

# Roundtable on Financing Water

## **OECD-WWC-Netherlands Roundtable on Financing Water**

Second meeting 13 September 2017, Tel Aviv

### **Background paper**

#### **Mapping financing flows: An inventory of data sources**

## **1. Data Sources for Water Financing**

1. Data on financing water security is often incomplete, disparate, or not even recorded. What data sources do exist have specific attributes that make them suitable for some uses, but not others. This note describes a number of data sources and how they might be exploited for future analytical work. The sources of data described here do not represent an exhaustive list and it is envisaged that this list will be expanded over time, collating in one place all major, relevant sources of data.

2. The two main types of data collectors/providers are official bodies (for instance, national statistical offices, the OECD, the World Bank, and other development finance institutions, etc.) and commercial/industry body data providers. Data can be further categorised according to the level of aggregation, namely whether data relate to projects/transactions, firms, cities, countries, or some other grouping. Table 1.1 lists a number of databases made available by official bodies, while Table 1.2 outlines major commercial databases, and Table 1.3 lists non-financing flow databases that might be usefully combined with others. Descriptive information about each database is provided from Table 1.4 through to Table 1.18.

**Table 1.1. Official Data Sources**

Source	Level of Aggregation/Type of Information
World Bank Private Participation in Infrastructure Database	Project/Transaction
National Statistical Offices	Project/Transaction/Aggregate
OECD Creditor Reporting System	Project/Transaction/Aggregate

**Table 1.2. Commercial and Industry Body Data Sources**

Source	Level of Aggregation/Type of Information
IJGlobal Project and Infrastructure Financing Database	Project/Transaction
Global Infrastructure Hub Project Pipeline	Project/Transaction
Thomson Reuters (ONE)	Project/Transaction
Dealogic	Project/Transaction
Bloomberg New Energy Finance	Project/Transaction
FACTIVA	Project/Transaction
Global Water Intelligence	Project/Transaction
Bluefield Research	Sector/Transaction/Firm
Firms in the Industry (e.g. Suez, Veolia)	Firm
Orbis	Firm
Osiris	Firm
Standard & Poor's (SNL/Capital IQ)	Firm
International Water Association Water Statistics	Aggregate/City

**Table 1.3. Potentially Useful Non-Financing Flow Data Sources**

OECD Policy Instruments for the Environment Database	Policy
OECD Innovation in Environment-related Technologies Database	Patented Technology

## 1.1. Official Data Sources

### *1.1.1. Private Participation in Infrastructure Database*

3. The World Bank's Private Participation in Infrastructure (PPI) database contains information about global infrastructure projects with a mix of public and private funding in low and middle income countries. For the water and sewerage sector, the database contains information about approximately 1 000 active, closed, or cancelled projects across 63 countries since 1993. The database relies on publicly available information and some projects (such as those involving local and small scale operators) tend to be omitted, as they are typically not reported in the major sources of information on which the dataset relies. Data include important project dates, project type (brownfield, greenfield, divestiture, et cetera), contract type (for example, lease, build-operate-transfer, or build-own-operate), contract length, nature of government support (guarantees, credits, direct financial support, and so forth), private sector investors and quantum, sources of revenue, information about the bidding process, and support from multi- or bi-lateral agencies. The PPI database is updated with last year's data six months after year-end.

**Table 1.4. Private Participation in Infrastructure Database**

Attribute	Description
Coverage	139 Low and Middle Countries
Time Period	1990-present
Access	Open
Type	Official World Bank Data
Level	Project/Transaction
Description	Project-level data on 6 400 infrastructure projects (country, IDA status, financial closure date, investment year, type of PPI, % private, total investment, capacity, multi-lateral support, bilateral support, etc.)
Link/Source:	<a href="https://ppi.worldbank.org/">https://ppi.worldbank.org/</a>

### *1.1.2. National Statistical Offices*

4. National Statistical Offices produce data on spending on local and central government functions according to the Classification of the Functions of Government (COFOG) system, including water supply (code 6.3) and wastewater management (5.2). There is an additional class covering pollution abatement (5.3), which includes groundwater protection,<sup>1</sup> and a class for environmental protection not elsewhere classified (5.6), which can include some aspects of water administration and management. These data provide standardised, aggregate-level information in accordance with the UN System of National Accounts (SNA), as further detailed in the System of Environmental-Economic Accounting for Water (SEEA-Water). SEEA-Water provides a framework for reporting water-specific national financial accounts alongside hydrological information.

5. The Classification of Environmental Protection Activities (CEPA), another international standard for measuring government spending, also provides a number of categories relating to water. Classes of note are wastewater management (code CEPA 2) and protection and remediation of soil, groundwater, and surface water (CEPA 4). An additional class that may be applicable in some cases is protection of biodiversity and landscapes (CEPA 6).

6. The availability of data following the CEPA classification varies by country and fiscal year, generally forming part of reporting on environmental protection expenditure accounts (EPEA). EPEA have been developed to align with the SNA and are required to be reported by Eurostat in accordance with EU regulations.

7. The Classification of Resource Management Activities (CReMA) is closely linked to CEPA, focusing on expenditures and transactions whose primary purpose is resource management, as opposed to environmental protection. CReMA comprises a number of classes, including management of waters (CReMA 10), which relates to: reductions in water use through process modifications; reductions in losses, leaks, and reuse; replenishment of water stocks; measurements and laboratories pertaining to water resources; and regulation, administration, and information activities relating to water.

8. CReMA excludes expenditure already covered in CEPA, notably preservation and/or restoration of water quality. Given the practical difficulties of separating water management expenses by intended purpose per the definitions of the various classes, especially when water agencies are tasked with multiple remits, Eurostat considers this CReMA class a “low priority domain” (Eurostat, 2014<sub>[1]</sub>).

9. Some countries provide separate reporting on specific sectors or projects, often where dedicated government agencies are responsible for aspects of water

<sup>1</sup> As well as abatement of air, noise, radiation, and other pollution.

management, for instance, national infrastructure, development finance, or environmental bodies.

10. The above classifications refer to government services provided collectively. Private provision of water-related services are classified in national accounts according to the International Standard Industrial Classification of All Economic Activities (ISIC), notably ISIC 36 and 37 for water collection, treatment, and supply, and sewerage, respectively.

**Table 1.5. National Statistical Offices**

Attribute	Description
Coverage	Global; some countries may provide information beyond basic UN system of national accounts (SNA) categories
Time Period	Depends on country and fiscal year, but generally long time series <sup>2</sup>
Access	Open
Type	Official national or UN data
Level	Aggregate, with detailed project or sectoral information available depending on country and fiscal year
Description	Varies by country, but aggregate data plus public spending on infrastructure, PPPs, wastewater spending typically available
Link/Source:	National Statistical Offices; UN

### ***1.1.3. OECD Creditor Reporting System***

11. The OECD records statistics on official development assistance (ODA) flows targeting global environmental objectives from members of its Development Assistance Committee (DAC) and multilateral development banks to low- and middle-income recipient countries. These data can be disaggregated according to the sector being targeted, including for water supply and sanitation (WSS). The database also includes a number of other subsectors that are water-related, for instance, hydroelectric power, aquaculture, and flood control and prevention projects.

12. Other projects that do not fall into clearly water-related sectors or subsectors may nonetheless relate to water, for example, some health interventions such as malaria eradication or other public health projects that target water-borne diseases. Many such projects could be identified manually by searching for indications of ties to water.

13. The database contains detailed information on development aid flows since 1995 from around 100 donor countries and organisations to around 200 recipients, for around 260 sectors or subsectors. Additional information about specific projects is available, allowing analysis of the underlying nature of projects themselves (size, number of donors, channel of donation, and so on).

<sup>2</sup> The UN provides a data availability table, outlining information availability for countries by fiscal year and category (<https://unstats.un.org/unsd/nationalaccount/madt.asp>).

**Table 1.6. OECD Creditor Reporting System**

Attribute	Description
Coverage	Global coverage of flows from OECD Development Co-operation Directorate member countries and Multilateral Development Banks to developing countries
Time Period	1995-present
Access	Open
Type	Official OECD data
Level	Donor-recipient flows by project, sector, type of assistance
Description	Bilateral and multilateral development finance flows. Includes data for water supply and sanitation (can be broken down by sub-sectors) and a number of other water-related categories.
Link/Source	<a href="https://stats.oecd.org/Index.aspx?DataSetCode=CRS1#">https://stats.oecd.org/Index.aspx?DataSetCode=CRS1#</a>

## 1.2. Commercial and Industry Data Sources<sup>3</sup>

### 1.2.1. IJ Global

14. The Project Finance and Infrastructure Journal's (IJGlobal) database contains information relating to over 12 000 infrastructure transactions and 10 000 projects. The database aims to cover transactions with private sector participation from around the world in many sectors, including water (with desalination, distribution, and treatment as subsectors). The data are collated at a project level, with information relating to the type of project/transaction, its contractual structure, value, debt-equity ratio, sponsors, debt providers, important dates, among other information.

15. Of the more than 10 000 projects, about 500 are in the water sector. The relatively low number reflects the fact that much water infrastructure globally is entirely publically funded. The average value of a project across the 55 countries in the data set is USD 414 million.

**Table 1.7. IJ Global**

Attribute	Description
Coverage	Global
Time Period	2000-present
Access	Subscription
Type	Commercial
Level	Project/Transaction
Description	Project-level data on 10 000 infrastructure projects, including data on finance (type, amount) and financiers. Asset data includes water as a primary sector.
Link/Source	<a href="https://ijglobal.com/data">https://ijglobal.com/data</a>

### 1.2.2. Global Infrastructure Hub Project Pipeline

16. The Global Infrastructure Hub (GI Hub) was founded by the G20 in 2014 to increase support for, and data about, infrastructure projects around the world. This followed from recognition of a scarcity of comprehensive data relating to infrastructure projects, which hinders empirical analysis seeking to improve policies to improve infrastructure investment. However, GI Hub remains a work in progress, with only a handful of projects in a limited number of countries identified as occurring in the water sector.

<sup>3</sup> There is likely to be significant overlap between projects included in the various commercial databases listed below. If the projects from various databases were to be compiled, they would need to be reconciled (manually) to eliminate potential duplication.

**Table 1.8. Global Infrastructure Hub Project Pipeline**

Attribute	Description
Coverage	Global
Time Period	Active/'live' projects
Access	Open
Type	Not-for-profit
Level	Project/Transaction
Description	Global database of infrastructure projects. Currently under development, with few water-related projects.
Link/Source	<a href="https://pipeline.gihub.org">https://pipeline.gihub.org</a>

**1.2.3. Thomson Reuters**

17. Thomson Reuters is a major supplier of data about a range of financial markets, including project finance, as well as equity and fixed income. In the Thomson ONE project finance database, information available about water projects covers project name, country, sponsor, status, and value. Since 2000, nearly 800 projects have been identified in 95 countries, with a mean value of around USD 370 million.

**Table 1.9. Thomson Reuters**

Attribute	Description
Coverage	Global
Time Period	1970-present
Access	Subscription
Type	Commercial
Level	Project/Transaction
Description	Project finance data (country, sector, cost, financing status, etc.)
Link/Source	<a href="https://financial.thomsonreuters.com/en/products/data-analytics/financial-news-feed/project-finance-international.html">https://financial.thomsonreuters.com/en/products/data-analytics/financial-news-feed/project-finance-international.html</a>

**1.2.4. Dealogic**

18. Dealogic provides financial data on fixed income and equity capital markets, mergers and acquisitions, and other information about financial institutions and their portfolios. Dealogic also has project-level information for a range of sectors. Information is gathered from companies involved in the transactions, including banks and advisors.

**Table 1.10. Dealogic**

Attribute	Description
Coverage	Global
Time Period	Depends on dataset; good project coverage from at least 1994-present, with earlier coverage for issues of financial instruments
Access	Subscription
Type	Commercial
Level	Project/Transaction
Description	Information about capital markets transactions (fixed income and equities), mergers and acquisitions
Link/Source	<a href="http://www.dealogic.com/content/">http://www.dealogic.com/content/</a>

**1.2.5. Bloomberg New Energy Finance**

19. The Bloomberg New Energy Finance (BNEF) database contains information relating to global projects in renewable energy, energy smart technologies, clean transport, and carbon markets. The project information focuses primarily on renewable energy with installed capacity greater than 1MW. However, projects classed as “large hydro” (projects of more than 50MW) are not included in the dataset, so any empirical work relating to hydroelectric power would need to use additional data sources. Due to

confidentiality requirements, not all transactions have a monetary value associated with them.

**Table 1.11. Bloomberg New Energy Finance**

Attribute	Description
Coverage	Global
Time Period	Depends on exact dataset; project data from 2004-present
Access	Subscription
Type	Commercial
Level	Project/Transaction
Description	Database of clean energy projects, policies, companies and investments.
Link/Source	<a href="https://about.bnef.com/product/">https://about.bnef.com/product/</a>

### **1.2.6. Factiva**

20. Factiva is a news database, that draws from around 33 000 sources, many of which are not freely available. Factiva draws from a range of sources, including premium financial news sources and newswires in 28 languages worldwide. Searches can be conducted by free text and industry, as well as using a number of other filters. The information available will vary according to the level of detail of the news article, but for certain stories may include quantitative information (e.g. investment amounts or other financial information).

**Table 1.12. Factiva**

Attribute	Description
Coverage	Global
Time Period	Better coverage for recent news, with ability to search archives
Access	Subscription
Type	Commercial
Level	Project
Description	News database of nearly 33 000 premium sources, including licensed publications, influential websites, blogs, images and videos. 74% of Factiva's premium news sources are not available on the free web.
Link/Source	<a href="https://www.dowjones.com/products/factiva/">https://www.dowjones.com/products/factiva/</a>

### **1.2.7. Global Water Intelligence**

21. Global Water Intelligence (GWI) is an industry research and consultancy organisation that produces a range of *ad hoc* reports on aspects of the water sector, as well as collates water tariff data for cities. The water charges database is updated annually and includes detailed information about pricing for over 380 cities. GWI also reports information about desalination, PPP, and water reuse projects, estimates of WSS coverage by country, and forecast estimates of capital and operating expenditures by utilities and industrial users. Some of its information is gathered via survey (such as the water tariff data), while others draw on market contacts, industry research, and other data sources.

**Table 1.13. Global Water Intelligence**

Attribute	Description
Coverage	Global
Time Period	Depends on dataset
Access	Subscription
Type	Commercial
Level	Project/Transaction
Description	General water sector intelligence, pricing/tariff information, other ad hoc data
Link/Source	<a href="https://www.globalwaterintel.com/">https://www.globalwaterintel.com/</a>

**1.2.8. Bluefield Research**

22. Bluefield Research is a commercial provider of water sector data and market analysis. Their datasets include information about global merger and acquisition transactions, the US hydraulic fracturing and power generation sectors, the global mining industry, as well as US and Canadian municipal data on water supply and sewerage tariffs, forecasts of required capital expenditure by European, US, and Canadian municipalities, and a number of other bespoke datasets. Bluefield uses various data sources and collection methods to collate the data it uses in its research.

**Table 1.14. Bluefield Research**

Attribute	Description
Coverage	Global
Time Period	Depends on dataset
Access	Subscription
Type	Commercial
Level	Project/Transaction
Description	Industrial and municipal data, plus general market intelligence and ad hoc information
Link/Source	<a href="http://www.bluefieldresearch.com/global-industrial-water/">http://www.bluefieldresearch.com/global-industrial-water/</a>

**1.2.9. Orbis**

23. Orbis, a database owned by Bureau Van Dijk, a privately owned research and data company, contains financial information about 220 million private companies (and a small number of major public companies) around the world. The data include company identity, industry, actual and projected financials, credit risk indicators, ownership, peer comparisons, and other information, not normally available in the public domain. It is possible to search by sector, so water-related companies can generally be identified.

**Table 1.15. Orbis**

Attribute	Description
Coverage	Global
Time Period	10 years of historical data, with additional archival subscription service (up to 20 years)
Access	Subscription
Type	Commercial
Level	Firm
Description	Commercial database of private company information
Link/Source	<a href="https://www.bvdinfo.com/en-gb/our-products/company-information/international-products/orbis">https://www.bvdinfo.com/en-gb/our-products/company-information/international-products/orbis</a>

**1.2.10. Osiris**

24. Osiris is the public company counterpart to Bureau van Dijk's Orbis dataset. Osiris contains detailed financial information on around 70 000 publicly listed companies (and some major private ones). Data include financial accounts, corporate

structures, stock prices, brokers' estimates and reports, credit ratings, news, and other company filings. Osiris presents standardised financial information, to allow comparisons between companies with different accounting standards.

**Table 1.16. Osiris**

Attribute	Description
Coverage	Global
Time Period	Depends on type of data and company
Access	Subscription
Type	Commercial
Level	Firm
Description	Commercial database of private company information
Link/Source	<a href="https://www.bvdinfo.com/en-gb/our-products/company-information/international-products/osiris">https://www.bvdinfo.com/en-gb/our-products/company-information/international-products/osiris</a>

### **1.2.11. Standard & Poor's**

25. Standard and Poor's (S&P) has a vast array of financial information available across many datasets. As well as its own credit ratings, it provides financial information and analyst estimates for major public and private companies in its CapitalIQ platform, claiming 99% coverage of global market capitalisation. It is possible to search by sector and key-word, so water-related companies can be identified.

**Table 1.17. Standard & Poor's**

Attribute	Description
Coverage	Global
Time Period	Depends on dataset
Access	Subscription
Type	Commercial
Level	Firm
Description	Commercial database of private company information
Link/Source	<a href="http://marketintelligence.spglobal.com/client-solutions/data">http://marketintelligence.spglobal.com/client-solutions/data</a>

### **1.2.12. IWA Water Statistics**

26. The International Water Association (IWA) aggregates data relating to water charges, abstraction, and consumption in various cities and countries. In general, the data come directly from water agencies in the various countries or cities. The coverage of countries or cities varies across data series, depending on the availability of information. Most data series do not present a global view and even within data series not all countries are necessarily directly comparable, due to potential differences in definitions, scope, and data collection techniques between authorities in different jurisdictions. IWA is a global non-profit organisation comprised of individuals and water companies, such as engineering and consulting firms and utilities.

**Table 1.18. IWA Water Statistics**

Attribute	Description
Coverage	Depending on data, select global or city coverage
Time Period	2014-present
Access	Open
Type	Commercial
Level	Aggregates
Description	Water charges, abstraction, consumption data for some cities and countries
Link/Source	<a href="http://www.iwa-network.org/water-statistics/">http://www.iwa-network.org/water-statistics/</a>

### 1.2.13. Firms

27. Another potential source of data is directly from firms involved in the water sector. This could entail either construction firms, engineers, operators of water infrastructure, financiers, consultants, or other professional firms sharing available data. The exact nature of data availability would depend on the firms providing it.

## 1.3. Non-Financing Flows Databases

### 1.3.1. OECD Database on Policy Instruments for the Environment

28. The OECD's Policy Instruments for the Environment (PINE) database collates information on environmentally related taxes, fees and charges, tradable permits, deposit-refund systems, environmentally motivated subsidies and voluntary approaches used for environmental policy and natural resource management. Although the primary focus is OECD member and accession candidate countries, there is some information available for certain other nations, bringing the total number of countries covered to about 60. Information on policy instruments may be either at national or sub-national level. The scale of relevant instruments and extent of coverage varies considerably among countries.

29. The PINE database contains quantitative and qualitative information about policy instruments at a country level. These can be grouped by environmental domain, including water pollution, waste management, and biodiversity.

**Table 1.19. OECD Database on Policy Instruments for the Environment**

Attribute	Description
Coverage	OECD member and accession countries, plus others
Time Period	1990-present
Access	Open
Type	Official OECD data
Level	Policy
Description	Qualitative and quantitative information on policies (taxes, fees, charges, tradeable permits, environmental subsidies, voluntary approaches) and their attributes (rates, exemptions, earmarking, etc.)
Link/Source	<a href="http://www2.oecd.org/ecoinst/queries/">http://www2.oecd.org/ecoinst/queries/</a>

### 1.3.2. OECD Innovation in Environment-related Technologies Database

30. The OECD's Innovation in Environment-related Technologies dataset extracts patent data from the PATSTAT database of global patents, managed by the European Patent Office (EPO). The OECD uses algorithms to search for patents that contribute to environmental management and climate change adaptation and mitigation. The data include inventions from over 200 jurisdictions in more than 150 technological domains (each comprising multiple patent classification codes) since 1990. Water-related domains include supply- and demand-side technologies and water pollution abatement.

31. The database presents the raw numbers of patents developed by country and technological domain, collaboration on patents between inventors resident in different countries, and tracks in which countries individual patents are registered for protection. The raw count represents the sheer volume of inventive activity in countries, while the collaboration and diffusion figures reveal patterns of how innovation occurs and spreads internationally.

**Table 1.20. OECD Innovation in Environment-related Technologies Database**

Attribute	Description
Coverage	Global
Time Period	1990-present
Access	Open
Type	Official OECD data drawn from EPO PATSTAT database
Level	Patented Technology
Description	Development of technologies, international collaboration (co-invention), and diffusion: includes demand-side technologies (water conservation); supply-side technologies (water availability); water pollution abatement
Link/Source	<a href="http://dotstat.oecd.org/Index.aspx?DataSetCode=PAT_DEV">http://dotstat.oecd.org/Index.aspx?DataSetCode=PAT_DEV</a>

## 2. Possible Uses of Data Sources

32. The data sources listed in this note could be used for undertaking in-depth analytical work to better understand the dynamics of financing flows in the water sector. Such a mapping would draw on several of these data sources, benefiting from their varying coverage, while remaining aware of areas of potential overlap. This section describes some of the benefits and limitations of using the various sources of data.

33. Of the sources listed in this note, the project-level datasets tend to be the most complete and benefit from a close overlap between different providers. In particular, IJ Global appears to have good coverage of its target universe, as well as a broad range of information relating to projects. The Thomson Reuters dataset overlaps somewhat, but not entirely, with IJ Global, but contains far less descriptive information. The World Bank's PPI dataset also contains many data fields about projects, but its geographic scope is limited to low- and middle-income countries and is not a fully comprehensive.

34. Because no database will contain all water-related projects, it is unclear how comprehensive each source is. One way to assess this is to analyse the degree of overlap between different sources, with a larger overlap suggesting more comprehensive data sources. Such a reconciliation of different sources would be a manual task, requiring individual projects be matched based on available information, as in general there is no unique identifier consistent across datasets.

35. Project finance datasets could also be complemented by looking at public information about projects, especially as they tend to omit fully public projects. By combining these sources of data, a more comprehensive picture of water-related projects can be built, albeit with varying levels of detail in the financial information. At a minimum, the data available permits analyses of the aggregate value of investments, and the information from IJ Global and PPI would allow deeper exploration of the characteristics of public and private projects, including capital structure and the role of public and private finance. The best course of action in terms of combining multiple databases will depend on the underlying research questions and entail a trade-off between coverage and the reconciliation required between data sets.

36. Individual firms are likely to be able to provide a range of detailed information about financing water-related investments, be they financiers, utilities, engineers, or others companies, although commercial sensitivity may limit the extent of disclosure possible. Further, obtaining global coverage would require receiving information from many firms, which might pose difficulty. On the other hand, where specific firms have large market shares, by region or by sector, it would only take a handful of firms for a sufficient level of coverage to inform insightful analytical work. In some cases, data could be anonymised or provided as aggregates, to avoid potential commerciality or privacy concerns.

37. Firm-level financial data is also available in a range of databases, notably from S&P and Bureau van Dijk. These would be suited for company-level analysis, given their generally high level of data quality and extensive coverage. For example, analysis could focus on what types of firms are active in various water sectors, by size, region, capital structure etc. It would also be possible to assess the financial performance of firms, to understand their profitability and gauge/benchmark the health of companies involved in the water sector. Despite generally strong coverage, these datasets are not guaranteed to cover all firms, especially closely held, privately owned ones. Another possible drawback is that typically these databases report information at

the level of financial statements, which may not provide the desired level of granularity. For instance, a company with a large portfolio of water assets (be they an investor, a utility, or a technical advisor) might not report financial data at a project or even sector level. For research focusing on individual projects, data directly from firms or from a project-level database are more suited, although could be usefully complemented with firm-level information.

38. The Factiva news database offers good potential for finding information missing from project databases. For instance, the Thomson Reuters project finance database does not provide a large range of information about individual projects present in other databases (e.g. IJ Global), but by analysing news sources in Factiva, it might be possible to find missing information for some projects. This approach is superior to using standard search engines, given three quarters of Factiva's sources are not available on the free web and include a range of finance-oriented news outlets. Nonetheless, this is a potentially time-consuming manual task, as individual projects would need to be searched and there is no guarantee that the desired information is available.

39. The usefulness of national accounts and official data for analysing water-related finance varies by country and fiscal year. In developed countries and in recent years, relevant information is more likely to be available, although all countries should report government spending according to the COFOG classifications, including on water supply and sanitation. Nonetheless, this may not occur with the desired level of granularity (i.e. at project-level) or cover the full range of investments in water (e.g. in flood protection, which can belong to multiple classes<sup>4</sup>). Information at the lowest level of granularity would need to be sought directly from national statistical offices. Some countries also report on individual projects, be they funded by government or FDI, especially where a government agency is tasked with managing these (such as infrastructure or development banks). This could complement data in commercial project-level databases, as these tend to omit entirely publically financed projects.

40. Commercial water sector research agencies have some useful data, although the bespoke nature of consulting work can result in narrowly focused datasets. For instance, Global Water Intelligence has a database and associated reports about desalination technologies in particular, while Bluefield has good information on US & Canadian municipalities, but less so for other countries. Nonetheless, some of the data the companies sell may be useful for analysing certain aspects of the water sector and their approach to information gathering, including their contacts within the industry, may also prove instructive.

41. There are a number of databases of water tariffs, although they vary in their time periods, geographic coverage, and level of aggregation. IWA collects information about average tariffs in a number of cities, while GWI publishes an annual collection of detailed tariffs for 380+ cities, including their structure (e.g. information about block tariffs, fixed and volumetric charges, et cetera). The OECD has also published data on water tariffs, although at a national level and it does not update the data annually. This information is interesting for cross-country and cross-city comparisons, although a more complete analysis requires data on transfers and taxes, the other two sources of revenue for governments to pay for water services.

42. The PINE database provides a list of environmental policies in countries around the world and could be used as a starting point to analyse the effect of regulation on outcomes of interest. However, the database is not updated on a frequent

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<sup>4</sup> Depending on its primary purpose and the context, flood protection could be included in COFOG 4.2.1, Agriculture, alongside a number of non-water related activities or 5.3.0, Pollution Abatement, which includes abatement of other types of pollution, or, indeed, certain other classes.

basis, has some coverage gaps, and in general is not exhaustive. Combining the information already available in the database about water policies with a new round of specifically tailored data collection would result in a potentially powerful set of information about water-related environmental policies. For example, combining the output of such a data collection effort with project and other relevant databases, it might be possible to examine the effect of environmental policies in stimulating investment in infrastructure. Such an analysis could also arise from a broader research agenda exploring the impact on financing flows of the investment environment in general, placing specific policies in context alongside measures such as the World Bank's ease of doing business index, investment protection, and other indicators.<sup>5</sup>

43. Using PATSTAT alongside company financial databases (e.g. S&P or Orbis), it would be possible to match up firms with their innovations. This would allow a deeper understanding of the types of firms (by size, industry, source of finance, and so on) that are actively innovating in the water sector.

44. There are also some aspects of financing water security that are not easily captured by available data sources. For instance, consumer and company spending on water-efficient appliances, such as faucets, shower heads or washing machines, represents investment in water security, but such data is not readily captured or possibly not even able to be captured. It may be possible to reach quantified estimates of such spending for certain categories of products, but the robustness of any figures would of course depend on the quality of the underlying assumptions and data used in the process.<sup>6</sup> In general, this type of expenditure constitutes water management according to CReMA class 10, which may be estimated for some countries, but not all.

45. Other types of spending that might not be readily captured include some government expenditure on infrastructure with water security-related characteristics. For example, ecosystem rehabilitation or building public spaces that double as emergency reservoirs/retention ponds to mitigate the impact of flooding and sewage overflow after storms qualify as investments in water security. However, even if information is available about the total level of investment in such infrastructure, isolating the portion of the investment directly attributable to water security enhancement will require the development of an analytical approach, drawing on government spending data and making a number of assumptions and approximations.<sup>7</sup>

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<sup>5</sup> See Ang, Röttgers and Burli, (2017<sub>[1]</sub>) for analysis of the effects of policy settings and the broader investment environment on investment in renewable power generation in OECD and G20 countries since 2000.

<sup>6</sup> The International Energy Agency releases an annual energy efficiency report which, among other things, attempts to estimate the level of investment in energy efficiency (International Energy Agency, 2016<sub>[3]</sub>). Such an approach could potentially be applied to water efficiency.

<sup>7</sup> For example, if a newly built public park contains low-lying areas to collect flood waters, the data requirements to decompose total spending into general infrastructure (the park) and water-security infrastructure (the low-lying areas) may prove prohibitive.

## References

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