Crowdsourcing Global Wastewater Data

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CROWDSOURCING A GLOBAL WASTEWATER INDICATOR

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About Us

Environmental indicators and performance indices like the Yale Environmental Performance Index (EPI) have emerged as powerful tools for decision-makers to navigate an uncertain information landscape. In fact, there have been dramatic increases in the development and use of indicators in general over the past two decades, because they (a) distill complex information, (b) allow decision-makers and key audiences to efficiently spot critical areas of concern, (c) support policy development and target setting, and (d) measure impacts of policy responses. For the past 15 years, the EPI has ranked how well countries perform on high-priority environmental issues once every two years in two broad policy areas: protection of human health from environmental harm and protection of ecosystems.

Environmental Performance Index

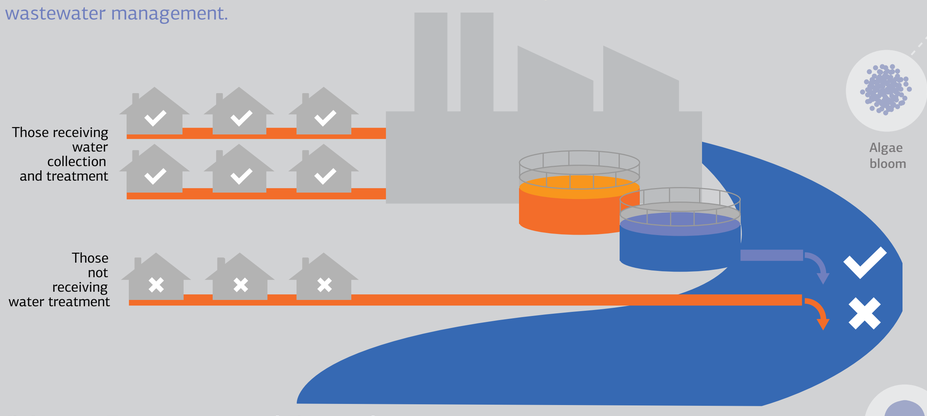
Data and statistics that inform these indicators are now more accessible than ever due to technological advances, but we still suffer from knowledge gaps and information asymmetries. The challenge lies in bridging scientific understanding with needed data collection to effectively manage an issue at multiple scales – locally, regionally, and globally. The EPI ranks countries according to their overall performance on twenty indicators in two policy categories: environmental health and ecosystem vitality. These indicators, like the new wastewater treatment indicator described here, are aimed at the national government scale, but its flexible framework and methodology can also be adapted to a variety of purposes at different scales.

Out Wastewater Indicator & SDGs

EPI's wastewater indicator was developed to evaluate the global availability of national statistics on wastewater treatment to inform the Sustainable Development Goals (SDGs), specifically SDG 6, Target 3, which calls for improving water quality through wastewater management by halving the proportion of untreated wastewater worldwide by 2030. Given the significant data gaps and definitional inconsistencies worldwide, we developed an idealized measure of wastewater treatment performance defined as "the weighted average of volumes of wastewater treated at all utilities in a country, normalized by the population served by a given utility." This methodology is described below, along with an examination of what wastewater treatment data is available, how the EPI is collecting more of it, and what lessons can be drawn from this research to enhance the chances of successfully implementing the Sustainable Development Goals.

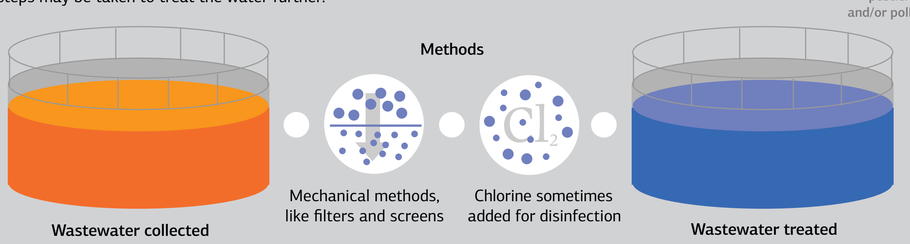
What is Wastewater Treatment?

This indicator tracks how well countries treat wastewater from households and industrial sources before it is dumped into the environment. It tracks the performance of basic wastewater management.



Primary Treatment and Beyond

There are different levels of wastewater treatment. We consider the definition "at least primary treatment," which removes a lot of suspended solids and reduces biochemical oxygen demand. Extra steps may be taken to treat the water further.



How do we know?

The Percentage of Wastewater Treated in the Sewerage System × The Percentage of Population Connected to the Sewerage Network = The Index Score for Wastewater Treatment

90%
Up to 90% of wastewater is developing countries is sent into rivers and open water bodies.

80%
80% of the world's marine pollution comes from sources onland, and wastewater contributes to much of it.

Crowdsourcing New Data

Responding to the SDG framework, the Yale EPI is looking to refine and improve its database through a first-of-its-kind innovative effort to crowdsource updates and feedback using an interactive map of wastewater treatment performance (www.epi.yale.edu/waste_map). It is targeted at water experts and decision-makers around the world and aims to:

1. Validate existing data by working with local experts on the ground
2. Improve spatial and temporal data coverage
3. Build a wider community of users around wastewater data

Crowdsourcing efforts can help complement and ground-truth official data sources to improve environmental and development outcomes. Hopefully this crowdsourcing effort can innovate wastewater data collection and improve capacities to monitor, verify, and report on the SDGs.

Why do we want your feedback?

Our first-of-its-kind wastewater treatment indicator has its limitations, including its spatial and temporal coverage, inconsistent terminology, and methods among various data sources. That's why we're turning to you.

What are we looking for exactly?

Help us by checking out your country — or any country you may be familiar with. Is the data consistent with your experiences or knowledge? Is it incomplete? Is the data source valid or problematic?

What to do?

1 Click a country

Examine the corresponding graphic and data layer, which includes our most recent data, the year it represents, and its source.

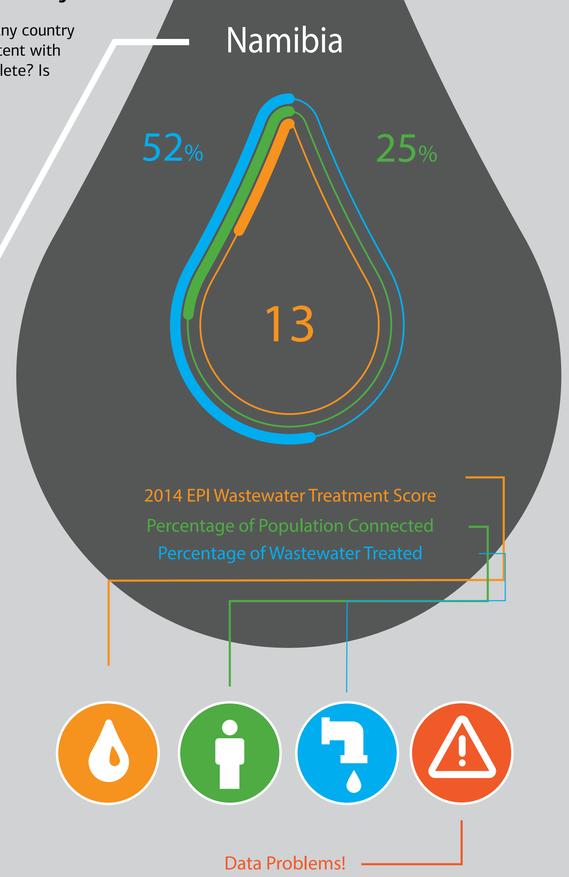
2 Vote

Give the data a thumbs up or a thumbs down.

Agree Disagree

3 Comment

Leave more detailed comments. You'll have to log on to Facebook, just so we can verify your expertise or background. We promise not to share it or use it for anything else.



Where are the Data Gaps

We compiled the first global dataset of wastewater treatment data from the Pinsent Masons Water Yearbook (2013), the United Nations Statistics Division (2011), the Organisation for Economic Cooperation and Development (OECD) (2013), the Food and Agriculture Organization of the United Nations (FAO) (2013), and our own literature review of statistical reports for major cities, utility-reported data, peer-reviewed research, and direct contact with experts and government officials. Despite the EPI's nearly exhaustive search (the results of which can be found in the Supplementary Material) the following data issues persisted

1. **Wastewater Data Coverage is Sparse.** The majority of data was reported at the city or municipal level, largely because data for urban, centralized collection systems were far more available than data from rural, decentralized systems. This was problematic for countries like the United States where 97% of its households lie outside of urban areas, with 20% of them using septic systems that are not resolved by the wastewater treatment indicator. This might explain why North America performed worse on connection rates than the Middle East, North Africa, and Eastern Europe.

2. **Rural Wastewater Treatment is Severely Lacking.** This limited the EPI's study to predominantly urban areas. For example, data for Namibia (which ranked 79th out of 183 countries on the index's wastewater treatment score) was only available for its capital, Windhoek. In most cases, the only city-level data available online were from a country's capital city or major cities.

3. **Multi-year Data Rarely Exists.** This prevented the EPI from developing a time series of wastewater treatment performance on a national level. Single-year averages were calculated from whatever data was available. For 96 countries, the only available data were ten or more years old.

4. **Types of Available Data Follow Regional Patterns.** Many Latin American and Caribbean countries had data, but it was more than a decade old. 82.2% of these countries fell into this category. Most sub-Saharan countries lacked data altogether, such as Botswana, Comoros, Djibouti, Equatorial Guinea, Guinea-Bissau, Mauritania, Tanzania, Gambia, Somalia, and Zambia. In Asia, data for Sri Lanka, Nepal, and Afghanistan, were just as elusive.

5. **More Granular and Disaggregated Data Is Needed.** Primary, secondary, and tertiary treatment stages were rarely specified, as were the sources of that wastewater, i.e. industrial, municipal, domestic, commercial, stormwater runoff (both urban and rural). However, several European countries like Sweden, which ranked 12th on wastewater treatment, reported different values for each stage.

1. **How should wastewater data be streamlined and standardized?** Definitions of wastewater treatment vary widely across the globe, yielding disparate, incomplete, and incomparable datasets. These conditions limit our capacity to establish baselines, set goals, develop targeted policies, and monitor progress

- **A Centralized, Global Data Custodian, like the partnership between the World Health Organization and UNICEF's Joint Monitoring Programme, is needed to;**
  - Clearly specify definitions, protocols, and reporting mechanisms. It must harmonize terms like "wastewater generated" and "wastewater collected".
  - Collect data that disaggregates wastewater sources and treatment stages so that policymakers can articulate separate baselines and targets for each.
  - Collect data for wastewater reuse and recycling as water becomes a scarcer resource globally. The Sustainable Development Solutions Network provides an example metric in Goal 6.6 : monitor the "proportion of the flows of municipal wastewater that are directly and safely reused."

2. **Data collection efforts can be cumbersome, especially for places with limited resources.** How can wastewater treatment data be acquired in places that need it most?

- **Embrace the Data Revolution!** This data custodian will need a scientific method for incorporating innovative data sources like satellites, crowdsourcing, and mobile technologies into the SDB monitoring and evaluation process. These sources are promising ways to reduce the bias toward collecting data almost exclusively from centralized wastewater treatment systems at the expense of more decentralized and often rural systems.

Environmental Performance Index

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