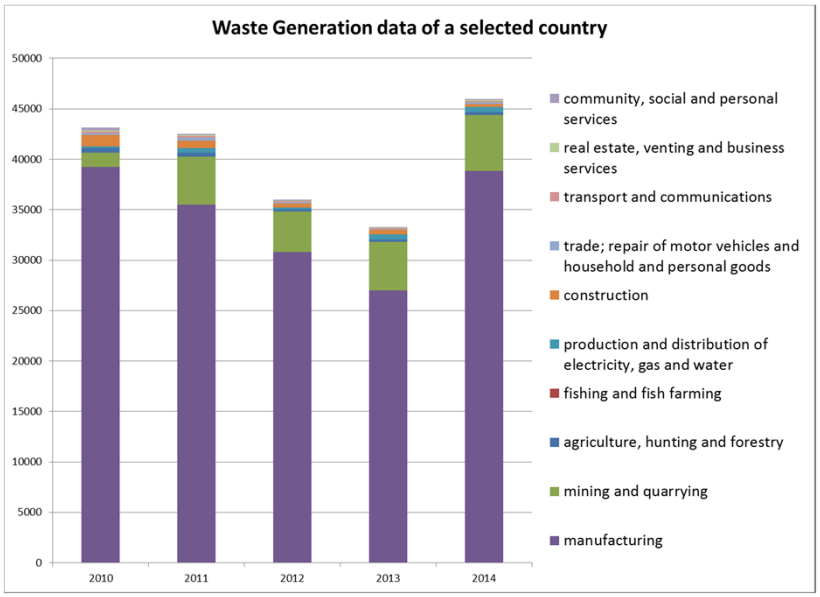
Tables on websites

Downloadable xls-sheets

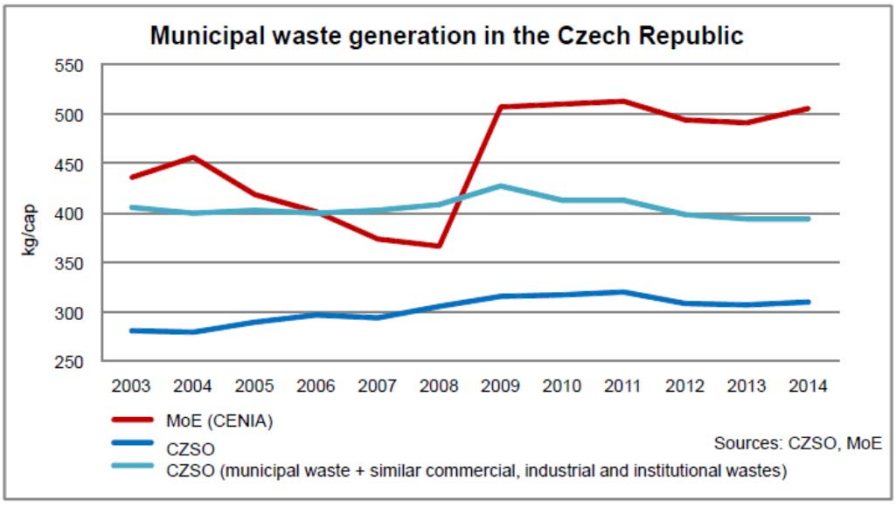
Cross-country comparison still difficult

- No central portal to access data for the same theme from different countries
- Language constraints
- We noticed that some weblinks have changed over time
- Data quality and data coverage is often unclear
- Often metadata is not available

Examples, why data quality and metadata matter – Example 1



Examples, why data quality and metadata matter – Example 2



Examples, why data quality and metadata matter – Example 3

Time series data on the indicators for 1990-2013, Table C-1: Renewable freshwater resources:

		Unit	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008
1	Precipitation	million m^3	72584	58648	65811	67660	89588	83605	85085	87279	72402	53441	72602
2	Actual evapotranspiration	million m^3	25209	23984	27099	27550	37138	37635	37816	38087	29609	21855	29690
3	Internal flow (Row 1 - row 2)	million m^3	47375	34664	38712	40110	52450	45970	47269	49192	42793	31586	42912
4	Inflow of surface and groundwaters from neighbouring countries	million m^3											
5	**Renewable freshwater resources** (Row 3 + Row 4)	million m^3	**47375**	**34664**	**38712**	**40110**	**52450**	**45970**	**47269**	**49192**	**42793**	**31586**	**42912**
6	Outflow of surface and groundwaters to neighbouring countries	million m^3											
7	Outflow of surface and groundwaters to the sea	million m^3											

Open questions:

a) What do empty cells mean? Zero or not applicable or no information available?
b) The renewable freshwater resources are equal to the internal flow. This can only be the case when the inflow equals zero.

Quality assurance in environment statistics

- Data have to be fit for purpose
- Environment Statistics uses a range of data sources, collected for various reasons, not always to official statistics standards
- Quality judgements are a result of holistic decisions based on
  - Uses
  - Costs
  - Conditions and circumstances affecting quality
  - User expectations
- Trade offs between accuracy and relevance

(Based on a presentation done by Adam Tipper, Statistics New Zealand)

The QA process in environment statistics follows usually 2 stages

1. Conceptually-focused quality assessment prior to data collection

2. Data checking: Ensuring that the actual data was compiled and prepared to the standard expected, and checking for missing values, outliers, unusual movements or levels completed once data has been received.

Data quality framework for environment statistics of Statistics New Zealand

Conceptual fit checks

Quality assurance of data

Need	Design	Build	Collect	Process	Analyse	Disseminate
• Identified measure may be under-developed	• Measures template prepared – may be incomplete • Lack of internationally standard methodologies can affect statistical design • Procurement written with 'incomplete information'	• Collections are undertaken by a variety of agencies, supplied in various forms – unclear what we are expecting to receive • Multiple versions may be supplied	• Vast majority of data are collected from external (official and non-official) agencies • Need to check procured reports and data, and see what metadata gaps remain.	• Large number of input datasets means a range of data quality checks and techniques need to be applied, but done so to a consistent standard • Need to ensure data received matches expectations.	• Generating aggregating outputs from non-random sampled data is not possible – need to understand the data before analysis. • Lack of coherent analysis tools can impact on validating data quality • Lack of access to unit record data affects QA and analysis	• Conveying data quality and limitations appropriately; expressing non-representative data in a national context

Data quality criteria and their applicability to environment statistics (Statistics NZ)

Criteria	Standard descriptor	Applicability to environment
Relevance	The degree to which the statistical product meets user needs in coverage, content and detail.	-Geographic coverage -Fit to topic -Collection: How long, where from, by who and what for
Accuracy	The degree to which the information correctly describes the phenomena it was designed to measure.	-Accuracy in relation to topic -Methods and limitations -Available metadata
Timeliness	The degree to which data produced are up-to-date, published frequently and delivered to schedule.	Five years or less for key statistics
Accessibility	The ease with which users are able to **access** and understand the statistical data and its supporting information.	Extensive use of modelling -Transparency -Underlying data -Peer review
Coherence /consistency	The degree to which statistical information can be successfully brought together with other statistical information within a broad analytical framework and over time.	-Comparability with similar international indicators -Coherency across measures -Time-series consistency
Interpretability	The availability of supplementary information and metadata necessary to interpret and **use** the statistics effectively.	Ease by which a user can understand/track how the raw data feeds into the indicator.

Typical data quality problems with environmental data and statistics

- Not full coverage (e.g. only city data provided, but national data needed)
- Wrong unit of measurement (e.g. volume instead of mass)
- Decimal errors
- Samples are not representative (e.g. water emissions only measured when exceedance of a threshold value is most likely)
- Empty cells in a table. What does that mean (zero, not available or not applicable?)
- Outliers (measurement failure or not?)
- Use of different classifications (e.g. type of pollution classification for industries instead of ISIC)
- Same terms can have a different meaning by different expert communities (e.g. term “water use”)
- Not enough metadata available to assess the quality of data received from another source (e.g. administrative data)

What can NSOs do to improve data quality?

Before data collection (conceptual fit checks) clarify:

- Are the chosen data sources the right ones in terms of data quality, coverage, representativeness etc.?
- Can terms, definitions and classifications be matched with statistical standards?
- Which measurement units should be used?
- Is there a data quality assurance in place at the data source (e.g. for administrative data)?
- Which terminology needs to be used in questionnaires to avoid misunderstandings (example: the statistical term “water use” means something different for the water supply industry)
- Which is the right format for data exchange?
- Which metadata are needed?
- etc.

What can NSOs do to improve data quality?

After data collection carry out a data validation of the data:

- Coverage of data
- Correct use of measurement units
- Coherence of data with other sources
- Consistency of time series and outliers
- Balancing data items and sum of disaggregated data
- Correct use of classifications
- Metadata
- Etc.

- In case of data quality problems contact the original source of the data
- Some countries have thematic Intergovernmental Committees, which develop and quality assess jointly important national data sets (e.g. water, land use, air emissions etc.)

Conclusions

- Quality of environment statistics can be improved by measures at NSOs:
  - Before data collection
  - After data collection
- Staff involved needs a basic understanding of environment statistics concepts AND the frameworks that are used by the data sources (e.g. administrative data sources) to “translate” correctly
- Metadata is important on all levels of the reporting chain
- A close involvement of data providers and/or feedback loops are recommended

Questions for the discussion

a) How should we address data quality issues in future meetings of the JTF?

b) What can be done to make country data sets easier accessible from outside the country and to directly compare data from different countries?

c) To which extent are metadata needed for the UNECE core indicators?

d) Do we need guidance on how to deal with “empty cells” (zero versus not applicable versus not available) for the UNECE indicators?