



TOWARD A CLEAN WORLD FOR ALL

An IEG Evaluation of the World Bank Group's
Support to Pollution Management



IEG
INDEPENDENT
EVALUATION GROUP

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Toward a Clean World for All

AN IEG EVALUATION OF THE
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TO POLLUTION MANAGEMENT



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Careful observation and analysis of program data and the many issues impacting program efficacy reveal what works as well as what could work better. The knowledge gleaned is valuable to all who strive to ensure that World Bank goals are met and surpassed.

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abbreviations

| | |
|-------------------|---|
| ASA | Advisory Services and Analytics |
| CAS | country assistance strategy |
| CEA | Country Environmental Analysis |
| CPS | Country Partnership Strategy |
| DPL | development policy loan |
| DPO | development policy operation |
| EHS | Environmental, Health, and Safety |
| ENR | Environment and Natural Resources |
| ESAP | Environmental and Social Action Plan |
| GEF | Global Environment Facility |
| GHG | greenhouse gas |
| GP | Global Practice |
| IEG | Independent Evaluation Group |
| IFC | International Finance Corporation |
| MIGA | Multilateral Investment Guarantee Agency |
| NO _x | nitrogen oxides |
| NOP | no opinion possible |
| PCB | polychlorinated biphenyl |
| PM | particulate matter |
| PM _{2.5} | ambient particulate matter |
| PMEH | Pollution Management and Environmental Health |
| PPP | public-private partnership |
| SCD | Systematic Country Diagnostic |
| SDG | Sustainable Development Goals |
| SO ₂ | sulfur dioxide |
| SURR | Social, Urban, Rural, and Resilience |
| WHO | World Health Organization |

acknowledgments

This report was prepared by an Independent Evaluation Group (IEG) team led by Stefan Apfalter (task team leader) and comprising Antonio Giuffrida (lead health specialist), Arianna Ranuschio (consultant), Bekir Onursal (consultant), Gürkan Kuntasal (senior environmental specialist), Jacqueline Andrieu (evaluation analyst), Sarah Nur (consultant), Stephen Hutton (senior environmental economist), Subhendu Roy, Victor Malca, and Wasiq Ismail (consultants). Andrew Stone and Anjali Kumar advised the team.

Arianna Ranuschio, Gürkan Kuntasal, and Özlem Önerci conducted the analysis of the International Finance Corporation (IFC) and Multilateral Investment Guarantee Agency (MIGA) portfolios. Nadia Merdassi supported the team on knowledge management issues. Emelda Cudilla and Vibhuti Narang Khanna were responsible for administrative aspects and formatting of the evaluation report.

The evaluation was conducted under the guidance and supervision of Midori Makino (Manager) and José Cándido Carbajo Martínez (Director) under the overall direction of Caroline Heider (Director General, IEG).

Professor Leonard Ortolano prepared a literature review on climate change mitigation and local and regional pollution reduction cobenefits. Professor Saleem H. Ali prepared a literature review on tensions between development and pollution to create additional evidence for this evaluation.

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highlights

- 1** High growth rates in many developing countries have helped reduce poverty but have also given rise to high levels of pollution with effects that dwarf other major health care concerns. Pollution also imposes substantial economic costs—often between 4 percent and 5 percent of a country's gross domestic product.
- 2** The effects of pollution fall overwhelmingly on developing countries, and within these, disproportionately on the poor. Ninety-four percent of annual deaths (8.4 million out of 9 million) caused by pollution occur in lower-middle-income countries.
- 3** Even though the World Bank Group has managed about 534 pollution-relevant interventions over fiscal years 04–17, the magnitude of its engagement has not kept pace with increasing global pollution levels. The World Bank Group has provided sustained financing for wastewater infrastructure, but missed opportunities to fight indoor and outdoor air pollution, which are in fact responsible for the highest share of deaths caused by pollution.

- 4** The World Bank Group's expanding engagement in climate change mitigation can be considered an increase of its efforts to address outdoor air pollution. The cobenefits for air pollution could be maximized if they are integrated systematically into climate change mitigation interventions.
- 5** The World Bank Group is in a strong position to integrate pollution into the development agenda of client countries through policy dialogue and diagnostic work. However, country strategies rarely reflect the top pollution concerns.
- 6** The World Bank's main country-level environmental diagnostic, the Country Environmental Analysis (CEA) has been instrumental in collating the pollution-relevant information and raising awareness about pollution and its costs. Yet CEAs have only covered 42 countries, due in part to limited funding, and even in these cases, pollution priorities are not reflected systematically in the World Bank's country strategies.
- 7** Interventions that aim to set up country-level pollution monitoring systems have been relatively rare and often unsuccessful.
- 8** Urban transport interventions have been relatively effective in reducing air pollution along the routes they serve. However, over the past 10 years, a large share of urban transport projects (49 percent) have supported the construction of roads and not public transport schemes.
- 9** Solid waste management and wastewater treatment interventions, which have pollution mitigation objectives, have struggled with multiple challenges, including the limited institutional capacity of the service providers involved and difficulties in recovering costs.

10 International Finance Corporation (IFC) Advisory Services efforts with pollution reduction objectives help client companies reduce or recycle waste, increase energy or resource efficiency, or introduce renewable energy; these are largely successful due to the high-quality technical advice provided by IFC.

11 IFC has had limited opportunities to provide advice for structuring pollution-abating wastewater treatment and waste management public-private partnerships (PPPs), due to lack of political support; those few waste management PPPs that were structured frequently fail to reach commercial closure due to political opposition. Similarly, IFC investments in waste and wastewater utilities are challenging investments because government commitment to private sector involvement frequently falters.

12 Most IFC investments in pollution-intense industries are successful in meeting pollution prevention requirements; yet, there is room for improvement since one-third of projects do not meet the relevant requirements for air emissions and wastewater.

13 For a significant number of Multilateral Investment Guarantee Agency (MIGA) guarantee projects, sufficient information on pollution prevention implementations was not available at the time of IEG's project-level evaluations. But for those projects where data were available, 62–75 percent of projects meet pollution prevention requirements.

Pollution Matters for Development

ECONOMIC GROWTH, combined with population growth, increasing urbanization, the motorization of traffic, increased vehicle use, and a gradual shift toward more industrialized economies, has led to high levels of pollution in many developing countries.

Approximately 9 million people die from pollution each year, mostly young children (1.7 million) and the elderly (4.9 million). Ninety-four percent (8.4 million) of these deaths occur in lower-middle-income countries. Pollution also imposes substantial economic costs, frequently in the range of 4–5 percent of a country’s gross domestic product—often exceeding the amounts countries received in terms of overseas development aid.

Within developing countries, the poor are hit particularly hard by pollution based on several factors, including living in areas with the worst environmental conditions. For example, informal settlements often lack access to clean water, have insufficient sewage or waste disposal, and are close to solid waste dumps or open waste burning sites, all of which contribute to the ambient air pollution. The poor also often rely on solid fuels (wood or charcoal) for cooking, which exposes them to dangerous levels of indoor air pollution.

The importance of fighting pollution is firmly anchored in the 2015 Sustainable Development Goals (SDGs), goal 12: ensuring sustainable production and consumption. In addition, pollution is referenced by nine other SDGs, which indicates how interlinked the issue of pollution is with many other aspects of the development agenda.

Also, according to the 2012 environmental strategy, *Toward a Green, Clean, and Resilient World for All* (page 1), a “clean world” with “low pollution and low emissions” is an explicit strategic objective of the World Bank Group.

Evaluation Approach

This evaluation is the first comprehensive assessment by the Independent Evaluation Group (IEG) of the World Bank Group’s pollution management efforts, and it complements two recent IEG evaluations on water and urban transport. The overarching question IEG seeks to answer in this evaluation is, “To what extent has the World Bank Group been relevant, effective, and efficient in addressing pollution concerns in client countries through (i) targeted interventions and (ii) the use of safeguards and Performance Standards in pollution-heavy industries?”

The theory of change underlying this evaluation recognizes that the World Bank Group through its government-facing policy advice—and together with other development partners—is one of

the pillars that helps client countries create the needed knowledge about their pollution priorities and develop strategies, policies, and regulatory frameworks to address pollution management issues effectively. In addition, the private sector-facing Advisory and Investment Services of the International Finance Corporation (IFC) promote the adoption of cleaner production and efficient processes. Complementary to all these activities, (IFC) investments, Multilateral Investment Guarantee Agency (MIGA) guarantee projects, and World Bank lending support the construction of pollution-abating infrastructure, mainly wastewater and waste management facilities. In addition to these pollution-targeted activities, the World Bank Group has a system of safeguards and MIGA and IFC Performance Standards in place that are intended to reduce or at least manage the pollution “footprint” of all World Bank Group projects on a routine basis.

This evaluation covered the entire World Bank Group portfolio of pollution-relevant activities (lending, nonlending, Advisory Services and Analytics, investment and policy lending, and guarantee projects), approved during fiscal years (FY)04–17.

The study focuses on local and regional pollution phenomena rather than the global concerns of climate change or ozone-depleting substances. Special emphasis is placed on those pollution sources that matter most for poor countries and the poor who live in there, such as indoor and outdoor air pollution, water pollution, and waste.

The evaluation applied six methodological instruments: (i) a strategic mapping of global and regional environmental concerns and the World Bank Group response; (ii) a portfolio review of World Bank Group projects and activities, gathering and analyzing project design features, results indicators, and drivers for success and failure; (iii) desk reviews of 52 country strategies and a sample of 30 Country Environmental Analyses (CEAs); (iv) five country case studies involving field missions (Ghana, Colombia, Indonesia, the Arab Republic of Egypt, and Croatia); (v) two literature reviews addressing the linkages between the climate change and the pollution agendas, and the trade-offs between managing pollution versus sustainable economic development, respectively; and (vi) field-based project evaluations in China, Egypt, and Croatia, and a regional program in Africa.

The World Bank Group’s Portfolio

The World Bank Group’s engagement in pollution is multisectoral and cross-cutting. To implement its strategies, the World Bank Group has used 534 projects, with a total commitment of US\$43 billion, that “target” pollution management directly during FY04–17. These 534 projects are the primary focus of this evaluation; they include 317 World Bank investment and policy operations, 77 IFC investments, 123 IFC Advisory Services projects, and 17 MIGA guarantee projects.

In addition, the World Bank Group has ramped up its climate change portfolio by 300 percent over the evaluation period, and many climate change mitigation interventions may provide an opportunity to generate pollution abatement cobenefits and so address outdoor air pollution.

Improving the Enabling Environment

Pollution management is complex and multidimensional, with responsibilities often spread across multiple agencies and jurisdictions. The World Bank Group supports client country governments in their efforts to create or improve the enabling environment for pollution management through International Development Association / International Bank for Reconstruction and Development lending (policy and investment operations).

These interventions cover (i) capacity building for institutions handling the country's pollution management agenda, (ii) regulations and standards setting across various pollution areas, (iii) strategy development and design of national pollution agendas, (iv) stakeholder dialogue, and (v) diagnostics. Policy operations have concentrated on creating regulatory frameworks and strategies, whereas investment operations most frequently provide institutional capacity building.

Many pollution interventions attempted to prevent or treat pollution; relatively few sought to build pollution monitoring systems. Given that (i) client countries frequently struggle to identify pollution priorities, that (ii) pollution data are often weak, and that (iii) the World Bank Group's own support is not always well targeted toward the client country's most serious pollution priority, this low emphasis on pollution monitoring is an important gap. The World Bank's *Pollution Management and Environmental Health Program*, established in 2015, could help strengthen such support, but many of its interventions have not yet closed, so the effects are not assessed in this evaluation.

Investment and policy operations are more likely to be successful when based on high-quality diagnostic work. Resolving institutional issues and fostering interagency coordination were found to be key ingredients in policy reform.

Capacity building was the most prevalent support mechanism in investment lending; interventions were successful in 53 percent of cases. Success relies on strong multistakeholder participation that includes all relevant agencies and a strong government commitment.

Countries often grapple with setting up pollution monitoring systems that allow them to better understand and prioritize their pollution concerns. Interventions that address monitoring of pollutants have not only been relatively rare but have also tended to fail more often. Seventy percent of such interventions failed to achieve their targets, compared with half and less than a third of interventions that aim at preventing or treating pollution, respectively. Commonly cited reasons for failure were overly ambitious goals, lack of government commitment, and failure to address legal and procedural prerequisites. Yet monitoring systems and data collection remain critical for enabling policy makers to understand and make appropriate strategic decisions for pollution issues.

Despite progress in policy setting, countries struggle to enforce pollution regulations, a pattern found across country cases. Constraints to enforcement include conflict of interest of the parties involved, lack of political will, lack of incentives for local authorities to enforce regulations, and politicization of decision making.

Progress in Managing Pollution

The World Bank Group made significant progress in improving pollution management in client countries. Drivers of performance of pollution management interventions are usually sector specific.

Urban transport interventions that sought to address air pollution were relatively successful in achieving emission reduction objectives and setting up the air quality monitoring systems. But the positive effects were mostly limited to the narrow environs around the project footprint; broader, sustained environmental benefits were achieved only in projects with a comprehensive approach that included both upstream (that is, support to improve the enabling environment, including capacity or institution building) and downstream measures (that is, finance of bus rapid transit or required infrastructure).

Efforts to address pollution through solid waste management and water treatment face multiple challenges. These interventions were successful less often, depending on the ability to recover costs and institutional capacity of the municipalities in charge.

IFC's Advisory Services have helped client companies reduce or recycle waste, increase energy or resources efficiency, or introduce renewable energy. These services were largely successful due to the high technical quality of advice provided by IFC.

A substantial share of IFC Advisory Services supporting wastewater or waste management facilitated the structuring of public-private partnerships (PPPs). These efforts often are confronted with lack of political support for private sector participation and hence frequently fail to reach commercial closure. Similarly, IFC investments in waste and wastewater utilities are challenging investments because of governments' frequently faltering commitment to private sector involvement.

Managing the Pollution “Footprint” of World Bank Group Projects

In addition to interventions that target pollution directly, the World Bank Group uses Performance Standards and safeguard policies to control the potential negative pollution effects from its projects; that is, it manages their “pollution footprint.” This evaluation assessed the effects of these efforts on 956 IFC investments and 168 MIGA guarantee projects in pollution-intense industries (for example, chemicals, oil and gas, pulp and paper, and so on) along with 114 World Bank projects classified as posing elevated environmental risks (category A projects).

Most IFC investments and MIGA guarantee projects meet the pollution-relevant Performance Standards. However, there is room for improvement in project performance: about one-third of IFC client companies do not meet the relevant requirements of air emissions and wastewater guidelines of these Performance Standards. For a significant number of MIGA guarantee projects, sufficient information on pollution prevention implementations was not available at the time of IEG's project-level evaluations. But for those projects where data were available, 62–75 percent of projects meet pollution prevention requirements.

The most important success factors are the commitment of the client and project enterprise to meeting pollution standards and their technical and financial capacity. Thus, IFC's project appraisal and MIGA's due diligence are important activities to assess the commitment and capacity of the client or project enterprise and the risks and to develop potential mitigation measures.

Although the World Bank safeguard system requires clients to take actions to avoid or minimize the effect of pollution issues generated from its projects, a lack of systematic data in core project documentation makes it difficult to assess the extent to which this system contributes to better pollution management.

The Need to Recalibrate the Approach to Fight Pollution

Over the past two decades, pollution and its effects on the poor have worsened for large parts of the world. From 1990 to 2013, premature mortality attributable to ambient particulate matter increased by 30 percent, from 2.2 million to 2.9 million deaths per year. The number of deaths caused by ambient air pollution rose continuously in all World Bank Group client Regions, except for Europe and Central Asia. In 3,000 cities around the world, particulate matter levels increased by 8 percent between 2008 and 2013, particularly in low- and middle-income regions where 98 percent of cities do not meet World Health Organization guidelines on air quality. For indoor air pollution, despite the reductions in exposure and related death rates, the total number of deaths has mostly remained stable at about 2.9 million per year as the result of overall population growth. Waste production has increased, and waste collection and disposal have not kept pace in most countries, leading to open burning of waste and uncontrolled disposal, which in turn results in air pollution and frequent leakages of toxic effluents. Only water pollution shows a moderate improvement. Between 1995 and 2015, deaths from unsafe water decreased by 34 percent in low- to upper-middle-income countries (from 1.9 million to just over 1.2 million) from improvements in water supply, despite the continuous decline in river water quality.

Yet, the World Bank Group's efforts dedicated to fighting local and regional pollution concerns have lost relative importance, owing to the large increase in efforts to fight climate change, which grew by 300 percent during the evaluation period. This raises the question of whether the World Bank Group's approach to fighting pollution needs recalibration.

The World Bank Group's strengthened engagement in climate change can, however, be seen as an increase of the World Bank Group's efforts to address ambient air pollution. Across the 804 climate change interventions during the evaluation period, this evaluation found that 45 percent of their components are likely to have cobenefits on air pollution; that is, the interventions reduce both greenhouse gases and pollution. Quantifying these cobenefits, is however, not possible, as the realization of cobenefits is highly contextual, as shown in an IEG-commissioned literature review. But to date, these climate change interventions are not designed as air pollution mitigation projects; hence they lack project monitoring systems that would track the potential decrease of primary pollutants, such as sulfur dioxide, nitrogen oxides, or PM_{2.5}; they may also not have been designed

to optimize conventional pollution abatement. It remains unclear to what extent these climate change interventions are likely to address local pollution concerns in areas where pollution matters the most for the poor.

Looking at the composition of the portfolio of pollution-targeted World Bank Group interventions more closely, this evaluation finds that the World Bank Group has provided sustained financing for wastewater infrastructure, but has potentially missed opportunities for fighting outdoor and indoor air pollution. Interventions that explicitly address outdoor and indoor air pollution account for only 33 percent and 9 percent of all pollution-targeted interventions, respectively, while they are responsible for 42 percent and 49 percent of deaths caused by pollution in developing countries, respectively. This calls for a better balance in the World Bank Group's portfolio, that is, one in which the World Bank Group's response is better aligned with the damage pollution causes.

Integrating pollution into other sectoral interventions plays an important role in this context. For example, the World Bank Group's climate change mitigation portfolio could provide an opportunity to address outdoor air pollution explicitly, helping to improve the design of interventions and build the case to clients to justify such interventions. Similarly, in the transport sector, a large share of urban transport projects (49 percent) only support the construction of roads and not public transport schemes from which one could expect pollution reduction effects.

Client Engagement through Knowledge Work and Policy Dialogue

Knowledge of the effects of pollution and the associated costs are important prerequisites for a concerted approach to fight pollution in client countries. Given its field presence and access to policy makers, the World Bank Group is in a strong position to integrate pollution into the development agenda of its client countries through its knowledge work.

However, efforts to integrate pollution concerns into countries' development agendas often struggle. World Bank Group country strategies and partnership frameworks rarely reflect the most serious pollution concerns. Only 28 percent of World Bank Group strategies for countries that have pressing pollution concerns reference such pollution concerns consistently. Most strategy documents (56 percent) do not mention them at all, even though they all had at least one major pollution concern. In particular, outdoor and indoor air pollution are rarely covered in country strategies.

The recently introduced Systematic Country Diagnostic (SCD) tool captures pollution concerns more accurately. Fifty-seven percent of the SCDs identify all pollution concerns correctly. This raises hopes that future Country Partnership Frameworks will better reflect pollution issues.

These findings may explain why the World Bank Group overall portfolio does not reflect the most serious pollution problems. Other specific pollutants (mercury, lead, pesticides, or e-waste) have also received little attention in the World Bank Group's portfolio.

The lack of quality data on pollution, its cost, and the cost-effectiveness of pollution abatement interventions increase the difficulty of building a case for governments to undertake pollution

abatement interventions or to borrow from the World Bank for that purpose. This suggests that the World Bank needs to scale up support for building client country pollution monitoring systems.

The World Bank's main country-level environmental diagnostic, the Country Environmental Analysis (CEA), identifies the most serious pollution issue in a country, based on available information. While CEAs cannot generate pollution data, they are instrumental in collating the information and raising awareness about them. Country cases underscore the value of CEAs in policy dialogue by lifting the visibility of pollution and assigning a monetary value to the damage caused by pollution.

Broadly, CEAs are found to be comprehensive in their advice and identification of pollution concerns but inconsistent when it comes to conducting an in-depth analysis on them.

However, CEAs have only been prepared for 42 of a total 151 active client countries, which is low compared with other sector diagnostic tools that reach many more countries. For example, the Investment Climate Assessments reach 62 countries and the Financial Sector Assessment Programs reach 142 countries. In many countries with CEAs, there is only limited uptake of their recommendations in country strategies.

Conclusion and Recommendations

The evaluation concludes that the World Bank Group has exercised an important role in several areas related to environmental pollution, including that of a source of knowledge and policy advice. It has the potential to fulfill its role as thought leader and convener for this global public good, in line with aspirations expressed in the *Forward Look*. This is even more so as the evaluation found very few other global players to exercise leadership in this domain, in particular in terms of shaping the development agendas of its client countries and how these address pollution. However, to reach its full potential, the World Bank Group needs to leverage its recognized strengths and develop integrated solutions. These should help client countries address pollution issues that curb their economic growth and undermine the health of their people.

To do so, the evaluation recommends the following five actions in a sequential manner. The recommendations, listed in order, address the underlying issues.

Recommendation 1 addresses the lack of capacity to generate data on pollution, the root cause of many issues identified in this report, including the lack of awareness about pollution and its effect on people and economic growth. These capacities will be essential for client countries aiming to meet their commitment under the Paris Agreement. It also reinforces the findings and recommendations of IEG's evaluation on data for development. Recommendation 2 suggests strengthening the World Bank's analytical work and policy advice. It relies on the implementation of recommendation 1—at least partially—as the World Bank's analytical work does not typically generate pollution data itself but relies on existing country data. Recommendation 3 calls for scaling up and recalibrating the World Bank's portfolio of interventions to manage pollution. This, again, will be facilitated, by the implementation of the preceding recommendations 1 and 2. The interest of client countries

to borrow from the World Bank to manage pollution is likely to be spurred by policy dialogue that explains the economic downsides of pollution. Leveraging the World Bank Group's climate change mitigation portfolio to better combat air pollution is an important part of scaling up the World Bank's pollution portfolio and is hence addressed in recommendation 4. Recommendation 5 addresses the need to provide capacity to private sector clients to better enable them to meet IFC's Performance Standards.

Recommendation 1: Strengthen the World Bank's efforts, including through technical assistance and capacity and institutional building, to develop client country pollution measurement and monitoring systems, especially in countries where such capacity is low. These systems should provide quality data in a transparent and systematic manner and effectively contribute to informing policy makers and the public about pollution priorities, recognizing that efforts to build such monitoring systems are likely to require initial trust fund support, as some client countries may be unable or unwilling to borrow for such purposes.

Recommendation 2: Strengthen the World Bank's country analytical work on pollution, in particular such analytical work that allows countries to prioritize their pollution concerns based on a country-wide and comprehensive assessment, and deploy such analytical work to cover more countries and target countries more strategically. Ensure more consistent quality of this work. This broader coverage will likely require a dedicated funding for such analytical work and involve a more strategic use of country-level analytical work that prioritizes countries with the greatest health benefits from pollution control. It will also require a more comprehensive integration of the identified pollution priorities in the SCDs and subsequent country strategies.

Recommendation 3: Intensify efforts to scale up and recalibrate the World Bank's efforts in pollution management to address the most important pollution priorities. In doing so, the specific circumstances of the poor and their exposure to pollution should be considered, including outdoor and indoor air pollution as well as specific pollution threats (for example, lead, mercury, pesticides, chromium, or e-waste) when warranted by their potential harm. Integrating pollution aspects more systematically into other sectors, for example, urban transport and energy, would be part of such an approach.

Recommendation 4: Leverage the World Bank Group's climate change portfolio to better combat local and regional air pollution and other applicable forms of pollution. This will require designing future climate change mitigation interventions (including, for example, investments, lending, policy and Advisory Services and Analytics (ASA) work and advisory services) so that they address local and regional air pollution issues.

Recommendation 5: For clients that lack the required knowledge, IFC should strengthen their support to help these clients to better comply with Performance Standards on pollution by offering advisory services. Building on the successful experience of advisory services in energy and resources efficiency, this will require offering such services to those IFC investment clients that lack the technical capacity to meet these standards.

management response

MANAGEMENT OF THE WORLD BANK GROUP INSTITUTIONS thanks the Independent Evaluation Group (IEG) for its valuable and informative evaluation report, *Toward a Clean World for All: An IEG Evaluation of the World Bank Group's Support to Pollution Management*. Management appreciates the recognition of the significant progress made by the World Bank Group in improving pollution management in client countries, noting that the key drivers of successful pollution management interventions are usually sector specific. The report acknowledges that pollution management is complex and multidimensional: countries often grapple with setting up pollution monitoring systems that allow them to better understand and prioritize their pollution concerns, and struggle to enforce pollution regulations. The report also highlights the disproportionate burden of the impacts of pollution on poor people in developing countries and notes that the magnitude of the World Bank Group's pollution-targeted engagement has not kept pace with increasing global pollution levels, notably air pollution, a leading cause of deaths from pollution. On the other hand, it recognizes the significant positive spillover effects on air pollution generated by the World Bank Group's strengthened engagement in climate change mitigation and that this can be considered as an increase in the World Bank Group's efforts to address air pollution.

Overall, Management concurs with the report's main findings and conclusions, which provide useful guidance on how to increase the effectiveness of the World Bank Group's pollution management operations and engagements. The report lauded the World Bank Group's efforts to integrate work on pollution with the development agenda of client countries through policy dialogue and diagnostic work. At the same time, the report pointed out the need for stronger and complementary efforts by the World Bank Group to support client countries in developing pollution measurement and monitoring systems, especially in countries where such capacity is low.

World Bank Management Comments

Air pollution has a direct impact on broader development outcomes. The report notes that interventions in pollution management, although challenging, are desperately needed as human-made pollution has a direct impact on broader development outcomes. Management appreciates the report's emphasis on the importance of fighting pollution and its acknowledgement of the centrality of progress on this front to the achievement of the Sustainable Development Goals (SDGs) and the 2030 Agenda. Addressing pollution is indispensable to meet Goal 12 to ensure sustainable production and consumption, and 10 other SDGs, which indicate how interlinked the

issue of pollution is with many other aspects of the development agenda. From an institutional perspective, the report further notes that a “clean world” with “low pollution and low emission” is an explicit strategic objective of the World Bank Group’s environmental strategy for 2012–22, “Toward a Green, Clean and Resilient World for All.” We also highlight the fact that the new Environmental and Social Framework (which will become effective in late 2018) places a stronger emphasis on pollution management and cleaner production, through the dedication of the Environmental and Social Standard (ESS3) to “Resource Efficiency and Pollution Prevention Management.”

Emphasis on air pollution is important, but other types of pollution should also be addressed. The IEG report assesses the effectiveness of the World Bank Group’s engagement in air pollution management in particular. This emphasis is understandable, given the increasing impact of air pollution on health outcomes in client countries. However, the report’s findings should be complemented by a comprehensive evaluation of the World Bank’s support to pollution management more broadly to take into account its efforts to address other types of pollution, such as water and land pollution. Moreover, pollution problems associated with exposure to toxic substances, including heavy metals and pesticides, are also critical to examine. Lead exposure has a significant impact on child development, resulting in a loss of lifetime earning potential in developing countries, estimated at \$977 billion annually.¹ An impact of this magnitude warrants greater consideration.

The report notes that strong government support and commitment are key ingredients for success in addressing pollution, both through policy actions and investment interventions. Pollution management operations typically entail a number of complexities, notably that pollution management is multifaceted and that it takes a long time—often decades—to reduce pollution to acceptable levels. Furthermore, the data needed to fully comprehend the extent of pollution problems and determine the most efficient approaches to pollution management is only partially available at the start of intervention programs. In addition, although pollution may be a severe problem, in countries with limited capacity and resources it must also compete with, and is often crowded out by, other development priorities for limited World Bank Group program resources. Consequently, an effective and efficient pollution management program should acknowledge these problems and would require strong government support to take specific actions. Such action could include the deployment of a variety of instruments to improve the enabling environment for pollution management in addition to technical interventions and sound underlying analytical work.

The report provides a good assessment of how the World Bank Group exercises its convening power at the international level to draw attention to pollution issues and advance the policy-making agenda, by acting as a knowledge broker and through partnerships and standard setting. At the country level, the World Bank Group’s convening power assists clients in establishing a national pollution agenda and integrating pollution management into country portfolios through various tools and services. These tools include diagnostic work such as Systematic Country Diagnostics (SCDs), the Country Environmental Analysis (CEA), and Policy Strategic Environmental Assessments, and the World Bank Group’s Country Partnership Frameworks. The report highlights the value-added of the World Bank Group’s field presence and access to policy makers, which places it in a strong position to boost the priority accorded to pollution in countries’ development agenda. At the same time, the report also

emphasizes that to reach its full potential, the World Bank Group needs to leverage its recognized strengths and develop integrated solutions.

Development of client countries' capacity in pollution measurement and monitoring is critical. Management is committed to strengthening clients' pollution measurement and ground-level monitoring systems. Management also recognizes the importance of ensuring that such data is reliable and of adequate quality to support the identification of environmental priorities and economically efficient interventions to address them, and for gauging progress in improving environmental quality. The existing challenges vary substantially across countries, with a number of countries having basic pollution monitoring systems already in place, developed by the relevant ministries. Government ownership is essential to ensure that such systems function effectively and fully at the national level, and that adequate equipment, human resources, monitoring infrastructure, and institutional and regulatory frameworks are in place. Moreover, the processes involved in putting such elements in place are time-intensive and require strong coordination and client ownership. In many developing countries, the support provided for monitoring and measurement in earlier pollution management projects is not sustained due to lack of technical capacity of the relevant agencies, underscoring the need to build policy and technical capacity to ensure enforcement of regulations.

Country-based analytical work on pollution can be widely applicable. Management agrees with the recommendation to strengthen analytical work on pollution more broadly and strategically, and to ensure uniformity of the quality of such work. Experiences from multiple client countries demonstrate the crucial role of such analytical work in building solid engagement with client countries on pollution management, including not only through CEAs, but also with Policy-level Strategic Environmental Assessments, Policy Notes, and other Advisory Services and Analytics (ASA) aimed at identifying pollution priorities and proposing interventions to address these priorities. Furthermore, the World Bank's analytical work has informed development operations financed by other institutions. In countries such as Bangladesh, China, Colombia, Lao People's Democratic Republic, Peru, Arab Republic of Egypt, Pakistan, Mexico, and Vietnam, findings from World Bank-financed analytical work have underpinned pollution management interventions at both the national and subnational levels, including policy, investment, and capacity-building operations. These countries have adopted recommendations related to consolidating environmental aspects in the productive sectors and strengthening pollution management, both with and without the World Bank's direct support.

The report recognized improvements in capturing pollution concerns in country diagnostics through the SCD. Fifty-seven percent of the SCDs reviewed in the report correctly identified pollution concerns, informing a dialogue with country authorities on development priorities and preparation of Country Partnership Frameworks. Government ownership and stable funding are critical prerequisites for conducting comprehensive and high-quality analytical work in a sustained manner. World Bank Group-funded operations often support the preparation of analytical work, particularly in countries with low capacity and low resources, and where addressing environmental quality is often crowded out by other competing development priorities and limited funding. Government

commitment is also important in addressing environmental priorities such as household air pollution, which mostly affects poor families that depend on burning biomass fuels to meet their energy needs, but tend to have low visibility in World Bank Group–supported operations.

Addressing the most important pollution concerns remains a top priority. Management is committed to scaling up and recalibrating its efforts in pollution management to address the most compelling pollution priorities. The report discusses some of the imbalances in the portfolio in this context, although additional reasons underpinning the gaps observed could be discussed further. The report’s findings could also facilitate the formulation of lessons that would be useful in recalibrating the portfolio. World Bank Group–funded projects in Bangladesh, Colombia, Chile, China, Lao PDR, Mexico, Morocco, Peru, Thailand, and Vietnam have supported policies aimed at reducing pollution and have produced tangible health benefits for people of all backgrounds. The World Bank has consistently designed its pollution management programs and projects in a structured and integrated manner, relying on one or all of the three prongs: (i) strengthening command-and-control (through supporting the national or subnational environmental agencies); (ii) creating market-based instruments to support commercial banks supporting industries to achieve environmental compliance; and (iii) engaging civil society through empowering the public sector to communicate their demands for a cleaner environment. In so doing, the World Bank has successfully supported commercial banks in a few countries to create a “green” line of business. In addition, in 2014, the World Bank established a Multi-Donor Trust Fund for Pollution Management and Environmental Health to promote more systematic and effective responses to deadly and costly air pollution in selected countries, including China, Egypt, Nigeria, South Africa, and Vietnam. While the World Bank Group is able to support countries in addressing the most important pollution concerns through knowledge, technical assistance, and lending, government commitment to tackling pollution management as a matter of priority will remain crucial for success. As the World Bank continues to scale up and recalibrate efforts in pollution management, suitable indicators will need to be developed to measure progress on this front.

The climate change portfolio could be further refined. Management recognizes that the World Bank is well positioned to build more synergies between efforts to fight pollution and tackle climate change. Rather than viewing mitigation of greenhouse gas (GHG) emissions as an entry point to fighting air pollution, Management is committed to supporting the reduction of air pollution using technologies and instruments that often are much less costly than some GHG mitigation interventions. In this context, the World Bank Group’s efforts to increase synergies between GHG mitigation and air pollution would include supporting energy efficiency, proper management of methane and other GHG emissions from landfills, and water pollution control and wastewater treatment activities. The World Bank has supported the governments of Chile, Mexico, and Colombia in adopting carbon taxes, which maximize synergies between air pollution management and climate change mitigation. Additional interventions by the government of Mexico include the establishment of baselines for GHG emissions for the gas and petrochemical sectors, and a roadmap to reduce black carbon to meet Mexico’s Nationally Determined Contribution.

IFC Management Comments

IFC Management would like to thank IEG for its evaluation of the World Bank Group's support to pollution management. IFC Management commends the IEG team for a thorough process, including extensive consultations and peer reviews, which led to a detailed, well-written, and thoughtful report. The report pulled together an extensive set of data points and information. Lumping, analyzing and synthesizing information on pollution across investment and advisory programs is a challenging task. The outcomes of the review are interesting, the recommendations are clearly articulated, and IFC Management will take findings of the evaluation into consideration.

Environmental and social sustainability is critical to the success of private sector businesses, and for their customers, surrounding communities, other stakeholders, and the environment. As rightly pointed out in the report, IFC's direct contribution to pollution management is the result of different areas of business: (i) investments in projects targeting pollution management, such as water and sanitation and waste management; (ii) investments in pollution-intense sectors with the implementation of management and mitigation measures, based on the adoption of IFC's environmental, social and corporate governance policies, guidelines, and tools; (iii) climate-related projects; and (iv) advice in public-private partnerships (PPPs) helping national and municipal governments partner with the private sector to improve infrastructure implementing good international practice and Environmental & Social (E&S) management. Indirectly, IFC's Performance Standards and Environmental, Health, and Safety (EHS) Guidelines are widely adopted as market standards, which are nowadays embedded in operational policies by corporations, investors, financial intermediaries, stock exchanges, regulators, and countries. This helps emerging markets raise their pollution management standards and level the playing field. IFC Management is pleased to see that the report acknowledges the leading role of IFC in setting and keeping up to date the EHS Guidelines for a large set of sectors. IFC believes that the implementation of Performance Standards 2012 and the stronger emphasis on the EHS Guidelines is already having a greater positive effect on pollution management than Performance Standards 2006, which were adopted for the projects included in the IEG's evaluation.

IFC Management shares the concern that political opposition or limited political support are factors impacting on success of wastewater and solid waste treatment and disposal PPPs. One of the primary causes of the limited political support to the implementation of wastewater and solid waste treatment and disposal PPPs is the perceived lack of affordability of the service fees. This has an impact on IFC's capacity to provide advice on the development of pollution abatement infrastructure and to mobilize private sector capital for this purpose. IFC also supports IEG's observation that tariff schemes and governments' reluctance for both political and social considerations to raise fees affect project performance and challenge operational sustainability of projects and operating agencies. This may be an area World Bank, IFC, and MIGA could work together to develop a set of financial and contractual instruments to improve the affordability of pollution abatement infrastructure PPPs and present gradual tariff increase plans.

IFC notes that, while the report uses the terms "Climate Change Portfolio" and "Climate Change Projects", in practice IFC does not have a climate portfolio—what exists is a portfolio of projects

where a share (or one component) of the finance is considered a climate cobenefit. It is only in the cases of Renewable Energy or Green Buildings and some ad-hoc schemes that qualify as 100 percent climate related. In this sense, counting projects may not be the right indicator if we want to measure or compare progress, as many projects may have only minor components for pollution abatement or climate action. As the World Bank Group follows the Joint Multilateral Development Bank Methodology for Climate Finance Tracking, which is based on a follow-the-money approach, only the specific component that delivers climate benefits is counted as climate financing. IFC believes a similar approach could be considered to identify and track pollution related components in projects. Based on the above, and to be consistent with the metrics used to assess progress on World Bank Group climate targets, IFC suggests that a useful exercise would be to look at finance volumes to see the penetration of pollution abatement practices in the World Bank Group portfolio. This would require metrics to identify components, such as capex for vapor recovery systems, within each project and then count the amount of finance that it is specifically deployed for pollution abatement.

IFC Management is pleased that IEG's evaluation concluded that IFC's Advisory Services projects aimed at enhancing resources and energy efficiency with a pollution focus were largely successful. IFC has been making significant efforts to develop a largely successful program deploying knowledge and expertise in service delivery to achieve positive outcomes with efficiency savings and cleaner productions, and including training and capacity building.

The report's main conclusions and recommendations are well defined and IFC is broadly aligned with them. Recommendation 5 is about increased advisory work on pollution related issues. This is consistent with IFC's strategy, which has strong emphasis on enhanced client support, strategic advisory, and getting the clients to make necessary funding available for pollution management. IFC Environmental and Social Specialists directly support clients as part of the enhanced supervision of projects and via advisory work, including the development of tools and services to support clients with applying the Performance Standards. A Strategic Advisory Program has been launched and is under full development. Further work is ongoing to provide technical resources and flexible support to help address unexpected E&S challenges faced by IFC clients that are beyond the client's ability or responsibility to address on their own. As appropriate, IFC is also looking for opportunities to work upstream to address E&S constraints that impact multiple potential IFC clients, such as cumulative impacts mitigation and management on an airshed or a watershed.

MIGA Management Comments

Useful report with important findings. Overall, MIGA finds the IEG evaluation report useful and important. The evaluation assesses the World Bank Group's effectiveness in addressing pollution concerns in client countries through direct (targeted) and indirect (use of safeguards and performance standards) interventions. Despite data limitations, the evaluation offers good insights into the MIGA experience regarding support for pollution management through its guarantee projects.

MIGA's experience with pollution prevention implementation. The evaluation states that for a significant number of MIGA guarantee projects, sufficient information on pollution prevention implementation was not available at the time of IEG's project level evaluations. However, MIGA notes: (i) only a small number of MIGA guarantee projects were reviewed, making it difficult to apply broad conclusions to the entire portfolio; and (ii) more than 70 percent of its portfolio has reporting requirements through annual monitoring reports, with a specific section on Performance Standard 3 (if applicable). Also, if projects are not in compliance with the EHS Guidelines with respect to emissions at approval, they are given a definite timeframe to bring them into compliance, failing which MIGA has the option to cancel the guarantee. The compliance timeframe given to projects varies across sectors and therefore, may not match the early operating maturity criteria used for project evaluations, typically three years past Board approval.

MIGA also notes that the finding of lack of "sufficient" information is more of a comment on quality of information—which has now been addressed by MIGA with the introduction of the 2013 Environmental and Social Sustainability Policy and the 2014 Environmental and Social Review Procedures, which require annual monitoring reports from project enterprises and monitoring site visits by MIGA E&S specialists. In addition, MIGA notes from the IEG evaluation that for those projects where data were available, 62–75 percent of projects met pollution prevention requirements.

Addressing pollution through MIGA guarantee projects. In its discussion on addressing pollution through private sector projects supported by MIGA, the evaluation report states that the most important success factor is the project enterprise commitment and technical and financial capacity in managing pollution associated with its operations. MIGA fully agrees with this assessment as well as with the report's finding that MIGA's due diligence is important for assessing the commitment and capacity of the project enterprise and for identifying risks and developing potential mitigation measures. MIGA also agrees with the report's finding that MIGA's engagement and communication with the project enterprise throughout the entire process improves its commitment and capacity, and projects are more successful.

Improving leverage through guarantee contracts. The evaluation report states that in all successful projects, MIGA fully includes environmental and social requirements in the Contract of Guarantee (CoG) for the guarantee holder and project enterprise to legally commit to meet pollution-relevant requirements. MIGA also fully agrees with the assessment and notes that MIGA uses conditions precedent in some instances as leverage to ensure that some actions are met before the CoG is signed.

¹ Attina, T.M., and L. Trasande, 2013. "Economic Costs of Childhood Lead Exposure in Low- and Middle-Income Countries." *Environ Health Perspect* 121: 1097–1102.

management action record

Improved data monitoring to show the need and efficacy of pollution interventions

IEG FINDINGS AND CONCLUSIONS Data on pollution are not available in a systematic manner for the major types of pollutants. For ambient air pollution, data availability varies drastically, with only 39 cities located in only 10 countries in Sub-Saharan Africa having data. The World Health Organization's own map of locations of air quality monitoring stations reveals large blank areas across the globe. There are only 55 countries with data on all aspects of wastewater treatment.

Within the World Bank's portfolio targeting pollution management, relatively few interventions sought to build pollution monitoring systems. Yet, the lack of quality data on pollution, its cost, and the cost-effectiveness of pollution abatement interventions increases the difficulty of building a case for governments to undertake pollution abatement interventions or borrow from the World Bank for this purpose. This suggests that the World Bank needs to scale up support for building client country pollution monitoring systems. The Pollution Management and Environmental Health (PMEH) program, established in 2015, could contribute to this scale up, but its time-bound operation raises questions of sustainability for such efforts.

IEG RECOMMENDATIONS Recommendation 1: Strengthen World Bank's efforts, including through technical assistance and capacity and institutional building, to develop client country pollution measurement and monitoring systems, especially in countries where such capacity is low.

These systems should provide quality data in a transparent and systematic manner and effectively contribute to informing policy makers and the public about pollution priorities, recognizing that efforts to build such monitoring systems are likely to require initial trust fund support, as some client countries may be unable or unwilling to borrow for such purposes.

ACCEPTANCE BY MANAGEMENT Agree

MANAGEMENT RESPONSE Management is committed to strengthening client countries' pollution measurement and ground-level monitoring systems. Effective functioning of such systems requires adequate equipment, human resources, updated monitoring infrastructure, and institutional and regulatory frameworks. The process of setting up a conducive environment is time-intensive and requires strong coordination and client ownership. In many developing countries, the support provided for monitoring and measurement in earlier pollution management projects is not sustained due to the lack of technical capacity of the relevant agencies. The recommendation is welcome to enhance the focus on building capacity for the enforcement of regulations and the technical capacity of regulators.

The Country Environmental Analysis can help countries prioritize and act on pollution concerns

IEG FINDINGS AND CONCLUSIONS Knowledge of the effects of pollution and the associated costs are important prerequisites for a concerted approach to fight pollution in client countries. The World Bank's main country-level environmental diagnostic, the Country Environmental Analysis (CEA), is instrumental in preparing the knowledge base on pollution issues in general, raising awareness about pollution priorities and prioritizing them so policy makers can act on them. CEAs were found to be comprehensive in their advice and identification of pollution concerns, but inconsistent when it comes to conducting an in-depth analysis on the identified pollution concerns. Most important though, CEAs have only been prepared for 42 of a total 151 active client countries, likely because of funding constraints, and the preparation of CEAs is not necessarily focused on countries with poorer environmental performance. In the relatively few countries where CEAs are prepared, uptake of their recommendations in country strategies is limited.

IEG RECOMMENDATIONS Recommendation 2: Strengthen the World Bank's country analytical work on pollution, in particular such analytical work that allows countries to prioritize their pollution concerns based on a country-wide and comprehensive assessment, and deploy such analytical work to cover more countries and target countries more strategically. Ensure more consistent quality of this work. This broader coverage will likely require a dedicated funding for such analytical work and involve a more strategic use of country-level analytical work that prioritizes countries with the greatest health benefits from pollution control. It will also require a more comprehensive integration of the identified pollution priorities in the SCDs and subsequent country strategies.

ACCEPTANCE BY MANAGEMENT Agree

MANAGEMENT RESPONSE Management supports the report's recommendation to strengthen analytical work on pollution more broadly and strategically. Experiences from multiple client countries demonstrate the crucial role of analytical work in building solid engagement with client countries on pollution management, including not only CEAs, but also Policy-level Strategic Environmental Assessment, Policy Notes and other ASAs aimed at identifying pollution priorities and proposing interventions to address them. Management is committed to conducting analytical work that can catalyze pollution control interventions. Such work has been conducted for example in Bangladesh, China, Colombia, Lao People's Democratic Republic, Peru, Mexico, Egypt, Macedonia, Pakistan, and Vietnam. In many of these countries, findings from World Bank-financed analytical work have underpinned pollution management interventions at both the national and subnational levels, including policy, investment, and capacity-building operations. Furthermore, many countries have also adopted recommendations derived from the analytical work related to consolidating environmental aspects in the productive sectors and strengthening pollution management, with and without the World Bank's direct support. The need for strong client ownership is particularly evident in those countries with limited capacity and resources. In such countries, the findings of analytical work have not been carried forward through World Bank-financed operations due to competition from other development priorities and constraints on available World Bank Group resources.

Air pollution: higher mortality among the poor

IEG FINDINGS AND CONCLUSIONS Over the past two decades, pollution and its effects on the poor have worsened for much of the world. Yet, the World Bank's (as well as the World Bank Group's) efforts dedicated to fighting local and regional pollution concerns have lost relative importance in the overall portfolio.

Looking at the composition of the portfolio of pollution-targeted World Bank interventions more closely, this evaluation finds that the World Bank has provided sustained financing for wastewater infrastructure but has potentially missed opportunities for fighting outdoor and indoor air pollution even though these two types of pollution are responsible for a higher share of deaths than unsafe water. The recently increased efforts to support client countries in managing outdoor air pollution, including through the PMEH program, need to be further scaled up. Other specific pollutants (mercury, lead, pesticides, e-waste, and so on) have also received little attention in the portfolio, despite the suffering of several million people from exposure and related health effects.

IEG RECOMMENDATIONS **Recommendation 3: Intensify efforts to scale up and recalibrate the World Bank's efforts in pollution management to address the most important pollution priorities.** In doing so, the specific circumstances of the poor and their exposure to pollution should be considered, including outdoor and indoor air pollution as well as specific pollution threats (for example, lead, mercury, pesticides, chromium or e-waste) when warranted by their potential harm. Integrating pollution aspects more systematically into other sectors, for example, urban transport and energy, would be part of such an approach.

ACCEPTANCE BY MANAGEMENT Agree

MANAGEMENT RESPONSE Management is committed to scaling up and recalibrating its efforts in pollution management to address the most compelling pollution priorities. For example, in recent years, policies aimed at reducing pollution in Bangladesh, Colombia, China, Lao PDR, Mexico, Morocco, Peru, Zambia, and Vietnam have produced tangible health benefits for people of all backgrounds.

Leveraging climate mitigation to address air pollution

IEG FINDINGS AND CONCLUSIONS World Bank Group's interventions that explicitly address outdoor air pollution are not commensurate with the damage this form of pollution causes. Air pollution interventions account for only 33 percent of all pollution-targeted interventions, while they are responsible for 42 percent of deaths caused by pollution in developing countries. However, the World Bank Group's rising engagement in climate change mitigation can also be considered an increase in the World Bank Group's efforts to address local air pollution. Across the 804 climate change interventions approved during the evaluation period, this evaluation found that 45 percent of their components are likely to have cobenefits on air pollution. But to date, these climate change interventions are not designed as air pollution mitigation projects; hence they lack project monitoring systems that would track the potential decrease of primary pollutants, such as sulfur dioxide, nitrogen oxides, or PM2.5. They may also not have been designed to optimize conventional pollution abatement. And it remains unclear to what extent they are likely to address local pollution concerns in areas where pollution matters the most for the poor. Emphasizing the pollution abatement cobenefits of climate change mitigation interventions could also help to build the case to governments for such activities.

IEG RECOMMENDATIONS Recommendation 4: Leverage the World Bank Group's climate change portfolio to better combat local and regional air pollution and other applicable forms of pollution. This will require designing future climate change mitigation interventions (including, for example, investments, lending, policy and ASA work and advisory services) so that they address local and regional air pollution issues.

ACCEPTANCE BY MANAGEMENT Agree

MANAGEMENT RESPONSE Management recognizes that the WBG is well positioned to build more synergies between efforts to fight pollution and tackle climate change. Rather than viewing mitigation of GHG emissions as an entry point to fighting air pollution, Management is committed to supporting the reduction of air pollution using technologies and instruments that often are much less costly than some of the GHG mitigation interventions. Management underscores the need to bolster coordination between air pollution and GHG mitigation, including through strong support for energy efficiency to attack both.

In addition, Management is committed to strengthening linkages between climate change mitigation, water pollution control and wastewater treatment and integrated waste management, including municipal solid waste disposal. For example, management of methane emissions from landfills contributes to improving air quality and reducing GHG emissions.

Helping private sector clients meet Performance Standards

IEG FINDINGS AND CONCLUSIONS Most International Finance Corporation (IFC) investments and Multilateral Investment Guarantee Agency guarantee projects meet the pollution-relevant Performance Standards. However, there is room for improvement in project performance as about one-third of IFC client companies do not meet the relevant requirements of air emissions and wastewater guidelines. One of the most important factors for clients that successfully meet standards are their technical capacity for pollution management. IFC Advisory Services have often been used to successfully raise client technical capacity on pollution, these services could be deliberately targeted toward clients that struggle to meet Performance Standards.

IEG RECOMMENDATIONS Recommendation 5: For clients that lack the required knowledge, IFC should strengthen their support to help these clients to better comply with Performance Standards on pollution by offering advisory services. Building on the successful experience of advisory services in energy and resources efficiency, this will require offering such services to those IFC investment clients that lack the technical capacity to meet these standards.

ACCEPTANCE BY MANAGEMENT Agree

MANAGEMENT RESPONSE Recommendation 5 is consistent with IFC strategy which has strong emphasis on enhanced client support, strategic advisory work, and getting the clients to make necessary funding available for pollution management. IFC E&S Specialists directly support clients as part of the enhanced supervision of projects and via advisory work, including the development of tools and services to support clients with applying the Performance Standards. A Strategic Advisory Program has been launched and is under full development. Further work is ongoing to provide technical resources and flexible support to help address unexpected E&S challenges faced by IFC clients that are beyond the client's ability or responsibility to address on their own. As appropriate, IFC is also looking for opportunities to work upstream to address E&S constraints that impact multiple potential IFC clients, such as cumulative impacts mitigation and management on an airshed or a watershed.

chairperson's summary: committee on development effectiveness

The Sub-Committee of the Committee on Development Effectiveness met to consider the document entitled *Toward a Clean World for All—An IEG Evaluation of the World Bank Group's Support to Pollution Management* and the draft response by Management of the World Bank Group Institutions.

The Sub-Committee welcomed the report and commended IEG for a timely and comprehensive assessment, particularly given the recent Lancet Commission Report on Pollution and Health, which also highlights the severity of pollution and its effects on mortality, productivity losses, and health care spending. Members were pleased to learn that Management concurred and was fully committed to implement IEG's recommendations.

Members highlighted the benefits of cost-benefit analysis of pollution management, and urged Management to extend the reach of country analytics through environmental diagnostics and to mainstream pollution in the Systematic Country Diagnostic in a more systematic way. They encouraged Management to assist client countries strengthen their pollution measurement and monitoring systems. Some members underscored the important role that the World Bank Group can play in strengthening the capacities of agencies at the country and local levels tasked with enforcing compliance with local regulations.

Members also highlighted the need to intensify efforts to scale up and recalibrate the World Bank's pollution portfolio. A member suggested that going forward, climate change projects incorporate pollution abatement and related result metrics. They agreed that resources will need to be raised and prioritized for this work. They highlighted the role that the private sector could have on pollution management, called for additional collaboration and coordination- both internal to the World Bank Group and with other partners—and asked to further evaluate the links between pollution and gender.

1

Introduction: Pollution and Development

highlights

- 1** High growth rates in many developing countries have helped reduce poverty but have also given rise to high levels of pollution.
- 2** The effects of pollution are overwhelmingly felt in developing countries, dwarfing major health care concerns such as human immunodeficiency virus / acquired immune deficiency syndrome; but pollution imposes also substantial economic costs, frequently in the range of 4–5 percent of a country's gross domestic product.
- 3** This evaluation is the first comprehensive assessment of World Bank Group's efforts on pollution management and focuses on the most serious pollution phenomena in poor countries: indoor and outdoor air pollution, water pollution, waste management, and toxic substances.

Introduction

Why Pollution Matters: A Rationale for World Bank Group Support

POLLUTION IS A BY-PRODUCT OF ECONOMIC ACTIVITY with real health and welfare impacts. Transport and industrial activities create air pollution in the form of particulate matter, nitrogen oxides, or sulfur dioxide; generate wastewater that, if left untreated, pollutes freshwater resources; and produce solid waste. Even cooking in poor families' households produces indoor air pollution, because burning wood or charcoal causes health-damaging pollutants such as fine particles and carbon monoxide. The challenge many developing countries face is managing the levels of pollution through policy making and investments in the needed infrastructure to keep pollution levels low and minimize their health and welfare costs.

Many developing countries have experienced high economic growth in recent decades, which is accompanied by poverty reduction but gives rise to high levels of pollution. Economic growth has been coupled with population growth, increasing urbanization, motorization of traffic, and vehicle use, and causing a gradual shift toward more industrialized economies.¹ At the same time, the provision of basic infrastructure for waste collection and disposal, wastewater treatment, and public transport has not kept pace. Thus, many developing countries suffer from worsening pollution—and will continue to do so. The economic growth up to 2030 will take place primarily in developing countries, with serious environmental implications, particularly regarding air and freshwater pollution (OECD 2008a).

Pollution takes an enormous toll in developing countries, dwarfing the effects from major health care concerns such as the human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS). Its death toll exceeds by far that of road traffic accidents. Approximately 9 million people are estimated to die from pollution, mostly young children (1.7 million) and older people (4.9 million) (Landrigan and Fuller 2016; Gurjar et al. 2010).² Ninety-four percent, or 8.4 million, of the 9 million deaths caused each year by pollution occur in lower-middle-income countries (Landrigan and Fuller 2016). Healthy life years lost from pollution in developing countries amount to 15 times that of developed countries.^{3,4} Within developing countries, the poor are hit particularly hard, as outlined in box 1.1.

Pollution imposes substantial economic costs, frequently in the range of 4–5 percent of a country's gross domestic product—often higher than official development assistance received which amounts to around plus or minus 1 percent of gross domestic product. Diseases caused by pollution increase health costs and inflict an unnecessary load on health care delivery. This diverts scarce resources from essential prevention programs (Landrigan and Fuller 2014).

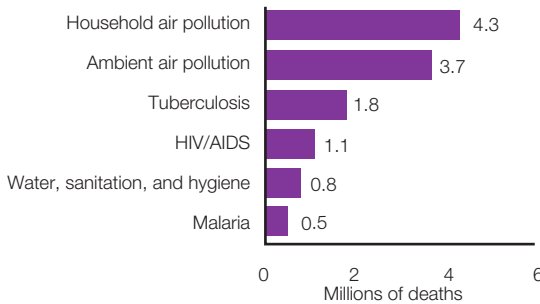
A Rationale for World Bank Group Support

The challenge is managing the levels of pollution through policies and investments that keep them reasonably low and minimize their health and welfare costs. Handling the tension between

Box 1.1 | Pollution and the Poor

The poor are hit particularly hard by pollution based on several factors, including exposure to pollution and lack of access to pollution mitigation measures. Poor people live in areas with the worst environmental conditions—for example, informal settlements lack access to clean water, sewerage, or waste disposal and are close to solid waste dumps or open waste burning sites, which contribute to ambient air pollution. The poor also rely often on wood or charcoal for cooking, exposing them to dangerous levels of household air pollution.

Figure B1.1.1 | Annual Deaths Caused by Pollution and Major Health Concerns



In the world's poorest countries, the predominant forms of pollution are indoor or household air pollution, ambient air pollution, and contaminated drinking water (figure B1.1.1). In addition, the poor suffer from contamination by waste and toxic substances. About 3.5 million people suffer from mercury-related health effects.

Lead pollution affects about 3 million, pesticide from agriculture

2.2 million (including agricultural workers and pesticide traders and handlers), and chromium from leather tanning about 1.8 million.

Sources: WHO Global Estimates of Burden of Disease Caused by the Environment and Occupational Risks, published at http://www.who.int/quantifying_ehimpacts/global/en/ and WHO 2014, 2014a and 2014b, 2016a and 2016b; Dasgupta, Meisner, and Mamingi 2005 and Dasgupta et al. 2005; Cairncross and Kolsky 2003, Biello 2014.

Note: Note that for toxic substances, data are exposure figures; hence, they are not visualized in the figure.

pollution and growth relies on a set of enabling factors and policies. Organisation for Economic Co-operation and Development countries have already made significant progress in addressing many environmental challenges over the past few decades. Pollution from industrial sources, for example, has been reduced, and the use of natural resources, water, and energy has, to some extent, been decoupled from continuing economic growth. This progress was made possible by a set of “enablers” and policies, summarized in box 1. 2.⁵



Box 1.2 | Enabling Factors and Policies to Manage Pollution

Awareness of the magnitude of pollution and its effects. Addressing pollution requires international, national government, and public awareness about pollution, its severity, and associated costs.

Understanding the cost of solutions. Awareness needs to be combined with a better understanding of solutions. Pollution cleanup and prevention are not necessarily prohibitively expensive. Affordable, low-cost solutions, including simply breaking exposure pathways, often exist, for example, in indoor air pollution, where better ventilation can decrease risk by up to 70 percent.

Strategic prioritization as part of the development agenda. To operationalize the fight against pollution, countries require an agreed-on overall development agenda that prioritizes combating pollution as part of their broader development pathway.

Sufficient institutional capacity along with adequate technical and financial resources. Developing countries face many competing priorities and limited budgets with which to address pollution problems, aggravated by institutional weaknesses, fragmentation of the pollution agenda across several agencies, and lack of technical competence and human resources. Technical and financial support is needed to improve the required infrastructure to address pollution, coupled with efforts to boost institutional capacity.

Regulation and effective enforcement. Unregulated markets can result in excessive pollution. The cost of pollution is mostly not reflected in a company's accounting practice and hence not reflected in the prices that consumers pay for these goods. Long-term policy frameworks that allow environmental costs to be priced into economic activities (for example, through green taxes and tradable permits or regulation, or the elimination of fuel subsidies) are required to make green technologies cost-competitive and provide business with the know-how and incentives to innovate products and production processes. But even where regulations do exist, countries still need to have the capacity to enforce these standards and regulations.

Sources: Oates 2006; OECD 2008b; Porter and van der Linde 1995; Global Alliance on Health and Pollution website, <http://www.gahp.net/new/what-is-gahp/working-with-gahp/IEG>; Dasgupta et al. 2004.

Through its range of tools and services, including project investments, policy operations, and advisory services, the World Bank Group can help establish these enablers and design the right set of policies in its client countries to allow them to learn from those countries that have successfully tackled their pollution problems.⁶

Motivation for the Evaluation

The importance of fighting pollution is confirmed by the recently adopted Sustainable Development Goals. In 2015, the global community's goalposts were revised, and 17 new Sustainable Development Goals were adopted. Primarily anchored in goal 12: Ensuring Sustainable Production and Consumption,⁷ pollution is referenced by 10 of these goals. Yet environmental pollution has received less than 0.5 percent of global development spending (Landrigan and Fuller 2016).

A “clean world” with “low pollution and low emissions” is an explicit strategic objective of the World Bank Group, per its latest environmental strategy of 2012, *Toward a Green, Clean, and Resilient World for All* (World Bank 2012b). But addressing pollution issues is not a new priority of the organization. Over the past 12 years, FY04–17, the World Bank Group approved 534 pollution-relevant activities, accounting for approximately US\$43 billion in commitments.

This evaluation is the first comprehensive assessment by IEG of pollution management efforts and is central to its work program. To date, the aggregated effectiveness of these 534 interventions has not yet been evaluated. This study is the first stock-taking exercise focusing on those pollution phenomena that affect poor countries the most, that is, air and water pollution and waste. With this focus and in taking a cross-sectoral approach, the evaluation complements IEG's evaluations on urban transport and on water supply and sanitation (World Bank 2017b and 2017e).⁸ It comes timely, after a period in which climate change attracted considerable attention and alarming reports by leading health agencies, including the World Health Organization (WHO), reached the development community about the widespread lethal effects of pollution. This evaluation is also central to the IEG strategic engagement area of environmental sustainability. This report will deepen evidence about the implementation and results of World Bank Group activities directly and indirectly aimed at encouraging environmental sustainability while promoting inclusive growth and poverty reduction.

Theory of Change and Approach

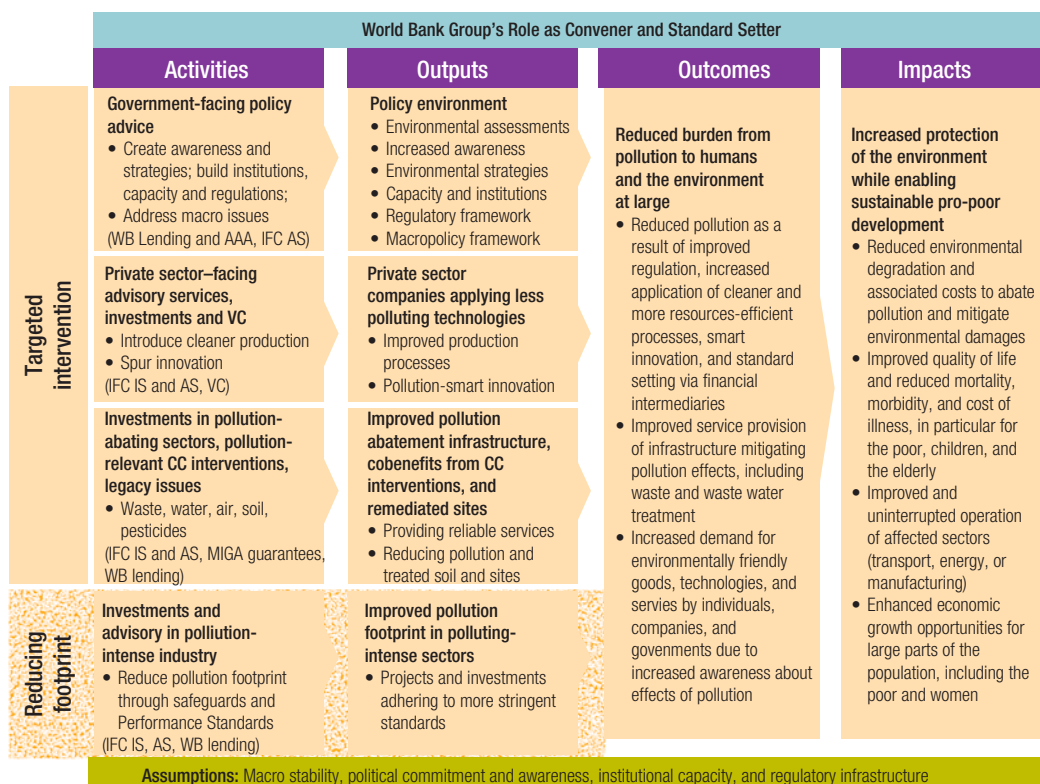
The overarching questions that IEG seeks to answer in this evaluation are, “To what extent has the World Bank Group been relevant, effective, and efficient in addressing pollution concerns in client countries through (i) targeted interventions and (ii) the use of safeguards and Performance Standards in pollution-heavy industries? Going forward, how well is it equipped to support countries moving toward a ‘clean world for all?’” To answer this question, a theory of change articulates the development impact assumptions underlying the World Bank Group's activities in pollution management.

The theory of change in figure 1.1 links the various World Bank Group interventions with outputs and intended outcomes and effects. In summary, the World Bank Group uses its government-facing policy advice to put in place the policy framework for an improved pollution management agenda. This includes creation of awareness through country analytics and policy dialogue. In parallel, IFC's private sector-facing Advisory and Investment Services promote the adoption of cleaner production

and more efficient processes. Complementary to this, the World Bank Group uses IFC Advisory and Investment Services, MIGA guarantee projects, and World Bank lending to improve pollution-abating infrastructure—mainly wastewater and waste management facilities. In addition, the application of World Bank safeguards and MIGA and IFC Performance Standards is intended to reduce the footprint of pollution-intense sectors. These outputs, if the assumptions of the results chain hold true, translate into the outcome, that is, reduced burden from pollution, decreased health risks, and increased protection of the environment, while enabling sustainable pro-poor development.⁹

The evaluation follows a mixed-method approach involving six methodological instruments to cover the sectoral, national, and global dimensions of World Bank Group support to pollution management: (i) a strategic mapping of global and regional environmental concerns and the World Bank Group response; (ii) a portfolio review of World Bank Group projects and activities, gathering and analyzing project design features, results indicators, and drivers for success and failure; (iii) desk reviews of 52 country strategies and a sample of 30 Country Environmental Analyses (CEAs); (iv) five country case studies involving field missions (Ghana, Colombia, Indonesia, the Arab Republic of Egypt,

Figure 1.1 | Theory of Change for World Bank Group Pollution Interventions



Note: AAA = analytic and advisory activities; AS = Advisory Services; CP = cleaner production; CC = climate change; IS = Investment Services; WB = World Bank; VC = venture capital.

and Croatia); (v) two literature reviews addressing the linkages between the climate change and the pollution agenda, and the trade-offs between managing pollution and sustainable economic development, respectively; and (vi) field-based project evaluations.¹⁰ Further details on the scope, evaluation approach, and its limitations are summarized in appendix A.

Although this theory of change visualizes the pathway toward results in a linear flow model, this evaluation recognizes the multisectoral and cross-cutting nature of pollution. The evaluation focuses on the major forms of pollution that matter the most in developing countries: indoor and outdoor air pollution, wastewater, waste, and toxic substances (box 1.1).

This report is structured in the following way. Chapter 2 presents relevant World Bank Group strategies and interventions and provides an assessment of to what extent the World Bank Group's response was adequate and relevant. Typically, a minimum of an enabling environment must be available for pollution management to be effective; hence, in chapter 3 the report assesses the World Bank Group's support in countries to build or improve the enabling environment. Chapters 4 and 5 assess the World Bank Group's effectiveness in investments. Chapter 6 looks beyond projects at the World Bank Group's engagement with client countries through knowledge work and policy dialogue.

ENDNOTES

¹ Outlook on the Global Agenda 2015, World Economic Forum 2015, available from <http://reports.weforum.org/outlook-global-agenda-2015/top-10-trends-of-2015/6-rising-pollution-in-the-developing-world>.

² See also "Pollution the Silent Killer of Millions in Poor Countries," on the Global Alliance on Health and Pollution website at <http://www.gahp.net/new/pollution-the-silent-killer-of-millions-in-poor-countries>, retrieved April 2016.

³ This trend is further aggravated by relocating polluting industries to poor countries where production costs are low and environmental regulations and public health infrastructure are often absent. (Laborde et al. 2015).

⁴ The death toll from pollution is also seven times higher than the one from road traffic accidents, which killed 1.25 million in 2013. Similar to pollution, traffic accident deaths are concentrated in developing countries: More than 90 percent of the world's road fatalities occur in developing countries. See http://www.who.int/gho/road_safety/mortality/traffic_deaths_number/en.

⁵ For a more detailed analysis of the tensions between pollution and development, see the results of the IEG-commissioned literature review, summarized in appendix C.

⁶ This forms the rationale for World Bank Group support for the management of pollution: (i) Inform policy makers about the cost of pollution, advise them on policy options for abatement, including the costs of abatement and the design of legal and regulatory frameworks; build institutions and their capacities to address pollution issues; increase general awareness in client countries to create broader and unified support for costly pollution mitigation measures. (ii) Finance infrastructure and services that either abate pollution directly (for example, waste management or wastewater treatment) or indirectly (such as by building mass transport systems as an alternative for urban commuters to using polluting vehicles). (iii) Improve how markets work by overcoming market failures such that products and services are delivered in a more sustainable manner. World Bank Group support for policy interventions such as taxation of pollution or the elimination of fuel subsidies can help internalize these environmental costs. And (iv) support technical diffusion and innovation for clean production processes, through, for example, IFC cleaner production interventions, investments, and Advisory Services.

⁷ LeBlanc (2015) has developed a detailed network map for the Sustainable Development Goals and, intriguingly enough, goal 12 (Ensuring Sustainable Production and Consumption) has the most network connections (14) to the

other goals. This would be fairly intuitive in terms of the broad economic nexus of the goal, but the linkages to the other environmentally linked goals deserve attention. This goal is most directly associated with pollution externality concerns, and the network analysis highlights how reaching the broadest range of development outcomes can have an effect on the environmental sustainability of production and consumption systems.

⁸ This evaluation complements IEG's evaluations on water and sanitation and on urban transport (World Bank 2017e and 2017b). In this pollution evaluation, a substantial section of the "targeted" World Bank lending portfolio (about one-third) addresses pollution issues related to wastewater. The focus of evaluating these projects was on investigating the downstream water quality aspects, that is, pollution issues related to wastewater and water treatment. This evaluation did not address sanitation and water supply and treatment issues. As pollution has no spatial boundaries, it assesses rural and urban aspects of pollution. Relevant projects in the transport sector will therefore be assessed from a pollution angle, including those in urban transport. Although the recently completed evaluation on urban transport focused on the infrastructure aspects, the pollution evaluation focuses on the effects of transport (and urban transport) projects on local air pollution, including efforts to develop a policy framework and systems to monitor such pollution effects.

⁹ Note that this evaluation focuses on assessing the relevance of World Bank Group activities, their efficiency, effectiveness, and sustainability at the outputs and outcomes level.

¹⁰ In China, Egypt, and Croatia, and a regional program in Africa.

2

The World Bank Group's Strategy and Portfolio

highlights

- 1** The most recent environmental strategy, from 2012, *Toward a Green, Clean, and Resilient World for All* presents a World Bank Group-wide unified environment strategy, emphasizing the link between pollution and the poor.
- 2** The World Bank Group's engagement in pollution during fiscal years (FY)04-17 comprises some 534 interventions, which accounts for US\$43 billion in commitments, managed by multiple World Bank Group entities across several sectors with various levels of focus and concentration.
- 3** The World Bank Group's efforts in fighting pollution did not keep pace with increasing global pollution levels.
- 4** Mapping global pollution priorities against World Bank Group resource allocation reveals a mixed picture. The World Bank Group provided sustained financing for wastewater infrastructure while at the same time missing


opportunities to fight indoor and outdoor air pollution.

5 World Bank Group's strengthened engagement in climate change can be seen as an increase of the World Bank Group's efforts to address outdoor air pollution, if air pollution concerns are integrated systematically into its growing climate change portfolio.

World Bank Group’s Strategies to Address Pollution

World Bank Group strategies have long incorporated pollution concerns, but the emphasis has shifted from “mainstreaming” to a more targeted approach over time. Pollution concerns were already prominent in the 1992 *World Development Report*, which stated that inadequate attention had been given to environmental problems that damage the health and productivity of the largest number of people, especially the poor (World Bank 1992). The 2001 environment strategy—which remained the central strategy relevant for pollution until 2012—focused exclusively on the World Bank. Although the strategy prominently featured pollution concerns, it emphasized the need to integrate (that is, mainstream) environmental concerns into country development programs, sector strategies, and investments (World Bank 2001). IFC and MIGA focused mainly on pollution management at the project level.

Most recently, the World Bank Group presented a unified environment strategy for 2012–22, *Toward a Clean, Green, and Resilient World for All*. This strategy establishes strong links between environmental concerns—degradation, pollution, and overexploitation of natural resources—and economic progress. The “clean agenda”—one of three agenda items of the 2012 strategy—addresses pollution by directly calling for an advancement of low pollution, low emissions, and clean air and water resources.¹ The strategy also emphasizes the link between pollution and the poor and women and children in particular, and the pollution-related challenges faced by growing urban centers (World Bank 2012b). The World Bank Group’s strategies have been supported by a system of Environmental, Health, and Safety (EHS) Guidelines, safeguards, and Performance Standards (box 2.1) to manage effects of pollution at project level, adding to its efforts that target pollution directly.



Box 2.1 | Environmental, Health, and Safety Guidelines; Safeguards; and Performance Standards

The International Finance Corporation (IFC) published over 60 Environmental, Health, and Safety (EHS) guidelines for a range of sectors. The World Bank Group EHS guidelines contain the performance levels and measures that are normally acceptable and applicable to projects. The guidelines are applicable to all projects regardless of the host country requirements. Currently, both the World Bank, IFC, and the Multilateral Investment Guarantee Agency (MIGA) address air, water, and land pollution management using the World Bank Group EHS Guidelines as referenced in the World Bank Operational Policy 4.01 and IFC and MIGA Sustainability Frameworks. The World Bank Group EHS Guidelines are undergoing review and update, considering lessons learned, technological improvements and GIIP, and evolving regulatory frameworks. A number of updated guidelines, including some pollution-intense sectors, have been issues for consultation and subsequently published.

Source: World Bank Group EHS Guidelines.

A Snapshot of the Portfolio Addressing Pollution

The World Bank Group’s engagement in pollution is multisectoral and cross-cutting. Over FY04–17, the World Bank Group had 534 projects that “target” pollution management directly, with a commitment of US\$43 billion.² These are the primary focus of this evaluation and are summarized in table 1.1. Further details on the portfolio are provided in appendix B along with a typology used to classify pollution concerns and interventions in appendix D.

In addition, the World Bank Group approved 956 IFC investments and 168 MIGA guarantee projects during the evaluation period (not listed in table 2.1). Through the application of Performance Standards (IFC and MIGA) and safeguards (World Bank) the World Bank Group has the potential to reduce the pollution “footprint” of these projects, albeit indirectly. They are hence considered the secondary focus of this evaluation. Although they are part of the overall evaluation portfolio, the assessment approach is different because the analysis concentrates solely on the role played by Performance Standards and safeguards in managing pollution. Though these are applicable to all projects, this evaluation focuses on those projects in which pollution concerns played a major role and a pollution-related standard was applied, that is, projects in pollution-intense industries.³ For the World Bank, this evaluation focuses on 114 projects with elevated environmental risks, or category A projects.⁴

TABLE 2.1 | World Bank Group Targeted Pollution Interventions by Institution (FY04–17)

| Institutions | Number of Projects | Number of Evaluated Projects |
|---|--------------------|------------------------------|
| World Bank lending (IBRD, IDA, or GEF) ^a | 317 | 144 |
| IFC investments ^b | 77 | 7 |
| IFC Advisory Services | 123 | 31 |
| MIGA guarantee projects | 17 | 4 |
| Subtotal | 534 | 186 |
| World Bank ASA (ESW or TA) | 397 | — |
| Total | 931 | 186 |

Source: IEG portfolio review (FY17 projects as of March 2017).

a. Plus 86 additional finance agreements and supplements.

b. Few evaluated projects are available as more than 80 percent of these projects were approved on or after 2010 and are thus not yet operationally mature.

c. ASA is not evaluated at the project level, so no evaluative evidence is available.

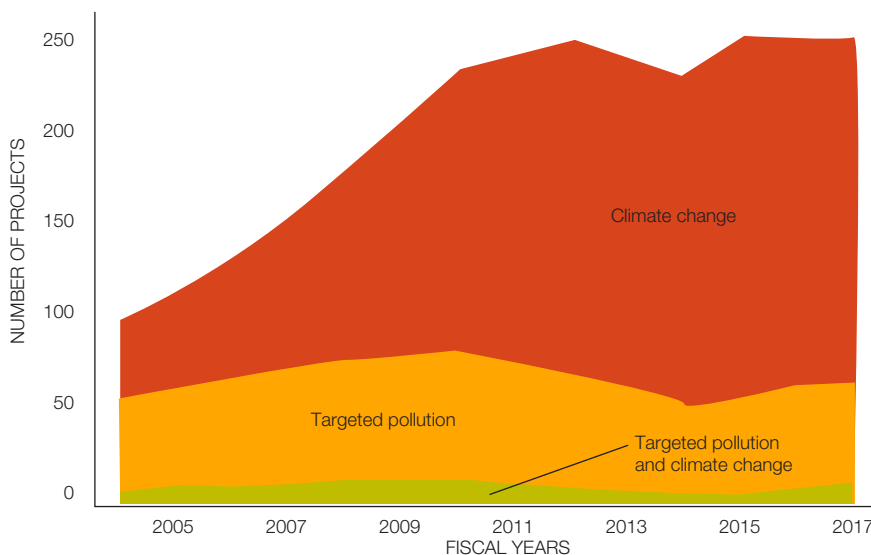
Note: ASA = Advisory Services and Analytics; GEF = Global Environmental Facility Trust Fund; IBRD = International Bank for Reconstruction and Development; IDA = International Development Association; ESW = economic and sector work; TA = technical assistance.

The World Bank Group has also approved 804 climate change projects (excluding Advisory Services and Analytics [ASA] projects). These interventions either aim to reduce greenhouse gases (GHGs) or pursue adaptation or resilience as their objective. From those trying to reduce GHG emission, one can expect them to also reduce the emission of conventional pollutants; hence they have so-called “cobenefits.” Although these “climate change–only” projects are outside the scope of this evaluation, their cobenefits are analyzed to reflect a comprehensive and fair picture of the World Bank Group’s fight against air pollution.

The number of World Bank Group interventions that target pollution issues remained stable in absolute terms, but their share shrank in relative terms owing to the large increase in climate change projects. Targeted pollution management projects remained relatively flat over the period FY04–FY17 while the number of climate change projects increased by about 300 percent (figure 2.1). Therefore, the targeted portfolio shrank in relative terms. Similarly, the relative share of pollution-targeted interventions of each institution’s total portfolio also decreases over time, except for IFC Investment, which remains flat.

Low-income countries take on pollution projects less often than countries in other income levels. Targeted pollution management interventions account for 3 percent of the World Bank Group’s support to low-income countries, over 4 percent of total projects in lower-middle-income countries, and almost 5 percent of total projects in upper-middle-income countries, an approximately 67 percent increase compared with low-income countries. This trend remains true for individual

Figure 2.1 | World Bank Group Targeted Pollution and Climate Change Portfolios (FY04–17)



Source: IEG Portfolio Review (note: FY17 projects as of March 2017)

institution's portfolios and is particularly strong for financing levels. Targeted pollution management in low-income countries accounts for just under 1 percent of all IFC investments and 5 percent of World Bank investment and policy lending.

When low-income countries take on World Bank Group support for pollution, pollution concerns are often integrated into loans supporting other sectors, particularly when it comes to development policy lending. In low-income countries, most pollution concerns are integrated into broader policy operations not focused on environmental or pollution concerns directly (70 percent), such as the Macroeconomic and Fiscal Management and Finance and Markets Global Practices. For upper-middle-income countries, that share is less pronounced with 55 percent.⁵

Most of the World Bank Group's targeted pollution efforts, across all countries and income levels, address waste and wastewater treatment. Often waste and wastewater are addressed in conjunction, largely because wastewater and drainage channels are de facto conduits for solid waste and need to be addressed in a coordinated if not joint manner. This is followed by projects that address both waste and wastewater pollution in conjunction with ambient air pollution problems and stand-alone ambient air pollution. Projects dealing with indoor air pollution concerns represent the smallest share across all income levels.

The World Bank's pollution-targeted portfolio contains a sizable share of interventions that address toxic substances in the form of industrial waste, but it deals much less with other toxic substances such as lead, mercury, or e-waste. Of all pollution-targeted projects, 19 percent (or 117 projects) address toxic substances.⁶ Of these, 85 percent (or 100 projects) relate to mitigating direct toxic exposure and 15 percent (or 17 projects) to indirect pathways, such as agricultural runoffs.⁷ Looking at the interventions addressing direct toxic exposure risks, industrial waste and persistent organic pollutants⁸ are most often addressed (in 52 and 28 projects, respectively). Other substances (for example, heavy metals, including lead, mercury, chromium, and arsenic [18 projects]; uranium [4]; pesticides [7]; dioxins and furans [3]; and e-waste [1])⁹ are addressed less frequently. These projects are usually categorized as solid waste projects (73 percent) or dedicated projects on obsolete pesticides and / or POPs (22 percent) and are hence subsumed under these types of interventions in the subsequent sections.

Is the World Bank Group's Response to Pollution Adequate?

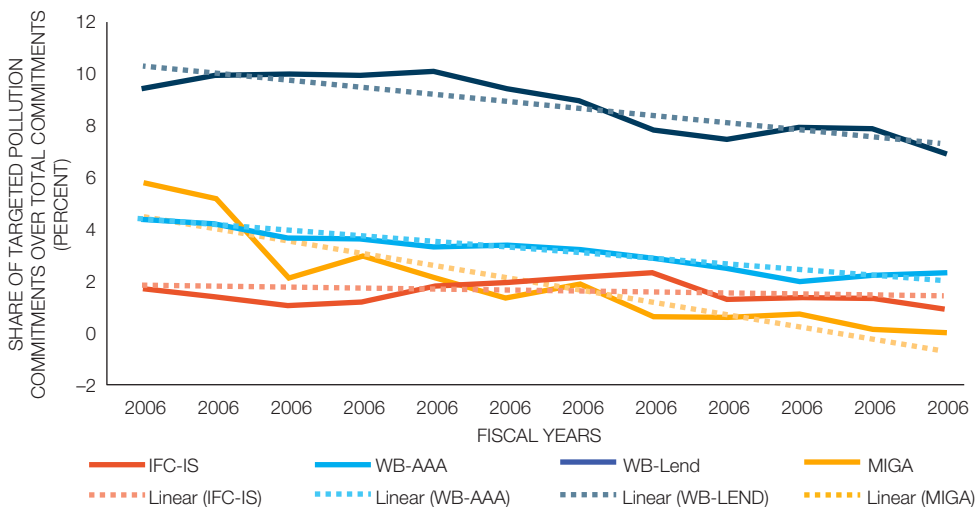
Over the past two decades, pollution and its effects on the poor have worsened. From 1990 to 2013, premature mortality attributable to particulate matter (PM) increased by 30 percent, from 2.2 million to 2.9 million deaths per year.¹⁰ The number of deaths caused by ambient air pollution rose continuously in all regions, except for Europe and Central Asia. Global welfare losses from exposure to PM rose 63 percent over the same period, reaching \$3.55 trillion (World Bank 2016a). In 3,000 cities around the world, PM levels increased by 8 percent between 2008 and 2013, particularly in low- and middle-income Regions where 98 percent of cities do not meet WHO guidelines on air quality (WHO 2016a).¹¹ For indoor air pollution, despite the reductions in exposure and death rates,

the total number of deaths has remained stable at about 2.9 million per year.¹² Waste production increased, and waste collection and disposal in most countries could not keep pace, leading to open burning of waste and uncontrolled disposal, which in turn results in air pollution and frequent leakages of toxic effluents into surrounding groundwater from uncontrolled dump sites (Bhada-Tata and Hoornweg 2012). Only water pollution shows a moderate improvement. Between 1995 and 2015, deaths from unsafe water decreased by 34 percent in low- to upper-middle-income countries (from 1.9 million to just over 1.2 million). Even there, ambient water quality is getting worse—with levels of pathogen pollution and organic pollution worsening in more than 50 percent of river stretches in Latin America, Africa, and Asia from 1990 to 2010.

Yet, the World Bank Group’s efforts dedicated to fighting pollution remained flat in absolute terms and declined as a share of the total portfolio, possibly aggravated by the general increase in postcrisis lending (figure 2.2). This trend also holds individually for all World Bank Group institutions. Examples from the recent past, however, indicate, that it is possible to scale up support to pollution management, including through large-scale projects that address priority pollution issues.¹³

Additionally, the World Bank’s research efforts on pollution represent only a very small fraction of its overall research efforts. Between 2003 and 2013, the Development Economics Group (DEC) delivered 25 research publications focused on pollution management (averaging two per year). Over that same period, they delivered over 1,300 publications on other issues (averaging 122 per

Figure 2.2 | Share of Pollution Interventions Relative to Rest of Portfolio (FY04–17)



Source: IEG portfolio review (FY17 projects as of March 2017).

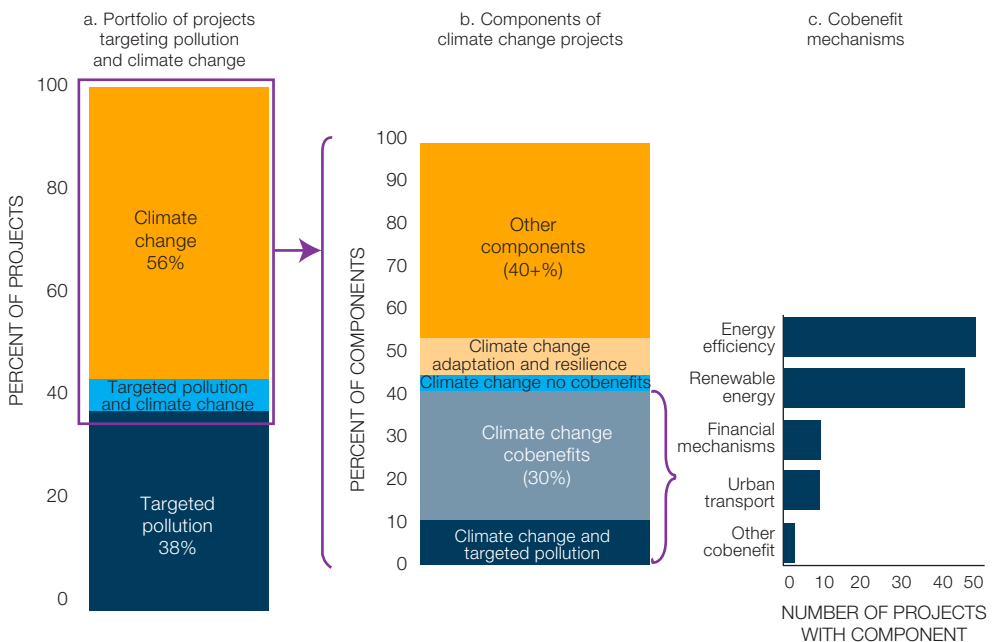
Note: AAA = analytic and advisory activities; CC = climate change interventions; Comts = commitments; IFC = International Finance Corporation; IS = investment services; Lend = lending; MIGA = Multilateral Investment Guarantee Agency; TPM = targeted pollution management interventions; WB = World Bank.

year). This means that pollution management represents less than 2 percent of all the Development Economics Group publications in 2003–13.

World Bank Group’s strengthened engagement in climate change can, however, be seen as an increase of the World Bank Group’s efforts to address ambient air pollution. Climate change interventions aimed at reducing GHG emissions are also likely to affect local air pollution, that is, the emission of PM or SO₂. To better understand potential cobenefits from climate change mitigation interventions on other types of pollution, IEG commissioned a comprehensive literature review. This review concluded that even though there is considerable quantitative literature estimating the local pollution cobenefits of climate change mitigation interventions, the size of these cobenefits is highly uncertain because substantial methodological variation across studies and the lack of any common standards in results reporting makes comparisons difficult.¹⁴

Across the 804 climate change interventions, 45 percent of components are likely to have cobenefits on air pollution (figure 2.3b).¹⁵ These include mainly energy efficiency and renewable energy activities, followed by financial mechanisms to foster climate change activities and transport projects with clear air pollution cobenefits (figure 2.3c). As quantification of the actual cobenefits is highly contextual, this analysis cannot provide a precise estimate of the World Bank Group’s total efforts related to fighting air pollution; however, it reveals that its actual ambition is more pronounced than could be derived

Figure 2.3 | World Bank Group Climate Change Portfolio and Associated Cobenefits



Source: IEG portfolio review (FY17 projects as of March 2017).

from just looking at those interventions that target air pollution directly. Of the remaining 55 percent, 10 percent of components aimed at adaptation or resilience, and the remaining 45 percent were mitigation interventions without obvious direct pollution cobenefits. For more details on the literature review on cobenefits, see appendix C.

However, these climate change interventions are not designed as air pollution mitigation projects. They lack project monitoring to track the potential decrease in conventional pollutants, such as PM, nitrogen oxides (NO_x) or SO₂. They may not have been designed to optimize conventional pollution abatement. And it remains unclear to what extent they are likely to address local pollution concerns that matter the most for the poor.¹⁶

The interlinkages between climate change and local pollution emission reduction have already been recognized in the World Bank Group's 2012 environmental strategy. The portfolio shows signs—albeit modest ones—that the World Bank Group's “work to strengthen the capture of cobenefits between GHG and local pollution emission reduction” is being operationalized. Between 2004 and 2012, on average 5 percent of all World Bank climate change lending operations also addressed air pollution, whereas as of 2012, this share increased to 6 percent (World Bank 2012b, 60). More specifically, the World Bank has already considered cases of potential complementarity between climate change mitigation and pollution abatement, especially in the policy sphere. IFC started to pilot Climate Smart Agriculture (CSA) in FY17 as an agribusiness approach that integrates climate-related benefits and pollution abatement practices.

Reflecting air pollution concerns in climate change mitigation interventions will require a cross-sectoral approach. To design projects that strike the right balance between mitigating GHG reduction and alleviating air pollution in a certain area, emissions of GHG as well as conventional pollutants (NO_x, SO₂, PM, and so on) from various sectors including their effects on air quality must be known, along with benefits from the reduction of GHG emission and local air pollution and associated costs of abating GHG emission and pollution for these sources. It would also require a sound understanding of the cobenefits that GHG emission reduction interventions have on local air pollution, which is highly contextual.

Another way of looking at whether the World Bank Group's resources allocation is synchronized with client countries' needs is by comparing its relative resources allocation to the magnitude of the major pollution challenges. Figure 2.4 depicts the amount of deaths caused by each type of pollution along with the relative share of the World Bank Group's portfolio in this area.^{17, 18}

Indoor air pollution receives relatively little attention, with only 9 percent of pollution interventions, even though it is responsible for 49 percent of deaths caused by pollution (figure 2.4a). These comprise 24 interventions that are part of the pollution-targeted portfolio and seek to advance fuel switching by supporting households in switching from using solid fuels (biowaste, coal, or wood) to less-polluting alternatives, such as liquefied petroleum gas. In addition, 53 projects aimed at increasing access to electricity were considered because of their potential to reduce exposure to indoor air pollution.¹⁹ Research, however, indicates that reduction in indoor air pollution cannot be assumed from electrification. Most poor people with access to electricity can afford to use it

only for lighting and running low-demand electrical appliances. Without marked improvements in socioeconomic conditions, electrification has little potential to bring about substantial reductions in indoor air pollution (Jamison et al. 2006).

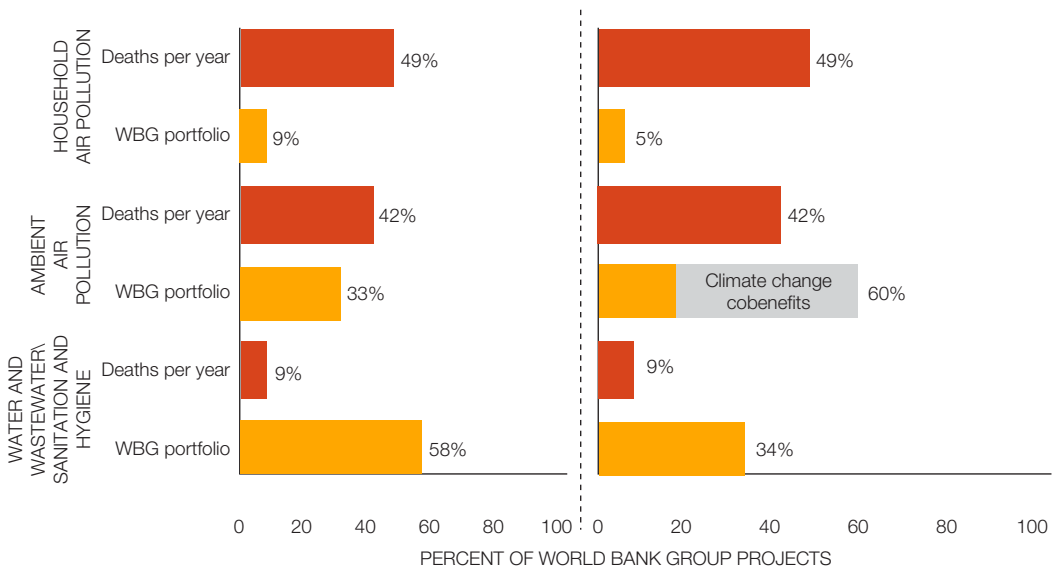
Despite the low number, those World Bank Group interventions that do address indoor air pollution focus on countries where it is the most serious problem. Almost half of World Bank lending interventions are in support of countries with the highest exposure to indoor air pollution.²⁰ Likewise, World Bank ASA support is also focused on countries that need it most. The support to indoor air pollution is stable and has not accelerated yet after the 2012 environmental strategy.²¹

Interventions directly targeting outdoor air pollution are also relatively few, compared with the magnitude of global deaths caused by it. About 33 percent of the World Bank Group’s pollution portfolio projects address air pollution concerns while outdoor air pollution is responsible for about 42 percent of global deaths (figure 2.4a).²² When taking all GHG mitigation projects into

Figure 2.4 | **Global Deaths from Pollution versus World Bank Group Resource Allocation**

a. Global deaths vs. World Bank Group resources allocation (excluding CC projects)

b. Global deaths vs. World Bank Group resources allocation (including CC projects)



Sources: WHO Global Estimates of Burden of Disease Caused by the Environment and Occupational Risks, published at http://www.who.int/quantifying_ehimpacts/global/en/ and IEG portfolio review (FY17 projects as of March 2017).

Note: Gray shading shows climate change contribution to ambient air quality through cobenefits. CC = climate change; WBG = World Bank Group.

account, as outlined above, the World Bank Group's response to indoor air pollution would be more commensurate with the health effects it causes, as visualized in figure 2.4b.²³

In addition to the main pollution areas of air pollution, solid waste and wastewater, several pollutants specifically threaten the poor. Research estimates that about 3.5 million people suffer from mercury-related health effects; lead pollution affects about 3 million, pesticide from agriculture 2.2 million, chromium from leather tanning about 1.8 million and e-waste (Dasgupta, Mesiner, and Mamingi 2005 and Dasgupta et al. 2005; Biello 2014). Yet these substances are addressed rarely by World Bank interventions: heavy metals (including lead, mercury, chromium, and arsenic) in only 18 interventions, pesticides in seven, and e-waste in only one.

ENDNOTES

¹ Pollution undoubtedly also links to the other two agendas in the strategy, but mainly in an indirect fashion. The “green” agenda on the sustainable management and conservation of natural resources is relevant for pollution in the context of contamination of these resources, for example. The “resilient” agenda deals with preparation for shocks and adaptation to climate change and is hence also relevant for pollution because climate change intertwines with air pollution (and other forms of pollution).

² These projects reference pollution management as their development objectives or pursue such activities under one of their components.

³ These pollution-intense industries include cement; brick, tile, and ceramic; textiles; glass; pulp and paper; chemicals; primary metals; oil, gas, and mining; power; food and beverage; animal production; and agriculture.

⁴ A project is classified as category A if it is likely to have significant adverse environmental effects that are sensitive, diverse, or unprecedented.

⁵ World Bank investment operations tend to focus on pollution, whereas development policy operation pollution concerns are often one of several policy areas addressed. Most World Bank projects (80 percent) targeting pollution have substantial pollution management components, with at least 30 percent of the components focused on managing pollution. For development policy operations, pollution tends to be integrated into broader agendas, as only 40 percent of development policy operations have a substantial pollution component.

⁶ Toxic and hazardous substances find their way into different media, becoming a significant threat to environmental and human health. Some of these substances, like POPs, have both local and global effects, whereas others, like lead, can have localized effects, adversely affecting productivity and growth in affected humans (especially children).

⁷ Toxic substances can have a direct effect, like toxicity from lead entering the human system through inhalation of fumes or the ingestion of solid lead after it touches one's hands (therefore “directly” affecting human health). These direct effects can often be attributed to occupational hazards, like handling obsolete pesticides, handling pesticides for agriculture, remediation of radioactive mines, or handling e-waste (such as lead in batteries). Other pathways are more “indirect”; for example, effects from pesticide or fertilizer runoff that enter ground or surface water sources, leading to drinking water contaminated with such hazardous material.

⁸ Including polychlorinated biphenyls (PCBs).

⁹ These figures need not add up to 117 because one project may address more than one pollutant.

¹⁰ Although the age-standardized death rate from PM_{2.5} exposure has decreased in most countries since 1990 because of overall improvements in health, population growth and increased exposure have nonetheless increased the number of premature deaths (World Bank 2016a).

¹¹ See also “Air Pollution Levels Rising in Many of the World's Poorest Cities” at <http://www.who.int/mediacentre/news/releases/2016/air-pollution-rising/en>.

¹² The age-standardized death rate from household air pollution decreased from 75 deaths per 100,000 persons in 1990 to 47 per 100,000 in 2013, a 38 percent drop (World Bank Group 2016).

¹³ The Bank has supported pollution abatement in a range of countries, both directly through environment projects and through integration in other sector operations, and has used projects to target air pollution and hazardous waste. A recently approved project in Zambia addresses lead pollution threats from mining, engaging with health agencies to reduce environmental health risks. A new program for results operation in China conditions disbursements on specific improvements addressing outdoor air pollution from industry and transport, and indoor air pollution through deployment of clean cookstoves. A newly approved policy lending operation in Lao People's Democratic Republic seeks to help set up standards and monitoring for air pollution, arsenic, and lead. These projects have not yet been closed nor evaluated hence this report cannot opine on their effectiveness, but they should be regarded illustrative examples of what is possible.

¹⁴ In energy and industry, the largest cobenefits come from replacing coal combustion with less-polluting fossil fuels, replacing fossil fuels with renewable energy, improving energy efficiency, and improving the characteristics of coal via coal washing and briquetting. For buildings, the largest air quality cobenefits are typically linked to improvements in energy efficiency and modifications in cooking stoves. Transportation studies typically aggregate the effects from a collection of interventions.

¹⁵ Analyzing the individual components of a statistically representative sample of the 670 climate change interventions addressing "climate change only" (and not referring to pollution), 45 percent involved mechanisms from which pollution cobenefits can be expected. A random sample of 145 projects was drawn from the population of the 570 climate change projects identified at that time (~7 pct error, 95 pct confidence).

¹⁶ Integrating air pollution management aspects into climate change projects also represents a win-win opportunity for both client countries and the World Bank: such interventions would not only reduce greenhouse gas emission and hence contribute to a public global good, they would also contribute to resolving local pollution concerns.

¹⁷ For consistency across variables and with other references in the report, IEG used figures from WHO 2012. Although other, more recent sources were identified, the trend depicted in figure 2.4 does not change in terms of substance. For example, IHME 2015 identifies deaths from household air pollution as 2.9 million (lower-bound = 2.2 million and high-bound = 3.6 million), ambient air pollution as 4.2 million (lower-bound = 3.7 million and upper-bound = 4.8 million), and unsafe water sources as 1.25 million (lower-bound = 1.0 million and high-bound = 1.9 million).

¹⁸ This global mapping of priorities and resources allocation must be seen in context. Making meaningful progress toward Sustainable Development Goal 6 on water supply and sanitation still requires an increase in the scale and speed of wastewater and sanitation service provision (World Bank 2017d; World Bank 2017e). For other pollution concerns, public funds may lend themselves less to addressing pollution issues. For example, in agriculture or industrial pollution management, abatement costs are the responsibility of the private sector, and fewer types of interventions exist to support these efforts through public funding.

¹⁹ Of these 53 projects, half (26 projects) refer to indoor air pollution only in their context or environmental section and without specifying the pathways and conditions under which increased access to electric power would also lead to reduction in indoor air pollution.

²⁰ For such a quantitative analysis, the universe of client countries was divided into quartiles, based on pollution exposure data. This division yielded four discrete categories depending on the level of pollution: "lowest," "low," "middle," and "high." Proxy measures for "pollution exposure" for indoor air pollution were the "household air quality" and for outdoor air pollution the "PM_{2.5} exposure average," both according to the Yale Environmental Performance Index.

²¹ For IFC Advisory Services and investments, the number of projects is marginal and does not allow for a meaningful conclusion. MIGA has no intervention in this space at all.

²² According to 2015 IHME data, deaths from ambient air pollution amount to 4.2 million (lower-bound = 3.7 million and upper-bound = 4.8 million).

²³ Note that the World Bank Group has recently increased its efforts to support client countries in managing air pollution, particularly countries that suffer the most from it. Forty percent of all interventions targeting air pollution support the quartile of countries with highest pollution levels.

3

Improving the Enabling Environment

highlights

- 1** Pollution management is complex and multidimensional, encompassing several disciplines that are often administered by different agencies.
- 2** The World Bank Group supports client country governments in their efforts to create or improve the enabling environment for pollution management, primarily through World Bank investment lending operations and development policy operations.
- 3** Policy operations concentrate on creating regulatory frameworks and strategies, whereas investment operations most frequently provide institutional capacity building.
- 4** Building national pollution monitoring systems received relatively little attention, particularly in policy operations; most operations aim at the prevention and treatment of pollution.

5 Policy operations that encompass measures to strengthen the enabling environment to manage pollution are less successful than comparable policy operations without a pollution focus.

6 Investment operations sought to enhance the enabling environment of client countries for pollution management performance as well as comparable projects and the portfolio as a whole.

7 Diagnostics and analytical work to underpin policy and investment operations are important for the success of both types of operations.

8 A conducive government environment toward implementing critical changes, strong government support for taking specific actions, and substantive content and design based on robust analytical work, explains the success in policy lending.

POLLUTION MANAGEMENT is complex and multidimensional, encompassing several disciplines that are often administered by different agencies. Effective pollution management relies on a set of enablers, summarized in box 1.1, that together constitute the “enabling environment” for pollution management. This section addresses the effectiveness of World Bank Group interventions aimed at creating the enabling environment so policy making can happen and institutions are in place to manage a country’s pollution agenda. Interventions that involve public or private finance of infrastructure are discussed in chapter 4.

Focus of World Bank Group Interventions to Improve the Enabling Environment

The World Bank Group supports client country governments in their efforts to create or improve the enabling environment for pollution management through International Bank for Reconstruction and Development (IBRD) / International Development Association (IDA) lending. These interventions provide government-facing policy advice aimed to create awareness, develop strategies, create regulatory frameworks, build capacity, or help establish monitoring systems and corresponding standards, and data collection and sampling methods; at times, they also seek to adjust macro frameworks, for example, by abolishing disincentives for pollution abatement, such as fuel subsidies. Typically, this policy advice is the domain of the World Bank, including both lending (IBRD/IDA) and nonlending (through Advisory Services and Analytics (ASA)).

Most policy support is delivered through World Bank investment operations and policy operations. Fifty-eight investment operations have standalone efforts on creating an enabling environment along with 43 policy operations;¹ these are the focus of this analysis. Of these, 19 investment and 28 development policy operations (DPOs) have been evaluated. An additional 240 investment operations deliver “upstream” support together with investments, for example, investments in waste or wastewater treatment infrastructure. These are typically institution and capacity improvement measures in support of these investments and are hence analyzed in chapter 4 along with the effectiveness of their investment component.

The World Bank Group supports all Regions, but both types of lending show strong variations. DPOs were frequent in Latin America and the Caribbean and Sub-Saharan Africa but were not prepared in support for countries in Europe and Central Asia. This raises the question of how the World Bank Group decides on the allocation of DPOs, as these countries—at least conceptually—are of higher income and with the suitable fiscal management capacities to be candidates for DPOs. Investment operations are strong in Sub-Saharan Africa and the other Regions mentioned above; the Middle East and North Africa and South Asia Regions receive the fewest though.

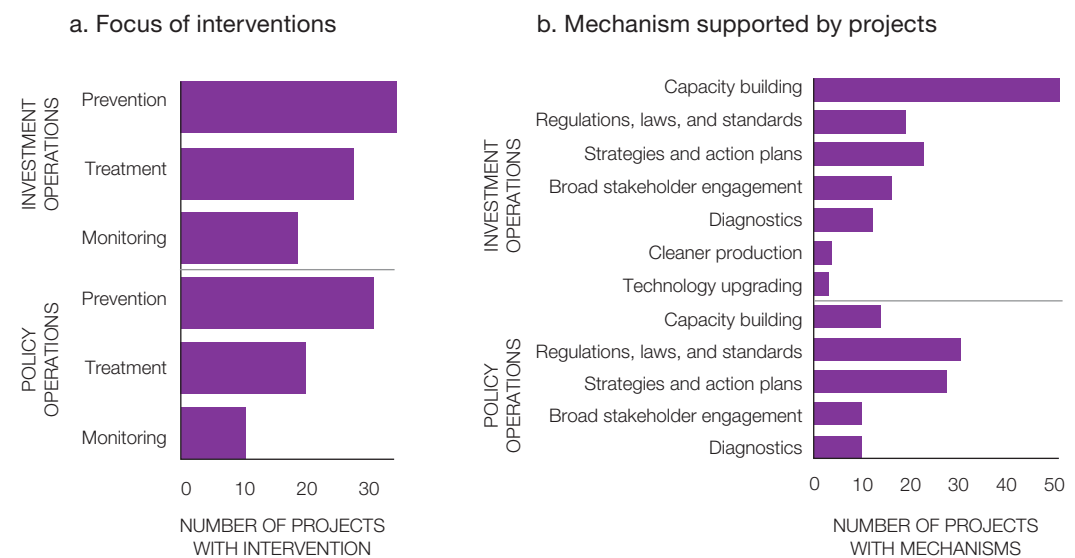
During the evaluation period, the World Bank provided mainly five types of policy support to improve the enabling environment in client countries for pollution management: (i) capacity building for institutions handling the country’s pollution management agenda; (ii) regulations and standards setting across various pollution areas; (iii) strategy development and design of national pollution agendas; (iv) stakeholder dialogue; and (v) diagnostics.

DPOs concentrate on creating regulatory frameworks and strategies, whereas investment operations most often provide capacity building. Many (33 out of 44) DPOs contained prior actions to strengthen the regulations in client countries, followed by developing strategies (30 out of 44 DPOs; figure 3.1b).

Investment operations frequently support capacity-building efforts. Fifty-two of the 56 operations contain at least one component aimed at enhancing institutional capacity. Investment operations are also used to develop strategies and action plans, laws, and regulations and standards, and to foster broader stakeholder engagement. To a small extent, these also provide more technical support in the form of cleaner production and technology upgrading (figure 3.1b).

Relatively few interventions sought to build pollution monitoring systems at country level, particularly in policy operations, when compared with prevention and treatment of pollution (figure 3.1a). Given that client countries frequently struggle to identify pollution priorities, that pollution data are often weak, and that the World Bank Group’s own support is not always well targeted toward the client country’s most serious pollution priority, this low emphasis on pollution monitoring is an important gap. The Pollution Management and Environmental Health program is a vital component in

Figure 3.1 | World Bank Policy Support by Focus of Intervention and Mechanisms



Source: IEG portfolio review (FY17 projects as of March 2017).

strengthening such support (box 3.1), but as projects funded by it were approved after 2015, it is too early to report on results.

Existing projects already demonstrate the feasibility of improving pollution monitoring systems, even in lower-middle-income countries with limited environmental capacity. In Bangladesh, successive projects supported improvements in air quality measurement through direct support for equipment and monitoring systems, but also continued support for capacity building of pollution monitoring departments, and support for legal and regulatory improvements including for compliance and enforcement. A recently approved project in Zambia seeking to address mining pollution includes monitoring and evaluation systems for public health tracking of lead levels in blood. In Peru, an environmental policy lending series was used to support improvements in air quality monitoring systems, along with raising permissible emission standards—though progress was lower than initially hoped. An environmental policy lending operation in Peru worked with the transport sector to reduce air pollution by improving fuel quality and vehicle performance standards.

Box 3.1 | The Pollution Management and Environmental Health Program Trust Fund

The Pollution Management and Environmental Health (PMEH) program, launched in 2015 as a six-year multi-donor trust fund, focuses on air quality management, water, and land pollution, and is shaped through dialogue with implementing countries, including China, Egypt, Ghana, India, Nigeria, South Africa, and Vietnam.

Its objectives are (i) to support developing countries to significantly reduce air, land, and water pollution through pollution management planning and investment; (ii) to generate and share knowledge on pollution and its health implications in urban, rural, and marine areas; and (iii) to promote awareness of PMEH issues among policy makers, business partners, city leaders, and the public.

The PMEH program has concentrated most of its efforts on air quality management, as the PMEH secretariat has facilitated the formulation of country-level air quality management planning across China, Egypt, Nigeria, South Africa, and Vietnam. The program also supports country efforts to strengthen political prioritization and operations related to contaminated and toxic site management. Specifically, it seeks to increase governments' capacity to prepare or update national pollution management plans, including site remediation prioritization, in low- and middle-income countries. Integrated solid waste management, including the protection of the maritime environment, is also an important part of the PMEH program.

Source: PMEH 2015.

Results and Lessons from World Bank Group Upstream Support

Investment operations with a targeted component to enhance the enabling environment of client countries did equally as well as comparable projects and the portfolio as a whole. Investment operations targeting pollution achieve successful development outcome ratings in 70 percent of cases, whereas projects in comparable sectors achieve successful development outcome ratings in 75 percent of cases, and the portfolio as a whole in 72 percent of cases.² Throughout this report, success is measured using the framework described in box 3.2.

Policy operations that encompass measures to strengthen the enabling environment to manage pollution are somewhat less successful than comparable policy operations without a pollution focus and less successful than the portfolio of policy operations. Seventy-one percent of policy operations that aim to improve the enabling environment for pollution management achieve a successful development outcome rating, compared with 75 percent of comparable policy operations and 78 percent of the rest of the portfolio.³

Associated diagnostic work is important for the success of both investment and policy operations. Investment operations with diagnostics achieved their targets in 56 percent of cases, compared



Box 3.2 | Assessing Performance of Pollution Interventions

The evaluation relies on two measures of “success.” (i) Development outcome ratings as a proxy of success are quoted as per established evaluative information available in World Bank Group project-level evaluation documents, including Implementation Completion and Results reports, Implementation Completion and Results Reviews, Expanded Project Supervision Reports, Project Completion Reports, and Public Expenditure Reviews. Referencing these ratings is meaningful when the object of analysis corresponds to the thrust of the interventions, that is, when it is a sizable component of what the successful implementation influences or is even largely responsible for a specific development outcome rating. When the term “development outcomes” is referenced directly, the Independent Evaluation Group used this rating. (ii) As pollution activities were often only components of projects, an additional “effectiveness framework” was developed to assess the performance of components. This framework also relies on evaluative information available in project-level evaluation documents both in terms of indicators and their results as well as qualitative information on the achievement of intervention targets. A three-level categorical array was designed to capture this information; these categories include positive results (full or substantial achievement of targets), negative results (modest or negligible achievement of targets), and no data or information available to assess achievement of targets. When terms like *success* or *high performance* are used, then the latter measure underpins the assessment.

with 44 percent of investment operations without diagnostics. Similarly, policy operations built on analytical work conducted as part of the operation achieved their targets in 70 percent of cases. Such work provides the analytical underpinnings for the design of the operation—the important role of which has already been stressed previously (World Bank 2016c). Additional lessons from policy lending operations indicate that environmental policy reform can take significant time to progress, so policy reform engagements can be more effective if they use instrument structures that allow for a longer period of engagement. Many successful operations have been structured as programmatic series, and a program in Peru used a deferred drawdown option which helped to extend program duration. Policy reform programs are more likely to be successful if they have ownership both from environmental agencies and from the leadership of other sectoral agencies who will be responsible for implementation. In addition, strong government support for taking specific actions, along with substantive content and design based on extensive analytical work, explains the success in DPOs with efforts on strategies, regulations, and laws (box 3.3) (World Bank 2016b).



Box 3.3 | Client Country Experience: Critical Success Factors for Policy Lending

In Colombia, one of the most widespread and serious problems is air and water pollution. Through three development policy loans (DPLs) for sustainable development, the government approved and implemented the National Policy on Environmental Health covering water and air quality, an Air and Water Pollution Control Policy, and a National Development Plan for air quality monitoring. A strong political will, reflected in the support of policy makers who helped draft laws and strategies, a comprehensive diagnostic effort by the World Bank through a high-quality CEA, were pivotal toward the achievement of DPLs' objectives. During the formulation and approval process, the Ministry of Finance and the Ministry of Environment played a critical role in ensuring cooperation and coordination of key agencies.

In Morocco in 2006, the country enacted its first law on solid waste management, along with laws on environmental protection and environmental impact assessments. Through two DPLs, the government established procedures and technical standards for landfilling, advanced a provincial and prefectural master plan for municipal solid waste, and implemented the country's Solid Waste Program. Like the Colombia DPLs, a strong analytical base combined with a supportive government environment and strong commitment ensured the success of municipal solid waste strategies and plans. The government was fully committed to the program and to achieving the development objectives. It made substantial efforts to implement prior actions and follow up on shortcomings in implementation.

Sources: IEG country case studies and portfolio review analysis.

The most prevalent support mechanisms in investment lending were capacity building and institution strengthening. Investment operations that contain capacity building components are successful in 53 percent of cases. Strong multi-stakeholder participation that includes all relevant agencies and a strong government commitment were identified as crucial for successful capacity-building efforts. Introducing a system that supports cooperation and dialogue in capacity building and technical assistance activities also facilitates the adoption of policies and strategies. For example, in China, the World Bank provided capacity building and technical assistance to pilot sustainable transport solutions in selected cities. These efforts were successful not only because of a strong government commitment and active participation by local agencies but also because of a city-to-city peer learning and knowledge dissemination through a nationwide platform.

Efforts to enhance client country systems to monitor pollution as part of investment operations tend to fail more often than those to prevent or treat pollution. Efforts to treat pollution work best, with 71 percent of interventions being successful. Interventions aiming to prevent pollution are successful in about half of the cases evaluated (52 percent); building pollution monitoring systems was only successful in 29 percent of interventions.⁴ The main reasons pollution monitoring efforts failed were overly ambitious goals, lack of government commitment, and failure to address legal and procedural prerequisites.

Despite progress in policy setting, countries struggle to enforce pollution regulations, a pattern found across country cases (Ghana, Egypt, and Indonesia). Constraints include conflict of interest, lack of political will, lack of incentives for local authorities to enforce regulations, and politicization (box 3.4).



Box 3.4 | Client Country Experience: Enforcing Pollution Regulations

In Ghana, a large body of laws—more than 100—pertain to the environment. However, the development of such policies has not slowed damage to the environment because constraints make them ineffective. These constraints include weak compliance and enforcement, conflicts of interest, lack of political will, and the politicization of issues. Ghana has several legislative and regulatory mechanisms to ensure the regulation of air quality, but efforts are hampered by lack of funds, inadequate data, and challenges in sharing information between institutions.

In Egypt, enforcement of industrial pollution standards remains a major challenge. The World Bank’s decade-long involvement has focused on setting up credit lines to finance a pollution abatement investment that firms are already legally obliged to undertake. Enforcement measures alone are insufficient, but the combined “carrot and stick” approach of the Egypt Pollution Abatement Projects II, in which lines of credit at below-market rates were provided to companies, led to significant pollution abatement in firms covered by the program.

(Box continues on the following page.)



Box 3.4 | Client Country Experience: Enforcing Pollution Regulations (continued)

In Indonesia, the government has tried to increase enforcement issues relating to deforestation and related air pollution, but provincial and local governments have little incentive to crack down on local businesses, and with very limited funding and capacity the central government environment agency can take on only a small number of cases of the largest offenders.

In contrast, in Croatia enforcement of regulation does not appear to be a major issue. The upper-middle-income country has high capacity and little heavy industry.

Source: IEG country case studies.

Resolving institutional issues and fostering interagency coordination are key ingredients in policy reform. Countries often suffer from institutional issues, for example, lack of funding, low capacity because of decentralization, or unclear or overlapping mandates of local agencies. As a country's pollution agenda is typically spread across a range of agencies, interagency coordination is often a challenge (box 3.5).



Box 3.5 | Client Country Experience: Institutional Issues

Decentralization is a challenge for Indonesia, where responsibility for many environmental management issues has shifted to provincial and municipal governments over the past 20 years—but without fully funding the decentralized responsibilities, and without the necessary level of capacity building needed to support the subnational entities. This leads to significant variation in the quality of environmental management across provinces and makes it difficult for the central government to act to improve environmental management even when it has an interest in doing so. Related issues are weak coordination between central and local governments, weak coordination between agencies with overlapping sector responsibilities, inadequate financial resources for environmental compliance and enforcement, and inadequate human capacity at all levels.

In Colombia, a complex institutional setup for pollution management is a major difficulty for addressing pollution concerns and is aggravated by decentralization, overlapping mandates, and uneven capacity and weak governance structures. Policy making is a central function but implementation is decentralized, which can contribute to a tendency

(Box continues on the following page.)



Box 3.5 | Client Country Experience: Institutional Issues (continued)

for policy mandates to be established that are beyond the capacity of municipalities to implement. The World Bank contributed to overcoming these challenges through a series of development policy operations, based on an excellent Country Environmental Analysis. Its analysis of the cost of environmental degradation enabled the Environmental Protection Agency to gain attention from other key ministries; the subsequent development policy operations provided a platform to successfully bring all stakeholders to the table—a mechanism that survived even the closure of the World Bank project.

In Croatia, the fragmentation of the water sector is a barrier to improving wastewater treatment. The plethora of small municipal water utilities increases costs, poses risks to financial viability, and limits capacity for managing and operating investments or complex facilities.

In Ghana, decentralization efforts for wastewater and waste management have delegated service delivery to local authorities but without adequate funding. Low revenue generation, low remuneration in the public sector, and low-cost recovery make it difficult to operate these systems effectively, much less carry out new infrastructure projects

Source: IEG country case studies.

ENDNOTES

¹ The 56 investment operations contain standalone efforts to enhance the enabling environment, plus investment components in the associated sectors that are not relevant to pollution.

² Note that the standards and methods used by the World Bank Group to assess success for policy operations versus investment operations are fundamentally different; therefore, success ratings for policy operations should not be compared directly with those of investment operations. Hence, the success of policy operations is discussed separately. Because of the relatively low number of evaluated policy operations (28) with a pollution emphasis, only the key drivers of success and failure are summarized: a more detailed analysis would require a larger number of operations.

³ Comparable policy and investment operations are defined as operations carried out by global practices that do work most similar to pollution-targeted interventions, including Environment and Natural Resources, Transport and ICT, Water and Sanitation, and Energy and Extractives.

⁴ Monitoring, treatment, and prevention were assessed as individual components of interventions using the assessment methodology introduced in box 3.1; ratings pertain to them individually. Hence, if a project contains more than one of these, each component still can be rated individually in the portfolio review database.

4

Addressing Pollution through Investments

highlights

- 1** World Bank interventions that provide investments for pollution management in client countries tend to be less successful than comparable interventions. Because these interventions span many sectors, performance drivers are sector specific.
- 2** Projects with Global Environment Facility grant funding have lower ratings owing to their tendency to support high-risk pilots and to difficulties in implementing them in coordination with other partners and agencies.
- 3** Addressing air pollution through urban transport interventions worked out relatively well. Broader and sustained environmental benefits were better achieved in projects with a comprehensive approach that included both upstream and downstream measures.
- 4** However, a large share of urban transport projects support the construction of roads and not public transport schemes from which one could expect pollution reduction

effects, raising the question of whether the World Bank has a consistent approach to integrating pollution concerns across all relevant sectors.

5 Addressing pollution through solid waste management and water treatment poses a range of challenges, reflected in lower success rates. Success in solid waste management projects often depends on the ability to recover costs and on institutional capacity of the municipalities in charge.

6 World Bank Group experience also points to the potentially positive role that the private sector can play in operating wastewater and waste management facilities—even in low-income countries.

7 The International Finance Corporation (IFC) provides advisory services that help client companies reduce or recycle waste, increase energy or resources efficiency, or introduce renewable energy. These services were largely successful due to the knowledge and expertise involved in service delivery.

8 IFC advisory services also support pollution management, by assisting client governments in structuring public-private partnerships in waste management and, to a limited extent, in wastewater treatment; however, these efforts often face political opposition and so frequently fail to reach commercial closure.

9 Similarly, IFC investments in waste and wastewater utilities are challenging investments because of governments' faltering commitment.

THIS CHAPTER takes a closer look at World Bank Group support to finance public infrastructure to provide advice on the various types of private sector participation and invest in companies that actively engage in the pollution agenda. This encompasses World Bank lending operations, IFC Advisory and Investment Services, and MIGA guarantee projects in support of the pollution-abating infrastructure in wastewater, solid waste, and air pollution management. Complementary IFC Advisory Services are evaluated in this context as well, including Cleaner Production or Sustainable Business advisory interventions. These are private sector client-facing engagements often complemented by IFC investments to upgrade production processes. Collectively, these activities are often referred to as “downstream support,” as opposed to support for improving the enabling environment, referred to as “upstream support.”

The World Bank Group’s downstream support involves work across a range of sectors and many different types of interventions; therefore, factors that affect performance are mostly sector specific. Relevant sectors include water and sanitation, management of residential and industrial waste and toxic chemicals (for example, obsolete pesticides or PCBs), transport, and energy. As the context, mechanisms, and implementation modalities differ greatly across these sectors, the below discussion offers an assessment of sector-specific performance drivers.

Addressing Pollution through Public Sector Lending

World Bank investments that support the pollution management agenda through public sector financing focus on financing solid waste and wastewater treatment infrastructure. Of the 317 World Bank investments that address pollution concerns, 288 focus on financing infrastructure works. Although financing projects include complementary technical assistance, institution strengthening, and even policy advice, at their core, these projects focus on financing the infrastructure needed to deliver pollution management services in client countries. Such public financing—which accounts for nearly 81 percent of the pollution-relevant public financing portfolio—helps build, rehabilitate, and upgrade waste and wastewater treatment infrastructure or treatment facilities.

Most of these projects are implemented by three World Bank global practices (GPs): Environment and Natural Resources (ENR); Social, Urban, Rural, and Resilience (SURR); and Water. Jointly these three GPs account for over 80 percent of all pollution financing. The Water GP alone accounts for 39 percent of pollution financing, focusing almost exclusively on wastewater collection and treatment infrastructure. Projects in SURR also exhibit a strong focus on solid waste management and wastewater treatment (74 percent). Projects managed by ENR likewise have a strong emphasis on waste and wastewater (58 percent) but also address more exotic pollution concerns such as the disposal of POPs.

Outdoor and indoor air pollution are addressed less frequently, mostly as part of urban transport projects and energy access projects. Outdoor air pollution is mostly addressed through projects that support mass transport in the context of urban transport projects; about two-thirds (69 percent) of the projects managed by the Transport and ICT GP that had a pollution management component address outdoor air pollution. Moreover, air pollution is addressed through clean energy access projects and clean fuel initiatives, with the first aiming to fight outdoor air pollution and the second indoor air pollution. These projects are typically implemented by the Energy and Extractives GP. In addition, about a quarter of urban development projects (24 percent) address ambient air pollution, usually in combination with waste and wastewater efforts.

Results and Lessons of Experience

Interventions that provide investments for pollution management tend to be less successful than comparable projects. Only 57 percent of targeted pollution projects achieve a successful development outcome rating, compared with 75 percent of comparable projects in similar sectors and 70 percent of the portfolio as a whole. To better understand why pollution-targeted projects have a lower performance, the underlying sector-specific factors are presented below.

Addressing air pollution through urban transport interventions was relatively successful, in line with findings from IEG's recent global evaluation of urban transport (World Bank 2017d; World Bank 2017b). This study found that 67 percent of urban transport projects with a pollution component achieved a successful development outcome rating. With this success rate, the portfolio of public finance projects in the Transport and ICT GP outperforms other parts of the portfolio (water and waste [58 percent] and environment [36 percent]). The World Bank has generally been successful in achieving its pollution mitigation measure targets in the urban transport sector. About 67 percent of the closed and evaluated projects that tracked environmental benefits from urban transport interventions achieved a reduction in emissions of air pollutants (and GHGs).¹ The remaining projects considered the environmental benefits from the installation or use of air quality monitoring systems or vehicle emissions inspection facilities. Positive effects were mostly limited to the specific project areas; broader and sustained environmental benefits were better achieved in projects with a comprehensive approach that included both upstream and downstream measures.²

However, a large share of urban transport projects support the construction of roads. About half (49 percent) of urban transport projects are "roads-only" projects, that is, they finance the construction and improvement of urban roads and not public transport schemes from which one could expect pollution reduction effects. Although urbanization increased during the evaluation period, the overall urban transport portfolio trend³ was flat.⁴ The number of public transit projects—metro, bus rapid transport, and conventional bus—increased only slightly, but average project size was smaller (World Bank 2017d; World Bank 2017b).⁵

Pollution management through wastewater treatment and waste management is often pursued jointly in the same project. The Water, SURR, and ENR GPs implement projects with a focus on wastewater treatment or solid waste management or a combination thereof; urban development projects tend to have a higher share of solid waste projects.

Addressing pollution through solid waste management and water treatment poses a variety of challenges, as reflected in the lower success rates of such projects. Development outcome ratings for projects with wastewater and waste management components were positive in 56 percent and 47 percent of projects, respectively. Looking at the performance of the specific component, performance drops to 50 percent for wastewater treatment efforts and 35 percent for cases where wastewater and solid waste are addressed jointly;⁶ 25 percent of solid waste management efforts succeed.

Wastewater treatment projects were constrained by weak institutional capacity. All nine wastewater projects that did not achieve a positive outcome rating identified weak institutional capacity as one of the key factors hindering their implementation. Such weaknesses in capacity were mostly through lack of expertise in technical design, procurement, and financial management, which led to start-up delays and increased costs. Projects were also affected by complex institutional setup, which required multiple institutions with varying levels of capacity to coordinate, often in a decentralized setting.

Moreover, difficulties in recovering costs challenged two-thirds of wastewater treatment operations and their sustainability. In six out of the nine projects with a negative outcome rating, policy factors and interjurisdictional issues were described as constraining implementation—for example, land acquisition and planning were delayed in Morocco, and sector legislation was inadequate in Tunisia. Tariff setting, however, was the most prominent policy factor also affecting six of nine projects reviewed. Tariff schemes affect project performance and challenge operational sustainability as governments are reluctant to raise fees due to social and political concerns and operating agencies are therefore unable to raise the needed funds to support their operational requirements. But projects can achieve a supportive tariff regime by building buy-in with key stakeholder groups and presenting compelling affordability assessments and gradual tariff increase plans that mitigate political and social risks.

Similarly, success for solid waste management interventions often relied on cost recovery and institutional capacity. Municipalities need capacities in procurement, contract management, and finance to be able to develop and maintain an effective and financially self-sustaining waste management system. Project-level evidence points at interjurisdictional issues, often related to clarifying the responsibilities for a waste dump site and land ownership questions, as well as the role of the informal sector in waste collection and recycling, which need to be managed well. For example, in the case of Ghana, where the World Bank helped construct several engineered waste sites through the Second Urban Environment and Sanitation Project, the question of which jurisdiction would be responsible for managing the sites delayed implementation. The sustainability of the constructed waste site relies on a cost recovery scheme based on cross-subsidization from higher-income families and commercial clients in support of poorer households, additionally supported by public subsidies. Conversely, factors that contributed to low ratings in projects include lack of information regarding the commercial sustainability of collection and disposal systems (Montenegro) and lack of cost recovery, limited capacity, and increase in the number of open dump sites (Tunisia).

Pollution management efforts financed by Global Environment Facility (GEF) trust fund grants achieved lower rates of success—which explains the overall low success rates of pollution

interventions managed by ENR. Such investments achieve a successful development outcome rating in only 36 percent of cases—26 points lower than investments addressing other environment concerns. However, analysis by funding sources reveals that this is largely due to poor performance by pollution-focused projects receiving GEF financing.

Several features contributed to the low performance of GEF-funded projects, including some related to the often pilot-nature of these projects. The portfolio of GEF-financed pollution projects is relatively small, and comprises mostly projects that support cleanup of POPs, reduction of water pollution from agricultural nutrient runoff production, and creation of constructed wetlands for water treatment. The reasons for poor performance of these projects include lack of measurement of effects (for example, on nutrient flows), struggles to implement new technology (because of weak capacity or local opposition), aspirations to achieve demonstration effects but without measuring these effects, struggles to work with partner agencies, insufficient prior diagnostics, and lack of buy-in from local governments (box 4.1).

Development outcome ratings of the 17 pollution-targeted projects in low-income countries were



Box 4.1 | Lessons from Global Environmental Facility Trust Fund Projects

An agricultural pollution control project in Croatia funded by the Global Environmental Facility Trust Fund (GEF) led to substantial improvements in agricultural practices in the pilot areas and implemented a financing mechanism for improving farm-level manure storage. Yet, it was unable to demonstrate improvements in nutrient reduction, in part because of weaknesses in and non-use of monitoring systems. The small project size and the GEF grant financing terms may also have contributed to a lack of attention and support from the World Bank and from the government, which weakened implementation and supervision.

In a GEF-financed program to destroy and prevent further accumulation of stockpiles of obsolete pesticides in six countries in Africa, complex partnership arrangements, driven in part by the GEF financing mechanism, resulted in conflicts in defining roles and responsibilities, challenges in effective coordination, and confusion in project interventions. These were an important factor in the failure of the program to produce synergies across countries and partly contributed to the inability to eliminate pesticide stocks and associated waste in the targeted countries.

However, in both cases, it was clear that the projects would not have occurred without grant-based GEF financing; governments were not willing to borrow for these types of projects.

Sources: World Bank (2016e, 2017c).

exceptionally high. Most (88 percent) exhibited successful development outcomes, compared with 54 percent and 44 percent in lower-middle-income and upper-middle-income countries. Even though these projects varied in their approach to addressing pollution, they showcase the positive role that the private sector can play even in low-income countries. These high-performance projects covered areas of urban development, environment, and energy and extractives. A common feature is strong private sector participation across three sectors: (i) the construction and rehabilitation of wastewater treatment; (ii) the operation of solid waste landfills; and (iii) efforts to reduce indoor air pollution through improved stoves (box 4.2).

Overall, the dominant factors that led to the success of these projects in low-income countries were high-quality supervision and monitoring and evaluation, strong project design, and government commitment. In the Kyrgyz Republic project, the establishment of a monitoring and evaluation program in the context of project implementation was a key factor in isolating and protecting abandoned uranium mining wastes from natural disturbances—such as landslides and floods—and leaching and dispersal by ground and surface water drainage. Quality of supervision, project design, and



Box 4.2 | Lessons from Involving the Private Sector in Low-Income Countries

In Vietnam, the cities of Dong Hoi, Quy Nhon, and Nha Trang mostly discharged urban wastewater without treatment and disposed of solid waste in uncontrolled open dumping sites. The World Bank invested in new wastewater treatment plants and the construction and expansion of landfills to address those issues. These investments were successful owing to the implementation of a user fee system recommended at appraisal and a strong public awareness campaign aimed at increasing the understanding of the benefits and affordability of services. In the end, a strong emphasis on cost recovery and revenue generation, private sector participation, and beneficiaries' buy-in benefited more than 800,000 Vietnamese citizens.

In Burkina Faso, about 90 percent of the population relies on wood energy for cooking and heating and uses inefficient household stoves that release large amounts of black carbon and carbon-based greenhouse gases. In this context, the World Bank financed the establishment of private sector and nongovernmental organization–based production facilities to distribute about 250,000 improved stoves within five years and to substitute fuel wood for liquid propane gas for large users. As a result, about 110,000 improved wood stoves were disseminated to households, exceeding the target to that date, and major fuel wood users switched to liquid propane gas, a fuel low in carbon content that produces minimal emissions.

Source: IEG portfolio review.

government commitment were also mentioned as important factors facilitating all aspects of project management and implementation while providing flexibility to adapt to changing circumstances. In the Moldova and Vietnam projects, those four factors were crucial when successfully managing highly toxic chemicals (POPs and PCBs), which can travel through air, water, and soil.

Across the whole portfolio, few projects contained information about the targeting of pollution abatement toward the poor or vulnerable groups. Although appraisal documents and analytical works referenced therein cover a wide range of concerns, only 20 percent of such documents contain information on specific population groups that could be affected by the pollution issue addressed. However, in many cases, projects address pollution concerns that affect an entire population and therefore—arguably—do not need to provide analysis about how such a concern affects specific populations.

Private Investments and Advisory Services in Support of Pollution Management

The private sector arms of the World Bank Group, IFC and MIGA, also contribute to the pollution management agenda by means of their investments, advisory services, and guarantees. IFC conducted 77 investments that are part of the pollution-targeted portfolio. Of these, 61 were in utilities to support their rehabilitation or modernization of water and wastewater infrastructures; in addition, IFC provided finance through its Cleaner Production Lending Facility to 16 companies for the implementation of cleaner production efforts, that is, efforts aimed at preventing the production of waste, while increasing efficiencies in the use of energy, water, and other resources. MIGA implemented 17 guarantee projects for utilities; like IFC's investments, these projects provided guarantees to private investors who acquired equities in project enterprises working with local governments under concession agreements to provide solid waste management and wastewater and sludge treatment services.

In addition to investments, IFC provides also advisory services that help client companies reduce waste, increase energy or resources efficiency, or introduce renewable energy. Such services are provided by the Cross-Industry Advisory Services Energy business line, of which 49 were concluded in the evaluation period. This line largely provides advice for companies on how to implement cleaner production processes, typically done through cleaner production audits, assessments, and studies: 63 percent of the projects provided cleaner production advice, 23 percent advice on waste recycling, 10 percent on solid waste management, and 3 percent on wastewater issues.

IFC Advisory Services through supporting the structuring of public-private partnerships (PPPs) also assists pollution management. A substantial number of these PPPs engage in wastewater or waste management and hence contribute directly to the pollution agenda of their host countries. During the evaluation period, IFC supported 28 PPP structures through its IFC Cross-Industry Advisory Services PPP business line, of which 11 (60 percent) involved solid waste management and seven (40 percent) involved wastewater systems.

Results and Lessons of Experience

IFC investments in waste and wastewater utilities turned out to be challenging. Of the five⁷ evaluated investments, only two had a positive development outcome rating;⁸ by contrast, all other evaluated IFC investments in other utilities had a positive development outcome.⁹ Among IFC investments in waste and wastewater utilities that did not have successful outcomes, the prevailing reasons were lack of commitment by the private operator to meet project requirements defined in the covenants, failure to meet reporting requirements, and unwillingness to resolve outstanding issues. Conversely, features of successful investments included a strong government to open the water market to the private sector and introduce market-oriented pricing mechanisms and competition in the wastewater sector. In this context, strong technical capacity and a well-designed business model played a decisive role in ensuring success and providing a solid foundation for project development.

Of the four evaluated MIGA projects, three had positive development outcome ratings and one had a negative development outcome rating. The main drivers of success for these PPPs facilitated by MIGA were expertise and growth capacity of the operators who brought investments into the target countries, with proven track records of successful PPP implementation. However, it is worth noting that two of the four guarantees were canceled, both owing to factors associated with the local governments. Despite cancellation, one of these canceled projects still received a “satisfactory” development outcome rating because of the improved wastewater treatment services, an outcome substantiated from annual monitoring reports.

Similarly, IFC support to structuring PPPs in waste management and wastewater treatment also faced challenges. Of the six evaluated Cross-Industry Advisory Services PPP projects, only two received a successful development effectiveness rating, compared with 53 percent of all other Cross-Industry Advisory Services PPP projects. The reason for failure was political opposition that prevent such PPPs from being reaching commercial closure, as the supply of clean water and management of waste is often regarded as service to be provided by the public sector. In addition, some of these PPP structures require financial support in the form of “minimum revenue guarantees” that municipalities were not able to provide due to budget constraints. Therefore, such PPP structures did not attract sufficient interest from private investors. Although the sample of projects evaluated is small (n = 6), it tentatively indicates—and confirms IEG’s previous findings—that private participation in the water and waste management sector is more challenging than in other, more commercially oriented sectors such as energy, airports, or ports.¹⁰

IFC’s Advisory Services projects aimed at enhancing enhance resources and energy efficiency were largely successful.¹¹ Of the 17 IFC CAS-energy advisory services with a pollution focus evaluated, 76 percent obtained a positive development effectiveness rating. Success factors identified across these projects included knowledge and expertise involved in service delivery and delivery of training and capacity building combined with campaigns to raise public awareness. The fact that many of the process improvement suggested through cleaner production audits have a positive net present value (that is, bring about savings) has, in many cases, facilitated the adoption of these suggested cleaner production solutions.

ENDNOTES

¹ IEG's recent global evaluation of urban transport (World Bank 2017b) found this percentage to be 70 percent. The difference between 70 percent and the 67 percent found in this study can be attributed to differences in the evaluation period. Overall, the trends are identical.

² Comprehensive support that includes both upstream and downstream environmental activities increases the likelihood of achieving citywide results. IEG found that 70 percent of the cities receiving such comprehensive World Bank Group support were successful in realizing environmental benefits. By contrast, cities where the World Bank Group had not provided a comprehensive approach did not achieve reductions in air pollution and greenhouse gas emissions (World Bank 2017b).

³ Measured by projects appraised and their commitment or guarantee value.

⁴ Except for 2010, when there was a one-year surge in the wake of the global financial crisis.

⁵ Comparing 2012–16 vs. 2007–11.

⁶ In many cities, it is necessary to address solid waste and wastewater or drainage together since they are linked. Solid waste clogs waterways and pollutes water.

⁷ The majority of these investments were approved after 2010 and hence have not been evaluated. Second, for those investments that were approved prior to 2010, the methodology foresees a sampling so that results are statistically representative at the portfolio level of IFC investments.

⁸ With regard to assessing success of IFC interventions note that the report analyzes IFC interventions in two different ways: IFC investments that are regarded as pollution-targeted projects (discussed in this chapter) are assessed based on Expanded Project Supervision Reports (XPSRs). Using the XPSRs to judge their success appears justified as success is often impaired by broader issues (lack of government commitment, poor cost recovery, etc.) so that a detailed analysis of the underlying measures of pollution reduction (for example, actual BOD measurements for water treatment plants) appears redundant. Chapter 5 then analyzes IFC investments in pollution-intense sectors based on PS3 ratings which do take actual pollution measures into account.

⁹ In energy or gas distribution.

¹⁰ This confirms conclusions from IEG's public-private partnership evaluation (World Bank 2014).

¹¹ Note that success rates of IFC advisory services that aim at enhancing resources and energy efficiency cannot be compared with those of IFC advisory services that assist governments in structuring public-private partnerships as their context, political economy factors, and incentives vary.

5

highlights

Managing the Pollution Footprint of Projects

- 1** Most International Finance Corporation (IFC) investments in pollution-intense industries are successful in meeting the pollution prevention requirements.
- 2** Yet there is still room for improvement since one-third of IFC investment projects do not fully meet the relevant requirements of air emissions and wastewater management guidelines.
- 3** The most important success factors are the client's or project enterprise's commitment and technical and financial capacity in managing pollution associated with its operations; engaging with the client or project enterprise throughout the entire project improves their commitment and capacity, and projects are more successful.

4 A significant number of Multilateral Investment Guarantee Agency (MIGA) guarantee projects did not provide sufficient information on pollution prevention implementations at the time of IEG's project-level evaluations. But of those that provided data, 62–75 percent of projects meet pollution prevention requirements.

5 It is not possible to assess the extent to which the World Bank contributed to better pollution management through safeguards, as data on safeguards outcomes is not reported in World Bank documentation.

IN ADDITION TO INTERVENTIONS that target pollution directly, the World Bank Group uses tools to control the potential negative pollution effect from its projects; that is, it manages the institution's "pollution footprint."¹ This involves the application of policies and standards on Environmental and Social Sustainability for IFC investments and MIGA guarantee projects, and World Bank Environmental and Social Safeguard Policies for World Bank lending projects.^{2,3} This chapter provides (i) analysis of IFC investments and MIGA guarantee projects in pollution-intense industries and assessment of the projects' performance meeting the IFC's and MIGA's environmental requirements (that is, Performance Standard 3 related to air emissions, wastewater, and waste management)⁴ across the identified portfolio; and (ii) analysis of World Bank Category A lending projects that carry an elevated environmental risk and trigger pollution-relevant safeguards.

Managing the Pollution Footprint in IFC and MIGA Projects

Table 5.1 shows the number of pollution-intense IFC and MIGA projects analyzed in this study.⁵ IFC approved 956 investments and MIGA had 168 guarantee projects during the evaluation period in pollution-intense sectors. From this portfolio, projects were included in this assessment if (i) they were evaluated previously by IEG as part of the IFC Expanded Project Supervision Reports (XPSRs) / Project Evaluation Summary or MIGA Project Evaluation Report program, and received an evaluation rating;^{6,7} (ii) at least one of the three pollution-relevant resource efficiency and pollution prevention Performance Standard aspects (air emissions, wastewater, or waste) was triggered; and (iii) they belong to the real sectors (nonfinancial intermediaries).

Most IFC investments in pollution-intense industries are successful in meeting the pollution prevention requirements. At the time of IEG's evaluation, about two-thirds of IFC investment projects in pollution-intense industries meet Performance Standard 3, Resource Efficiency and Pollution Prevention, pollution prevention requirements for air emissions (72 percent) and wastewater (71 percent), and 92 percent meet waste management requirements. This analysis includes all evaluated pollution-intense projects subject to the pre-2006 IFC Safeguards Policy and the 2006 IFC Sustainability Framework from 2008 to 2015. This study does not include IFC projects that are subject to the 2012 IFC Sustainability Framework since those projects did not meet the operational maturity criteria during the time of this study, and thus, they are not evaluated by IEG yet. Room for improvement remains, since one-third of projects do not meet the relevant requirements of air emissions and wastewater guidelines at the time of project-level evaluation. Relatively lower success rates for meeting air emissions and wastewater requirements compared with waste requirements are mostly because air emissions and wastewater guidelines specified in the World Bank Group EHS Guidelines require adequate capacity and resources to implement, and thus are more challenging for clients to comply

TABLE 5.1 | IFC and MIGA Pollution-Intense Project Portfolio

| Performance Standard 3 ^a Aspects | With Rating at Evaluation Only | | With Rating at Both Appraisal and Evaluation | |
|--|--------------------------------|------|--|------|
| | IFC | MIGA | IFC | MIGA |
| Air emissions | 123 | 24 | 53 | 19 |
| Wastewater | 141 | 24 | 66 | 19 |
| Waste | 142 | 24 | 76 | 19 |

Source: IEG.

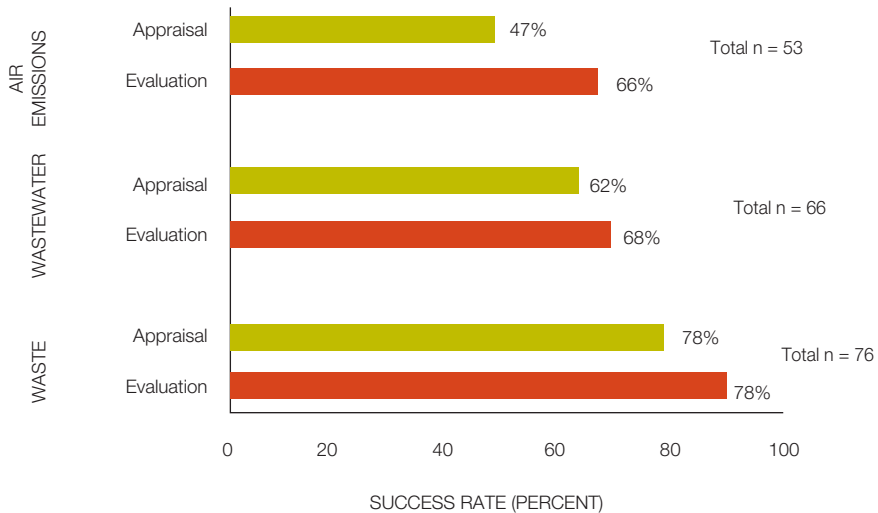
^a Performance Standard 3, Resource Efficiency and Pollution Prevention.

with. IFC and MIGA have updated their Policy and Performance Standards for Environmental and Social Sustainability in 2012 and 2013, respectively. In addition, a number of World Bank Group EHS Guidelines have been updated and published since 2015.⁸

IFC’s brownfield projects’ (those with existing assets prior to investment) performance in achieving pollution-relevant Performance Standards improves over the period that IFC stays invested in pollution-intense projects; however, the degree of improvement varies across air emissions, wastewater, and waste compliance (figure 5.1). Projects often achieve significant improvements in air emissions quality over time; after IFC intervention in a company, almost one-third (36 percent) of the projects that did not meet air emission requirements at appraisal meet the requirements by the time of evaluation, when they reach operational maturity. Yet, about one-third of projects are still not able to meet air emissions requirements, mostly because they do not apply the right technology or process to control or minimize emissions. Similar improvements are not observed for wastewater management—only 16 percent of the projects that initially did not meet the requirements can do so after five years. Most projects fail to demonstrate compliance in achieving effluent discharge limits because of lack of or inadequate wastewater treatment plants or operations. Projects face difficulties in improving wastewater treatment processes to meet treatment and discharge requirements because these may require new construction, hardware, or process change, which demand financial and technical resources. Projects also achieve more waste management requirements after IFC’s intervention. Almost half the projects that do not meet waste requirements at appraisal achieve them at operational maturity with IFC’s involvement, and many meet the waste requirements after five years.

IFC’s greenfield investment projects exhibit higher performance in achieving air emissions, wastewater, and waste management requirements than the existing projects (that is, brownfield projects). Air emissions requirements are met by 85 percent of the 26 greenfield projects, compared with 66 percent of the 53 brownfield projects. Air emissions requirements are usually included in the project design in greenfield projects, and thus the compliance is generally achieved with more success during the operation. However, air emissions requirements are not easily implemented by

Figure 5.1 | Success Rates in Achieving IFC's Air Emissions, Wastewater, and Waste Requirements, Appraisal versus Evaluation, FY12–15



Source: IEG.


Note: Success rates are calculated from Performance Standard 3 indicators.

brownfield projects because meeting the requirements often involves replacing or retrofitting existing technologies or fuel, or process changes, among other things, which would require financial and technical resources. Thus, implementing changes in a brownfield project is generally more difficult than in a greenfield project.

The success rates for achieving Performance Standards requirements vary across sectors. Of the total portfolio of IFC investments in pollution-intense industries for which at-evaluation ratings are available (that is, projects evaluated from 2008 to 2015), more than half of the projects are in the following top five sectors: Chemicals; Oil, Gas, & Mining; Industrial & Consumer Products; Food & Beverages; and Agriculture. For air emissions, the five most prominent industries have success rates above 65 percent in meeting requirements, with relatively little variation across sectors. The chemicals sector reports the highest relative improvement in meeting air emissions requirements among the five top sectors. IFC's intervention has a significant positive effect (that is, change) on projects in the chemicals sector by helping clients improve and achieve the requirements. Looking at the top five industries from the wastewater perspective, success rates vary significantly across sectors, ranging from 60 percent to 78 percent. IFC investments in the food and beverages sector report the highest relative improvement in wastewater performance between appraisal and evaluation, but starting from a low initial success rate at appraisal. The top five sectors meet IFC's waste requirements with a success rate ranging from 80 percent to 100 percent. The agriculture sector shows the highest percentage change (36 percent) from appraisal to evaluation.

During evaluation years 2008–15, eight pollution-intense projects demonstrated excellent performance in at least one Performance Standard 3 aspect, out of 167 evaluated IFC projects; however, performance of five projects were unsatisfactory and did not meet at least one of the Performance Standard 3 requirements on air emissions, wastewater, or waste management. This study analyzes these projects to learn lessons from and provide recommendations for further improvement in managing pollution prevention and abatement in projects. Box 5.1 includes examples of projects rated as excellent in meeting air emissions, wastewater, or waste requirements.

Performance of large-size IFC investments improves more than that of medium- or small-size investments. A better performance is likely due to the more substantial financial and technical resources available in such large investments.



Box 5.1 | Excellent Performance in Meeting the International Finance Corporation's Requirements

Air emissions. A brownfield project in the Latin America and the Caribbean Region proposed to convert an existing power plant from an open cycle to a combined cycle operation to improve energy efficiency. The International Finance Corporation (IFC) played a key role in enhancing the client's Environmental, Health, and Safety Guidelines management by identifying actions needed to mitigate environmental risks, including compliance with IFC's emissions standards and ambient air quality standards. With IFC's timely and appropriate advice, the client managed to achieve not only the emissions standards recommended for the existing facilities but also emissions standards for the new plants. The client's performance is considered a best-practices example because of, among other things, the use of wet low-nitrogen oxides burners.

Wastewater. An agricultural company in Latin America did not have an effluent treatment plant at appraisal. However, IFC's involvement, including the preparation of the Environmental and Social Action Plan, site visits, and advice contributed to the client's performance, resulted in a substantial reduction in harmful effluent and the achievement of zero wastewater discharge

Waste management. A mining company in the Sub-Saharan Africa Region had a well-developed approach to waste management that encompassed avoidance, minimization, recovery, reuse, and environmentally sound disposal. An agricultural project in Latin America and the Caribbean had implemented a sanitary and industrial waste management plan, segregating all wastes for either disposal in a landfill or sale to legally authorized recycling groups.

Source: IEG portfolio review.

For evaluated MIGA guarantee projects, where relevant data were available, 64 percent of MIGA guarantee projects meet air emissions and 62 percent of MIGA guarantee projects meet wastewater requirements, and 75 percent meet waste management requirements at the time of evaluation; however, there is still room for improvement.

For a significant number of guarantee projects adequate information on pollution prevention implementations was, however, not available at the time of IEG's project level evaluation. Such projects receive an "no opinion possible" (NOP) rating. When all projects, including those with NOP ratings, the above-mentioned proportions change. Thirty-three percent of projects meet MIGA's Performance Standard 3 requirements on air emissions, 19 percent of projects do not fully meet the air emission requirements and 48 percent of projects were rated NOP. For meeting wastewater requirements, 33 percent of project meet requirements, 21 percent do not fully meet requirements, and 46 percent of projects did not have sufficient information for compliance available. For complying with waste management requirements, 62 percent of projects meet requirements, 21 percent do not fully meet requirements and 17 percent did not have sufficient information for compliance available. Hence, in summary, NOP ratings ranged from 17 percent to 48 percent of projects. This lack of information resulting in NOP ratings in environmental and social evaluations has been addressed by MIGA with the introduction of the 2013 Environmental and Social Sustainability Policy and the 2014 Environmental and Social Review Procedures, which require annual monitoring reports from project enterprises and monitoring site visits by MIGA environmental and social specialists.⁹

Lessons of Experience: Addressing Pollution through Private Sector Projects

The most important success factors are client or project enterprise commitment and technical and financial capacity in managing pollution associated with its operations. If the client or project enterprise is committed and provides adequate resources in managing pollution, then the environmental performance is always successful and the project achieves IFC's and MIGA's pollution prevention and abatement requirements. In this study, all successful projects meeting Performance Standard 3 pollution requirements provided strong client or project enterprise commitment and capacity. Thus, IFC's project appraisal and MIGA's due diligence are important activities where commitment and capacity of client or project enterprise can be assessed in detail, and where risks and potential mitigation measures can be developed.

Engaging and communicating with the client or project enterprise throughout the entire process improves their commitment and capacity, and projects are more successful. In all successful projects in this study, IFC or MIGA provided timely and appropriate technical advice and assistance to the client or project enterprise following monitoring of the operations, including implementation of the Environmental and Social Action Plan (ESAP), site visits, and review of annual monitoring reports. IFC and MIGA continuously support the client's or project enterprise's environmental and social efforts during the entire investment or guarantee period. Frequent supervision of implementation of key environmental and social aspects during construction of large and complex infrastructure projects helps in detecting execution problems early on. It is also evident that project's technical capacity and performance significantly improve when the project seeks a qualified third party to provide technical assistance.

In successful projects, IFC and MIGA play a key role in enhancing a client's or project enterprise's Environmental and Social Management System through the identification of actions needed to mitigate environmental and social risks, including compliance with Performance Standards. In all successful projects in this study, IFC or MIGA adequately identifies areas of improvement, discusses technical recommendations clearly with the client or project enterprise, and prepares a detailed and comprehensive ESAP, which is agreed by the client or project enterprise at the beginning of the project. For the necessary leverage, it is essential that IFC or MIGA receive the client's or project enterprise's full acceptance of the ESAP and include the ESAP in legal agreements. Successful projects develop ESAPs that detail actions, roles and responsibilities, indicative budget, and an achievable and realistic completion schedule. When IFC or MIGA and the client or project enterprise mutually agree on the specific World Bank Group General and Sectoral EHS Guideline requirements and actions for the project, it is likely that the implementation and monitoring will occur as planned.

Improvement in pollution management can be quantified when adequate environmental baseline studies are conducted and relevant performance indicators are established to address project impacts. During this study, one of the challenges was not having sufficient information on emissions loads of projects, which made it difficult to determine potential improvements in pollution management and amount of pollution loads. Emissions are almost always expressed in concentrations that do not provide sufficient information on pollution loads; it is important to determine specific and annual emission levels and improvements. Thus, there is benefit to requesting emission loads in terms of mass flow rates.¹⁰

Legal agreements provide effective leverage and contribute to the meeting of requirements. Successful IFC projects include a Condition of Disbursement in legal agreements. IFC uses these requirements adequately in the ESAP and legal agreements to enforce compliance with environmental and social requirements. In all successful projects, MIGA includes Environmental and Social requirements fully in Contract of Guarantee for the guarantee holder and project enterprise to legally commit to meet pollution-relevant requirements.

All successful MIGA projects always report performance adequately. In MIGA guarantee projects, an NOP rating is never issued when a project enterprise submits adequate annual monitoring reports and MIGA monitors project activities.

The Application of Safeguards in the World Bank Lending Portfolio

The World Bank seeks to minimize the environmental harm of its projects through its safeguard policies, including through an operational policy on environmental assessment.¹¹ To identify evidence on the effectiveness of these safeguard policies on pollution management, an assessment of the reported information on pollution effects in project documentation for all 114 category A projects approved FY04–17 was carried out. Category A projects pose elevated environmental risks with broad and potentially irreversible effects.¹²

Pollution concerns associated with category A projects are generated largely from short-term construction activities (85 percent) but also from the project's general operations (70 percent) and, to a very limited extent, from induced pollution effects (13 percent). This is because most category A projects deal with the construction of infrastructure such as roads, highways, irrigation systems, water and sanitation systems, and solid waste landfills. Air and water are the resources most often at risk of pollution in category A projects. Monitoring of pollution is the most commonly identified mitigation action in these projects (65 percent of all short-term construction projects, 59 percent of all general operations, and 8 percent of induced-effects projects). Other mitigation actions include adequate disposal, maintenance of equipment, and standards enforcement.

Most projects receive ratings of implementation progress from self-assessments of moderately satisfactory or above; however, IEG cannot validate these ratings; nor can it assess the overall effect of safeguards on pollution management.¹³ Implementation progress is rated in the World Bank's implementation status reporting system, which provides a self-assessment of the status of safeguards ratings which is not validated by IEG. In addition, no rating is present for 15 percent of projects. Moreover, data on actual safeguards outcomes are not reported in World Bank documentation. They also do not report detailed information and data on how safeguards have contributed to management of air and water emissions. Similarly, an assessment carried out as part of IEG's evaluation on the FY16 *Results and Performance of the World Bank Group* found deficiencies in reporting of environmental and social safeguards results based on an assessment of Implementation Completion and Results reports validated in FY16 (World Bank 2017d). Hence, it is not possible to assess the extent to which the World Bank contributed to better pollution management through safeguards from a review of the existing World Bank data system.

ENDNOTES

¹ The objectives of the Performance Standard 3 are to avoid or minimize impacts on human health and the environment by avoiding or minimizing pollution from project activities. And to promote more sustainable use of resources, including energy and water.

² MIGA's Policy on Environmental and Social Sustainability and IFC's comprehensive set of Environmental and Social Performance Standards are important components of achieving positive development outcomes and environmental and social sustainability of projects. Similarly, environmental and social safeguard policies are a cornerstone of the World Bank support for sustainable development and poverty reduction aimed at ensuring strong protections for people and for the environment.

³ The purpose of evaluation of footprint projects is to assess the application of IFC's and MIGA's Performance Standards on Environmental and Social Sustainability for pollution management in IFC investments and MIGA guarantee projects.. IFC and MIGA require projects with the potential to cause pollution to comply with pollution-relevant Performance Standards, particularly Performance Standard 3, Resource Efficiency and Pollution Prevention, which focuses mostly on pollution-relevant aspects and applies to projects with release of pollutants to air, water, and land with potential adverse effects. IFC and MIGA also require the World Bank Group Environmental, Health, and Safety Guidelines or other appropriate internationally recognized sources to be used when selecting and implementing pollution prevention and control techniques and methods for projects. IEG assessed IFC investments and MIGA guarantee projects in pollution-intense industries and analyzed the performance of such projects in meeting these requirements.

⁴ Despite the broader focus of this report, this chapter is limited to analyzing compliance with Performance Standard 3 requirements in relation to air, wastewater and waste management.

⁵ The study looks at the application of Performance Standard 3 (PS3), Resource Efficiency and Pollution Prevention, requirements on air emissions, wastewater, and waste management across the IFC footprint portfolio, along with trends by year, investment size, primary sector, Region, and income level of the client country. The study analyzes ratings for the following IFC cases: (i) PS3 subindicator ratings for air emissions, wastewater, and waste management at evaluation of all footprint projects in the IFC Expanded Project Supervision Report / Project Evaluation Summary program from calendar year (CY)08 to CY11 (this portfolio set also includes projects appraised before the 2006 IFC Sustainability Framework); (ii) PS3 subindicator ratings of projects for which both appraisal and evaluation ratings are available from the IFC Expanded Project Supervision Report / Project Evaluation Summary program from CY12 to CY15 (this portfolio set includes only projects subject to the 2006 IFC Sustainability Framework); and (iii) PS3 ratings at evaluation of greenfield projects (that is, projects with no prior operation) from CY08 to CY15.

The study analyzes ratings for the following MIGA cases: (i) PS3, Pollution Prevention and Abatement, subindicator ratings for air emissions, wastewater, and waste at evaluation of all footprint projects in the MIGA Project Evaluation Report program from fiscal year (FY)11 to FY16 (this portfolio set includes projects appraised before the 2007 MIGA Sustainability Framework); and (ii) PS3 subindicator ratings of projects for which both due diligence and evaluation ratings are available from the MIGA Project Evaluation Report program from FY11 to FY16 (this portfolio set includes projects subject to the 2007 MIGA Environmental and Social Sustainability Policy and Performance Standards).

IEG initially identified 168 footprint MIGA guarantee operations based on sector codes used by MIGA. Of these, 39 projects are evaluated by IEG as part of the MIGA Project Evaluation Report program. Of the evaluated projects, 24 projects have evaluation ratings (Excellent, Satisfactory, Partly Unsatisfactory or Unsatisfactory, including No Opinion Possible (NOP) and Not Applicable (NA)) for at least one of the PS3 pollution prevention sub-indicators. Of the 24 projects, there are only 11 projects for air emissions, 13 projects for wastewater, and 20 projects for waste after projects with NA and NOP ratings are removed from the portfolio.

The MIGA evaluation portfolio contains a significant number of NOP ratings for air emissions and wastewater performance. This rating is given during an evaluation for which, after best efforts, the relevant information to establish material compliance (or lack thereof) cannot be obtained. The lack of sufficient information was mostly due to the former MIGA policy, which did not require annual monitoring reports from project enterprises or monitoring site visits. However, the 2013 Environmental and Social Sustainability Policy and Performance Standards and the 2014 Environmental and Social Review Procedures require annual monitoring reports and monitoring site visits. The small size of the MIGA portfolio prevents this study from better assessing the success or failure of projects in meeting the pollution-relevant environmental requirements.

⁶ IEG developed an environmental and social evaluation methodology in which the environmental and social effectiveness of an IFC investment or a MIGA guarantee project is assessed with an environmental and social effects indicator that covers both the project's environmental and social performance in achieving IFC's environmental and social objectives and requirements and the project's environmental and social improvements (that is, impact). IEG evaluates environmental and social effects along with business performance, economic sustainability, and private sector development, and then determines the overall development outcome of the project. The development outcome is presented in IEG's Expanded Project Supervision Report Evaluation Note, which is submitted to the management of IFC. Similarly, a Project Evaluation Report, which is an ex post self-evaluation of MIGA project underwriting outcomes, is prepared by MIGA for guarantee projects. IEG reviews all completed Project Evaluation Reports and prepares an Evaluation Note for submission to the management of MIGA.

⁷ During the evaluation of each environmental and social aspect, IEG rates each indicator and subindicator on a four-point scale (that is, excellent, satisfactory, partly unsatisfactory, and unsatisfactory) "at appraisal" for IFC, "at underwriting" or "at due diligence" for MIGA, and "at evaluation," when the project reaches its operational maturity, for both. For IFC, the operational maturity is assumed five years after Board of Executive Directors approval and when the project has generated at least 18 months of operating revenues. For MIGA guarantee projects, the operational maturity is accepted as guarantees approved at least three years earlier and in support of projects which have generated at least 18 months of operating revenues covered by at least one set of audited financial statements. During this study, the ratings for air emissions, wastewater, and waste management subindicators are used to determine success rates for achieving the requirements for air emissions and ambient air quality, wastewater and ambient water quality, and waste management. The success rate for these subindicators is calculated as a percentage of excellent and satisfactory ratings. IEG may also assign "no opinion possible" during

an evaluation for which, after best efforts, the relevant information to establish material compliance (or lack thereof) cannot be obtained.

⁸ This was done in the spirit of incorporating lessons learned and reflecting new process developments and new advancements in pollution control and abatement technologies.

⁹ “Project enterprise” is used in the discussion of MIGA projects and “project company / enterprise / entity” refers to the legal entity owning and implementing the project, which may or may not be the beneficiary of the MIGA guarantee. Note that in MIGA projects, “guarantee holder” is the company or entity benefiting directly from the MIGA guarantee, which may or may not be the project company.

¹⁰ For example, ton of SO₂ per ton of product.

¹¹ The requirement for environmental assessment is intended to ensure that environmental risks in projects are avoided or mitigated appropriately. Environmental assessments consider a variety of aspects, such as natural environment, human health and safety, social aspects, and transboundary and global environmental aspects. They also include the overall country policy and legal framework and its international obligations.

¹² The assessment was based on a desk review of core project documents. The assessment covered 114 World Bank category A projects active over 2005–15 and evaluated as of December 2015. These include projects that directly targeted pollution and projects in “footprint” sectors that were likely to have significant pollution effects.

¹³ The World Bank’s implementation status reporting system provides a self-assessment of the status of safeguards, in most cases rating them as moderately satisfactory, satisfactory, or highly satisfactory.

6

Knowledge and Policy Dialogue

highlights

- 1** The World Bank Group exercises its convening role on pollution-related issues mainly through providing expertise and knowledge; however, its real comparative advantage is the ability to enter into policy dialogue with its client countries to integrate pollution in their development agenda and country strategies.
- 2** However, World Bank Group country strategies rarely reflect the top pollution concerns a country suffers from. The recently introduced Systematic Country Diagnostic captures pollution concerns more accurately, raising hopes that future country strategies will reflect pollution issues better.
- 3** The lack of quality data on pollution, its costs, and the cost effectiveness of pollution abatement interventions increases the difficulty of building a case for governments to undertake pollution abatement interventions—or to borrow from the World Bank for this.

4 Country Environmental Analyses (CEAs) are the World Bank Group's main diagnostic tool with a mandate to inform country strategies and policy lending about environmental concerns.

5 To date, CEAs have only reached 42 client countries, compared with 62 reached by Investment Climate Assessments and 142 by Financial Sector Assessment Programs. Funding constraints appear to be the root cause.

6 Overall, pollution priorities identified in CEAs are not consistently referenced in World Bank Group country strategies, which may be one of the main reasons they do not reflect countries' most important pollution concerns.

THIS CHAPTER will analyze how the World Bank Group can advance the clean agenda effectively, beyond project-level interventions. According to the 2012 environmental strategy, pollution management is part of the World Bank Group’s clean agenda, which the World Bank Group can advance—in addition to its project work—through a range of activities (World Bank 2012b). This chapter discusses how the World Bank Group exercises its (i) convening power at the international level to draw attention to the issues of pollution and help advance the policy-making agenda; and (ii) engages in country-level policy dialogue and knowledge work to inform countries about their pollution issues, assist them in establishing a national pollution agenda and integrate pollution in country portfolios.

The Convening Power of the World Bank Group

Multi- and bilateral agencies, nongovernmental organizations, and civil society groups have undertaken a tremendous effort to place pollution on the global and national agenda. The fight against pollution has been a priority of the global development agenda since the mid-1980s, mainly through conventions or multilateral treaties. Reflected in the Sustainable Development Goals, pollution in its various forms is anchored in strategies of many international organizations, including the World Bank Group, the United Nations Industrial Development Organization,¹ the WHO,² and the United Nations Children’s Fund,³ or is part of the program, as is the case for United Nations Environment Programme. Pollution is also the theme for the 2017 Environment Assembly in December 2017, which could be regarded as the culmination of these global efforts.⁴

The World Bank Group plays a role at the international arena in advancing the clean agenda, mainly by acting as knowledge broker, but also through partnerships and standards setting. As of the 1990s, the World Bank has leveraged partnerships to advance the clean agenda, supported by its efforts to set standards, as summarized in box 6.1. In addition, it acts as a “knowledge bank” by contributing to the policy-making agenda, collecting data at the global and country levels, assessing costs of specific pollution types, or drawing attention to global, regional, and national pollution concerns. Knowledge is disseminated through the World Bank’s flagship reports, including *Getting to Green: A Sourcebook of Pollution Management Policy Tools for Growth and Competitiveness* on available policy tools for pollution management (World Bank 2012a); *What a Waste: A Global Review of Solid Waste Management* on waste specifically (Bhada-Tata and Hoornweg 2012); *Clean Air and Healthy Lungs: Enhancing the World Bank’s Approach to Air Quality Management* on the effects of air pollution (Awe et al. 2015); and *The Cost of Air Pollution: Strengthening the Economic Case for Action* (World Bank 2016a).⁵

Although United Nations agencies have the explicit mandate to act as global conveners on environmental issues, the World Bank Group is in a strong position to lift pollution up in countries’ development agendas because of its field presence and access to policy makers.⁶ Across IEG’s country case studies, other development partners were found to address pollution either indirectly,



Box 6.1 | Partnerships and Standards Setting to Advance the Clean Agenda

The World Bank leverages partnerships as an instrument for advancing the pollution agenda. In work starting in the 1990s, the World Bank and the World Health Organization partnered in developing standards for capturing the effects of pollution on human beings by establishing the now widely used measure of disability-adjusted life year.

Another key partnership showing the synergies between air pollution and climate mitigation interventions is the Climate and Clean Air Coalition, formed in 2012, of which the World Bank is an active member. Given the importance of household air pollution, the World Bank partners with the Global Alliance for Clean Cookstoves. The World Bank Group also engages with the Global Alliance on Health and Pollution, which facilitates the provision of technical and financial resources to governments and communities to reduce the effects of pollution on health in low- and middle-income countries.

Partnering with the Global Environmental Facility was instrumental in implementing the Stockholm Convention on persistent organic pollutants. The 2015 launch of the Pollution Management and Environmental Health Program is likely the most prominent example of leveraging World Bank Group resources through a multi-donor trust fund to advance the agenda.

Regarding standard setting, IFC's Performance Standards on Environmental and Social Sustainability have become globally recognized good practice in dealing with environmental and social risk management. Nearly 80 banks and financial institutions have voluntarily adopted the Equator Principles, which are based on IFC's Performance Standards. And 32 export credit agencies of the Organisation for Economic Co-operation and Development countries benchmark private sector projects against IFC's Performance Standards.

for example, through strengthening the role of the private sector in pollution management, or by addressing specific aspects of the pollution agenda. The World Bank, through its country offices, entertains a policy dialogue and hence has a unique opportunity to integrate pollution concerns into country's development agenda in a strategic and comprehensive manner.

Country-Level Experience: Alignment of the World Bank Group's Engagement with Pollution Priorities

The World Bank Group helps client countries define their respective development agenda through a range of tools and services. Central to the World Bank Group's engaging with a client country are the country strategies: the country assistance strategy (CAS) or the country partnership strategy (CPS).

These are prepared following a process of policy dialogue, based on diagnostic work including but not limited to the Systematic Country Diagnostics (SCDs), Country Environmental Analyses, and Strategic Environmental Analyses. As CASs and CPSs are the central tools used to define World Bank engagement with its countries, they can be expected to reflect the country's priorities regarding its overall development agenda, including the country's most pressing pollution concerns. To assess to what extent CASs reflect actual pollution priorities, the CASs of countries where pollution has reached alarming levels by global standards were reviewed.

A review of 57 countries with exceptional pollution levels revealed that pollution priorities are often not reflected in the country strategies.⁷ Only 28 percent of CASs and CPSs adequately reference the actual pollution concerns, that is, in only 16 of the 57 countries were all relevant pollution priorities from which the country suffers identified. Of these, 14 had only one top pollution issue. An additional nine countries (16 percent) reference at least one pollution concern but fail to refer to others. Many strategy documents (56 percent) do not mention pollution concerns at all, even though these 57 countries had at least one top pollution concern per global databases. Of the 44 country strategies identifying at least one pollution concern, only half referred to an upcoming World Bank Group portfolio addressing at least one of the issues.

The recently released SCDs provide a better identification of pollution priorities at the country level. The SCD is a diagnostic exercise to identify key challenges and opportunities for a country to accelerate progress toward development objectives that are consistent with the twin goals of ending absolute poverty and boosting shared prosperity in a sustainable manner. As of 2014, SCDs are required for the formulation of country-level strategies. SCDs more frequently identify pollution priorities correctly than CASs or CPSs. Of 72 countries with the biggest pollution concerns, 28 have a SCD. Fifty-seven percent of these identify all pollution concerns correctly and an additional 18 percent at least one. This raises hopes that they will be reflected either in future CASs or CPSs or in the World Bank Group portfolio.

The most frequently missed pollution concerns were outdoor and indoor air pollution. Only 12 percent of CASs or CPSs address indoor air pollution (seven strategy documents, of which five discuss top pollution priorities), and ambient air pollution is covered in just over a quarter of documents (15 documents, of which 10 cover a top pollution priority for the country). By contrast, solid waste management and wastewater treatment were mentioned more often (56 percent and 51 percent of documents, respectively) though in most cases, these pollution concerns were not a top priority (25 of the 32 documents in the case of solid waste management and 21 out of the 29 in the case of wastewater treatment).

These findings may explain why the World Bank Group portfolio does not reflect the global pollution priorities, as revealed in chapter 2. CASs and CPSs form the basis for preparing the pipeline of projects for a country; therefore, with pollution not finding adequate space in country strategies, it is not surprising that the overall World Bank Group portfolio of interventions shows an imbalance. This is further corroborated by field-based country cases. Country portfolios tend to follow other developmental priorities that are not necessarily aligned with the pollution priorities that the country

faces. Many pollution priorities were either not followed up at all in the portfolio, or if so, only through Advisory Services and Analytics work or rather insignificant investment efforts, given the magnitude of the problem (see box 6.2 for examples).



Box 6.2 | Case Studies: Pollution Priorities and World Bank Group Response

Ghana. Air quality (indoor and outdoor) presents a major health and environmental challenge and is the single largest environmental risk of premature death, contributing to nearly 18,000 premature mortalities each year. Yet the World Bank portfolio contains only one urban transport project with an add-on air monitoring component; unfortunately, the results of the urban transport project were unsatisfactory as the envisaged bus rapid transport system never took off. Indoor air pollution was never addressed in the portfolio, even though the 2007 Country Environmental Analysis already calculated that it costs Ghana about 1.5 percent of its gross domestic product. Ghana's e-waste problem is yet another missed opportunity. Its most prominent e-waste recycling site, the Agbogboshie e-waste management site, is infamous for manual disassembly of obsolete computers, monitors, televisions, and so on, to isolate metals (copper and aluminum). Much of the work is carried out by children, using only rudimentary tools and without protective equipment.

Interestingly, none of Ghana's pollution concerns in waste, e-waste, wastewater, urban air pollution, or indoor air pollution found reference in Ghana's latest country assistance strategy for 2013–16, even though they have been known for years. Climate change receives a passing reference but is not a central theme either.

Egypt. The World Bank Group lending portfolio did not reflect the key pollution concerns identified (outdoor and indoor air pollution), instead focusing on water pollution. According to the World Bank's own Country Environmental Analysis and the assessment of the cost of environmental damage contained therein, outdoor and indoor air pollution (combined) constituted almost 65 percent of the total environmental damage, water pollution around 29 percent, with the remaining 6 percent of damage caused by solid waste. Outdoor air pollution was addressed mainly through Advisory Services and Analytics work (World Bank 2013). Lending was limited to a pilot intervention aimed at testing market-based mechanisms for bringing industries into compliance with emissions standards (Second Egypt Pollution Abatement Project). In the area of hazardous waste, the intervention focused on persistent organic pollutants rather than a broader waste management agenda. Indoor air pollution was identified as one of the top pollution concerns, but no projects address this major issue.

Source: IEG country case studies.

Other specific pollutants have in general received little attention in World Bank Group pollution management efforts. As elaborated in greater detail in chapter 2, a range of pollutants that threaten the poor (including lead, mercury, chromium, and arsenic) are addressed rarely by World Bank strategies and interventions.

Challenges in building a case for governments to borrow from the World Bank Group for pollution issues are further exacerbated by the lack of quality data on pollution and its cost. Data on pollution are not available in a systematic manner for the major types of pollutants.⁸ The World Bank's country analytical work (Advisory Services and Analytics [ASA]) has an important role to play in this context, regarding helping countries identify their pollution priorities. The World Bank has supported a variety of analytical and advisory work on pollution issues. Some work addresses specific subsectors in specific countries, while others provide strategic analysis of pollution issues and can help governments to set their priorities based on costs of pollution and potential for pollution abatement. IEG's analysis below focuses on the Country Environmental Analysis (CEA), which aims to provide a comprehensive coverage of environmental issues, including pollution, for a full country and an analysis of the cost of environmental degradation from pollution. With this, a CEA is designed to be an upstream analytical tool that supports prioritization and awareness-raising of environmental problems, integrate environmental considerations in Country Assistance Strategies, Poverty Reduction Strategy Papers, development policy lending, and country-level development strategies and programs (World Bank 2008; Pillai 2008).⁹

Despite their crucial role in policy dialogue, CEAs have only been prepared for 42 of 151 active client countries without a discernable pattern of prioritization.¹⁰ This coverage of about 30 percent of client countries limits the aggregate effect of the tool. The preparation of CEAs is not necessarily focused on countries with poorer environmental performance.¹¹ The low global coverage of CEAs stands in sharp contrast to the World Bank Group's diagnostic work in other sectors, such as Investment Climate Assessments or Financial Sector Assessment Programs where global coverage is two to four times higher.¹² The low coverage of countries by CEAs may be due to funding constraints. Although during FY04–11, CEAs were funded to a substantial extent by ASA trust funds, this support ceased to exist; so that all CEAs during 2015–17 have to be funded through the World Bank budget. In parallel, the production rate of CEAs decreased substantially in 2012–14.

Broadly speaking, CEAs are comprehensive in their advice and identification of pollution concerns but show some inconsistency in conducting in-depth analysis on the identified pollution concerns. CEAs provided advice on three broad aspects, as intended in the original concept note ([i] promote environment-development priorities linked with growth and poverty prevention, [ii] evaluate performance of environmental institutions and their role in governance, and [iii] identify important environmental themes and sectors). Coverage of all major pollution areas and pollutants was balanced within and across all Regions when analyzing individual pollutants across a sample of 30 CEAs, issued between 2003 and 2015.¹³ However, although priority pollution concerns were identified, the attributing sectors causing that pollution lacked in-depth discussion in more than half of CEAs (16 out of 30).¹⁴ The reason certain CEAs select focal areas for in-depth assessments—as opposed to covering the identified pollution concerns in a manner commensurate with their relative

importance—may be that CEAs are sometimes used to prepare the “pipeline” of upcoming World Bank Group operations.¹⁵ The assessment of the nexus of pollution and poverty were important elements found in most CEAs, but the underpinning analytics showed some inconsistency.

Raising awareness about pollution and associated costs is an important benefit of preparing CEAs, enabling client countries to gain a comprehensive understanding of their major pollution concerns and prioritizing them. CEAs were found to bring discussion about pollution issues to the most senior government decision makers and to the forefront of public discourse. Thus, they raised awareness and contributed to creating a demand for interventions that mitigate pollution. Across most country case studies, the economic analysis and the analysis of the cost of environmental degradation were seen as the most important element of the CEA, allowing to place a “price tag” with individual pollution concerns to gain attention from nontechnical staff including from the ministry of finance.¹⁶

Yet, when looking systematically across all countries with a CEA, World Bank country strategies show only limited uptake of CEA recommendations. Out of a sample of 30 CEAs analyzed in depth, only seven discussed CEA recommendations in the subsequent strategy. A 23 percent uptake of recommendations from CEAs in country strategies is very low, compared to the uptake of 80 percent of Financial Sector Assessment Program (a comprehensive and in-depth assessment of a country’s financial sector) recommendations referred to in CASs. The fact that CEA recommendations are not taken up in country strategies may explain why, overall, other development priorities gain higher importance than countries’ top pollution concerns.

In addition to data paucity on pollution, a range of political economy factors lead to pollution not being prioritized adequately. Pollution affects the poorest most severely, who often lack voice in the national policy dialogue or government priorities may be not aligned with their concerns. Governments often perceive environmental concerns in general as being luxury goods that they cannot afford, or as a responsibility of rich countries to support through concessional finance. An IEG case study in Indonesia offers an instructive example: stakeholders uniformly argued that government was not interested in borrowing at commercial rates from the World Bank or others for perceived “nonproductive” investments in environment or climate change, preferring to focus on infrastructure.¹⁷ By contrast, one factor that has been conducive in motivating selected governments to prioritize pollution abatement has been the role played by the desire for accession to the European Union or the Organisation for Economic Co-Operation and Development, as membership in these institutions requires a degree of legislative and policy harmonization.¹⁸

ENDNOTES

¹ See <http://www.unido.org/what-we-do/environment.html>.

² See http://www.who.int/topics/environmental_pollution/en.

³ See <https://www.unicef.org/environment>.

⁴ See <http://www.unep.org/about/cpr/pollution-theme-2017-un-environment-assembly>.

⁵ The World Bank Group also issues a range of Regional and country-specific reports.

⁶ Several United Nations agencies, above all the United Nations Environment Program, have a strong and clear mandate that allows them to focus on pollution or aspects thereof within the broader environment agenda. Yet, they typically have less of a role in influencing how a country development agenda is shaped. The United Nations Environment Programme is the leading “global environmental authority” and sets the global environmental agenda, serving as an “authoritative advocate for the global environment.” Its pollution-related work spans a range of issues, including waste, chemicals, lead, resources efficiency, sustainable consumption and production, and resources-efficient cities. The focus of its work is developing international instruments, including conventions, assessing environmental conditions and trends, providing scientific and technical knowledge and tools, and strengthening institutions. The Programme’s efforts are complemented by those of several other United Nations agencies (for example, the United Nations Industrial Development Organization and the United Nations Children’s Fund) and those of the World Health Organization covering the health-related aspects by collecting data on pollution effects as well as setting standards and guidelines for interventions. See <http://www.unep.org/about/who-we-are/overview>.

⁷ For identifying a “top pollution” concern in countries, 72 countries that fall in the most-polluted 25 percent of countries globally according the World Health Organization and Yale Environmental Performance Index data were selected; data for indoor and outdoor air pollution, wastewater, or solid waste were used. Fifty-seven of these countries had country assistance strategies within this evaluation’s timeframe; countries without strategies include Hungary, Iran, Somalia, Vanuatu, and Zimbabwe.

⁸ For example, there are only 55 countries with data on all aspects of wastewater treatment (Sato et al. 2013). For ambient air pollution, the 3,000 cities and towns currently covered by the WHO air pollution database represent 1.6 billion people, or 43 percent of the global urban population. However, the availability of air pollution data are highly variable across Regions. In Europe, 1,549 towns and cities have air pollution data, whereas only 39 in Sub-Saharan Africa have data, and these are located in only 10 countries (WHO 2016a, 2014b). Low availability of data or questionable quality was also a pattern across IEG’s country case studies. In Ghana, only PM_{2.5} is measured in 10 defined locations with industrial discharges going unmonitored. In Croatia, although data are generated, they remain difficult to access. In Colombia, efforts to measure pollution are hampered by capacities to take adequate samples. Given this lack of pollution data, it is very difficult to compute reliable estimates of the economic cost of pollution.

⁹ Yet other analytical products have also contained substantial analysis and policy recommendations at the national or subnational level. For example, technical assistance to Sindh in Pakistan sought to help the government to prioritize environmental problems, including assessing the efficiency and cost effectiveness of different interventions. A study on air quality management for the whole of Pakistan helped to identify the sources of pollutants linked to the most serious mortality and morbidity effects, and identified policy options for abatement. A study on air pollution in Ulaanbaatar, Mongolia identified coal and wood burning for heat as the main source of particulate matter, estimated the health costs, and presented abatement measures along with their cost-effectiveness. A study on poverty and environment linkages in Lao PDR, Cambodia, and Vietnam looked at environmental indicators including indoor and outdoor air pollution, finding evidence for connections to poverty from these in both Lao PDR and Cambodia.

¹⁰ In total, 239 countries are part of the World Bank Group active lending portfolio. Of these, 42 received at least one Country Environmental Analysis (CEA). Pakistan, Egypt, and India received multiple regional or follow-up CEA, bringing the total number of CEAs to 46.

¹¹ One could arguably expect that Country Environmental Analyses (CEAs) may be found primarily in countries where they matter the most; an indicator of such could be the country’s environmental performance. Analyzing the CEA occurrence based on the environmental performance index (a joint project between the Yale Center for Environmental Law and Policy and the Center for International Earth Science Information Network at Columbia University) for client countries, the results provide little evidence that the demand for CEAs originates from countries with poorer environmental performance. Interestingly, countries with a high interest in World Bank Group Advisory Services and Analytics work in general in other sectors do not necessarily show the same interest in environmental concerns; advisory activity and environmental assessment creation do not correlate.

¹² Investment Climate Assessments (ICAs) are the World Bank’s tool to evaluate the competitiveness of the private sector and, like Country Environmental Analyses (CEAs), are intended to be used to generate strong awareness of the need to improve on key areas of client countries’ investment climates. To date, 62 countries have received an ICA, many

repeatedly over time. In addition, five regional ICAs have been prepared. The Financial Sector Assessment Program (FSAP), established in 1999 as a joint program with the International Monetary Fund, is a comprehensive and in-depth assessment of a country's financial sector. Similar to CEAs, FSAPs produce recommendations tailored to country-specific circumstances. In contrast to CEAs, though, financial stability assessments under the FSAP are mandatory for countries with financial sectors deemed by the International Monetary Fund to be systemically important. Since 1999, 142 countries have completed the program (many multiple times). Recently, demand has risen, and the G-20 countries have committed to be assessed under the program every five years. (See <http://www.imf.org/external/np/fsap/faq/index.htm#q6>).

¹³ The analysis did not exhibit any significant shift or pattern in certain pollutants, but rather included a range of pollutants, including mercury, cyanide, lead, persistent organic pollutants, dust, and even noise pollution.

¹⁴ For example, the Ghana Country Environmental Analysis (CEA) listed outdoor air pollution from urban environment and extractive industries as a main concern. However, when it came to discussing such industries and the urban environment in detail, the discussion on these sectors, contributions to air pollution was quite limited, with the economic analysis of cost of degradation annexed in the end of the document. Similarly, Egypt's CEA repeatedly mentioned indoor air pollution as a major concern that affects the poor disproportionately, but when it came to the actual discussion of attributions of this pollution, the discussion was limited, with no reference to costs of indoor air pollution. In contrast, Uganda's CEA lists setting air quality standards for controlling outdoor air pollution in its recommendations, but provides no analysis about the extent of the problem or the costs associated with it.

¹⁵ In many cases, Country Environmental Analyses (CEAs) are prepared in conjunction with development policy lending and as a result focus on the priority areas of the future lending operations rather than on the pollutants identified. For example, the 2007 CEA for Ghana was not intended as a comprehensive "state of the environment" report but functioned rather as a key input to stimulate the ongoing policy dialogue on natural resource management for the development policy lending operations that were in preparation at that time. The CEA builds on previously prepared economic and sector work, which was not intended to form part of a CEA. Hence, the strong focus of the CEA on forestry and mining and the lack of attention to indoor and outdoor air pollution and a range of other important concerns, such as e-Waste. In Indonesia, the CEA and associated policy dialog was part of raising awareness on climate change issues.

Most of the recommendations on pollution management centered around prevention of pollution rather than treating existing pollution problems. The greatest focus in CEAs was on prevention of pollution-related problems, with 295 recommendations. Slightly less focus was put on disseminating information on the magnitude of problems arising out of pollution, to build public awareness (212 recommendations) and to improve monitoring systems for detecting pollution (197 recommendations on monitoring). In contrast, only 84 recommendations were made on the treatment of existing pollution problems.

¹⁶ Good-practice examples for assessing cost of environmental degradation, for example, include the Indonesia CEA. However, inconsistencies were found with regard to the assessment of water, outdoor air, and indoor air pollution. These were major concerns in almost all the 30 CEAs sampled; however, only 10 CEAs provided a detailed cost analysis of water and outdoor air pollution and only eight CEAs did a substantial cost analysis of indoor air pollution. Moreover, the focus of CEAs on the poor and vulnerable groups varies. Although 25 of the sample of 30 CEAs analyzed did refer to the poor, the substantiating analysis has often been rather superficial. In 12 CEAs, there was only a negligible coverage of the poor (seven) nor none at all (five); only two CEAs had a substantial coverage, Peru and Colombia, which included substantial discussion on the disproportionate effects of indoor air pollution and water pollution on the poor, and those effects were quantified through estimates of economic losses. IEG's country visits corroborate these findings.

¹⁷ Government was open to support on grant terms, but these were rarely available, especially once the country had graduated from IDA. Pollution concerns were sometimes conflated with climate change by government officials, who argued that pollution (and greenhouse gases) were caused by rich countries, even when the main sources of local pollution were from domestic development. However, government was willing to engage with the World Bank on forestry, when driven by domestic and international political outcry about the costs of haze from deforestation-related forest fires.

¹⁸ In Turkey, the country's EU harmonization aspirations were a major driver of analytical work and policy actions, including those supported by World Bank policy lending. The need to meet EU directives on water quality was a major factor behind Croatia's investments in wastewater treatment. Mexico's aspiration to join the Organisation for Economic Co-Operation and Development was a driver for reforms in energy, water, forestry, and tourism supported by World Bank policy operations.

7

Conclusions and Recommendations

WITH ABOUT 534 POLLUTION-RELEVANT

INTERVENTIONS over FY04–17, the World Bank Group has helped address many of the factors impeding developing countries from addressing their pollution concerns adequately. All World Bank Group institutions are involved. The World Bank supports investment and policy operations across a range of sectors, including water and sanitation, waste management, urban transport, and energy; and IFC offers Investment and Advisory Services and MIGA guarantee projects.

Progress in managing pollution. The World Bank Group made significant progress in improving pollution management in client countries. Drivers of performance of these interventions are usually sector specific. Addressing air pollution through urban transport interventions worked out relatively well, albeit mostly limited to the projects' immediate footprint. Broader and sustained environmental benefits were better achieved in projects with a comprehensive approach that included both upstream and downstream measures. Addressing pollution through solid waste management and water treatment poses a range of challenges, reflected in lower success rates. Success in solid waste management projects often depends on the ability to recover costs and institutional capacity of the municipalities in charge.

IFC's Advisory Services have helped client companies reduce or recycle waste, increase energy or resources efficiency, or introduce renewable energy; these services were largely successful due to the knowledge and expertise involved in service delivery. IFC advice for structuring public-private partnerships (PPPs) also supports pollution management because a substantial share of these PPPs engage in wastewater or waste management; however, these efforts often face political opposition and hence frequently fail to reach commercial closure. Similarly, IFC investments in waste and wastewater utilities are also challenging due to governments' faltering commitment.

Managing the pollution footprint of World Bank Group projects. Most IFC investments meet the pollution-relevant Performance Standards. However, there is room for further improvement in project performance in meeting pollution-relevant requirements during the implementation phase of projects, as about one-third of IFC client companies do not meet the relevant requirements of air emissions and wastewater guidelines. The most important success factor found was commitment of the IFC client and its technical and financial capacity in managing pollution; engaging with the client throughout the project period improved their commitment and capacity, and projects were more successful.

For a significant number of MIGA guarantee projects sufficient information on pollution prevention implementations was not available at the time of IEG's project level evaluations. But of those where data were available, between 62 percent and 75 percent of projects meet pollution prevention requirements. While the World Bank undertakes mitigation actions to avoid or minimize the impact of pollution issues generated from its projects, assessing the extent to which the World Bank contributed to better pollution management through the safeguard system is impossible because of a lack of data.

Balancing the pollution portfolio. The World Bank Group's efforts to fight pollution lost in relative importance even as a range of pollutants worsened—raising the question of the adequacy of the World Bank Group's response. Looking more closely at the various types of pollution, the World Bank Group has provided sustained financing for wastewater infrastructure but missed opportunities in fighting indoor and outdoor air pollution, which are responsible for the largest share of deaths from pollution in developing countries.

Integrating pollution into other sector work plays an important role in rebalancing the World Bank Group's portfolio. For example, the World Bank Group's climate change mitigation portfolio could provide an opportunity to address outdoor air pollution explicitly, helping to improve the design of interventions and to build the case to clients justifying such interventions. In a similar vein, the fact that a large share of urban transport projects support the construction of roads and not of public transport schemes that could reduce pollution effects, points at the potential of better addressing pollution issues across sectors.

Client engagement through knowledge work and policy dialogue. Knowledge of the effect of pollution and associated costs is an important prerequisite for a concerted approach to fight pollution in client countries. Through its knowledge work and because of its field presence and global expertise, the World Bank Group is in a strong position to integrate pollution into the development agenda of its client countries.

However, integrating pollution concerns into a country's development agenda appears to be difficult, as World Bank Group Country Assistance Strategies and Country Partnership Strategies rarely reflect the top pollution concerns of a country; in particular, outdoor and indoor air pollution are rarely covered. The recently introduced Systematic Country Diagnostic tool captures pollution concerns more accurately—raising hopes that in future country partnership frameworks will reflect pollution issues better. These findings may explain why the World Bank Group overall portfolio does not reflect

the most serious pollution problems. Other specific pollutants (mercury, lead, pesticides, or e-waste) have also received little attention in the World Bank Group's portfolio.

The lack of quality data on pollution, its cost, and the cost effectiveness of pollution abatement interventions increases the difficulty of building a case for governments to undertake pollution abatement interventions or to borrow from the World Bank for this purpose. Relatively few World Bank interventions sought to build pollution monitoring systems; these interventions have not only been relatively rare, they also tend to fail more often. This suggests that the World Bank needs to scale up support for building client country pollution monitoring systems. The 2015-established PMEH program could contribute to this scale-up, but its time-bound operation raises questions of sustainability.

The World Bank's main country-level environmental diagnostic, the CEA, identifies the most serious pollution issue in a country, based on available information. Although CEAs cannot generate pollution data, they are instrumental in collecting the information and raising awareness. CEAs were found to be comprehensive in their advice and identification of pollution concerns, but inconsistent when it comes to conducting an in-depth analysis on the identified pollution concerns. Most important though, CEAs have only been prepared for 42 of 151 active client countries, likely because of funding constraints.

The evaluation concludes that the World Bank Group has exercised an important role in several areas related to environmental pollution, including that of a source of knowledge and policy advice. It has the potential to fulfill its role as thought leader and convener for this global public good, in line with aspirations expressed in the *Forward Look* (World Bank 2016b). This is even more true, as the evaluation found very few other global players to exercise leadership in this domain, in particular with regard to shaping the development agendas of its client countries and how these address pollution. However, to reach its full potential, the World Bank Group must leverage its recognized strengths and develop integrated solutions. These should help client countries address pollution issues that curb their economic growth and undermine the health of their people. To do so, the evaluation recommends the following five actions in sequential manner.¹

Recommendations

Recommendation 1: Strengthen World Bank's efforts, including through technical assistance and capacity and institution building, to develop client country pollution measurement and monitoring systems, especially in countries where such capacity is low. These systems should provide quality data in a transparent and systematic manner and effectively contribute to informing policy makers and the public about pollution priorities, recognizing that efforts to build such monitoring systems are likely to require initial trust fund support, as some client countries may be unable or unwilling to borrow for such purposes.

Recommendation 2: Strengthen the World Bank's country analytical work on pollution, in particular such analytical work that allows countries to prioritize their pollution concerns based

on a countrywide and comprehensive assessment, and deploy such analytical work to cover more countries and target countries more strategically. Ensure more consistent quality of this work. This broader coverage will likely require dedicated funding for such analytical work and involve a more strategic use of country-level analytical work that prioritizes countries with the greatest health benefits from pollution control. It will also require a more comprehensive integration of the identified pollution priorities in the SCDs and subsequent country strategies.

Recommendation 3: Intensify efforts to scale up and recalibrate the World Bank’s efforts in pollution management to address the most important pollution priorities. In doing so, the specific circumstances of the poor and their exposure to pollution should be considered, including outdoor and indoor air pollution as well as specific pollution threats (for example, lead, mercury, pesticides, chromium, or e-waste) when warranted by their potential harm. Integrating pollution aspects more systematically into other sectors, for example, urban transport and energy, would be part of such an approach.

Recommendation 4: Leverage the World Bank Group’s climate change portfolio to better combat local and regional air pollution and other applicable forms of pollution. This will require designing future climate change mitigation interventions (including, for example, investments, lending, policy and ASA work and advisory services) so that they address local and regional air pollution issues.

Recommendation 5: For clients that lack the required knowledge, IFC should strengthen its support to help these clients to better comply with Performance Standards on pollution by offering advisory services. Building on the successful experience of advisory services in energy and resources efficiency, this will require offering such services to those IFC investment clients that lack the technical capacity to meet these standards.

ENDNOTE

¹ Recommendation 1 addresses the limited capacity to generate data on pollution, the root cause of many issues identified in this report. These capacities will be essential for client countries aiming to meet their commitment under the Paris Agreement. It also reinforces the findings and recommendations of IEG’s evaluation on data for development (World Bank 2017a). Recommendation 2 suggests strengthening the World Bank’s analytical work. It relies on the implementation of recommendation 1—at least partially—as the World Bank’s analytical work does not typically generate pollution data itself but relies on existing country data. Recommendation 3 calls for scaling up and recalibrating of the World Bank’s portfolio of interventions to manage pollution. This, again, will be facilitated by the implementation of the preceding recommendations 1 and 2. The interest of client countries in borrowing from the World Bank to manage pollution will likely be spurred by analytical work that explains the economic downsides of pollution. Leveraging the World Bank Group’s climate change mitigation portfolio to better combat air pollution is an important part of scaling up the World Bank’s pollution portfolio and is hence addressed in recommendation 4. Recommendation 5 looks at the need to provide capacity to private sector clients to better enable them to meet IFC’s Performance Standards.

references

- Awe, Yewande, Jostein Nygard, Steinar Larssen, Heejoo Lee, Hari Dulal, and Rahul Kanakia. 2015. "Clean Air and Healthy Lungs: Enhancing the World Bank 's Approach to Air Quality Management." Environment and Natural Resources Global Practice Discussion Paper 3, World Bank Group, Washington, DC.
- Bhada-Tata, Perinaz, and Daniel A. Hoornweg. 2012. "What a Waste: A Global Review of Solid Waste Management." Urban Development Series Knowledge Papers 15, World Bank, Washington, DC.
- Biello, D. 2014. "Poisoned Poor Killed in Millions by Pollution." *Scientific American*, June 15. Podcast. <https://www.scientificamerican.com/podcast/episode/poisoned-poor-killed-in-millions-by-pollution1/>.
- Cairncross, S., and P. Kolsky. 2003. "Environmental Health and the Poor: Our Shared Responsibility." Available at: [http://www.lboro.ac.uk/well/resources/Publications/Advocacy %20document%20- %20Front%20cover%20+%20insides.pdf](http://www.lboro.ac.uk/well/resources/Publications/Advocacy%20document%20-%20Front%20cover%20+%20insides.pdf).
- Dasgupta, S., M. Huq, M. Khaliqzaman, K. Pandey, and D. Wheeler. 2004. "Indoor Air Quality for Poor Families: New Evidence from Bangladesh." Policy Research Working Paper 3393, World Bank, Washington, DC.
- Dasgupta, S., C. Meisner, and N. Mamingi. 2005. "Pesticide Traders' Perception of Health Risks: Evidence from Bangladesh." World Bank Policy Research Working Paper 3777, November 2005.
- Dasgupta, S., C. Meisner, D. Wheeler, N. T. Lam, and K. Xuyen. 2005. "Pesticide Poisoning of Farm Workers: Implications of Blood Test Results from Vietnam." Policy Research Working Paper WPS 3624. World Bank, Washington, DC.
- Gurjar, B. R., A. Jain, A. Sharma, A. Agarwal, P. Gupta, A. S. Nagpure, and J. Lelieveld. 2010. "Human Health Risks in Megacities Due to Air Pollution." *Atmospheric Environment* 44 (36): 4,606–13.
- Jamison, Dean T., Joel G. Breman, Anthony R. Measham, George Alleyne, Mariam Claeson, David B. Evans, Prabhat Jha, Anne Mills, and Philip Musgrove, eds. 2006. *Disease Control Priorities in Developing Countries*. 2nd ed. Washington, DC: World Bank.
- Laborde, A., F. Tomasina, F. Bianchi et al. 2015. "Children's Health in Latin America: The Influence of Environmental Exposures." *Environmental Health Perspectives* 123 (3): 201–209.
- Landrigan, P. J., and R. Fuller. 2014. "Environmental Pollution: An Enormous and Invisible Burden on Health Systems in Low- and Middle-Income Countries." *World Hospital and Health Services Journal* 50 (4): 35–40.
- Landrigan, P. J., and R. Fuller. 2016. "Pollution, Health and Development: The Need for a New Paradigm." *Reviews on Environmental Health* 31 (1): 121–4. doi: 10.1515/reveh-2015–0070.
- LeBlanc, David. 2015. "Towards Integration at Last? The Sustainable Development Goals as a Network of Targets." New York: United Nations Department of Economic and Social Affairs.
- Oates, W. E. 2006. "An Economic Perspective on Environmental and Resource Management: An Introduction." In *The RFF Reader in Environmental and Resource Policy*, edited by Wallace E. Oates, xv–xx. Washington, DC: Resources for the Future.
- OECD (Organisation for Economic Co-operation and Development). 2008a. *OECD Environmental Outlook 2030*. Paris: OECD.
- . 2008b. *Reconciling Development and Environment Goals: Measuring the Impact of Policies*. Paris: OECD.
- Pillai, P. 2008. *Strengthening Policy Dialogue on Environment: Learning from Five Years of Country Environmental Analysis*. Environment Department Paper. Institutions and Governance Series. No. 114. The World Bank, Washington DC.

- PMEH (Pollution Management and Environmental Health Program). 2015. *Pollution Management and Environmental Health Program Annual Report 2016*. Washington, DC: World Bank.
- Porter, Michael E., and Claas van der Linde. 1995. "Toward a New Conception of the Environment-Competitiveness Relationship." *Journal of Economic Perspectives* 9 (4): 97–118.
- Sato, T., M. Qadir, S. Yamamoto, T. Endo, and A. Zahoor. 2013. "Global, Regional, and Country-Level Need for Data on Wastewater Generation, Treatment, and Use." *Agricultural Water Management* 130 1–13. dx.doi.org/10.1016/j.agwat.2013.08.007.
- Vennemo, H., K. Aunan, F. Jinghua, P. Holtedahl, H. Tao, and H. M. Seip. 2006. "Domestic Environmental Benefits of China's Energy-Related CDM Potential." *Climatic Change* 75 (1–2): 215–239.
- World Bank. 1992. *World Development Report 1992: Development and the Environment*. Washington, DC: World Bank.
- . 1999. *Pollution Prevention and Abatement Handbook 1998*. Washington, DC: World Bank.
- . 2001. *Making Sustainable Commitments: An Environment Strategy for the World Bank*. Washington, DC: World Bank.
- . 2008. *Environmental Sustainability: An Evaluation of World Bank Group Support*. Independent Evaluation Group. Washington, DC: World Bank.
- . 2009a. *Climate Change and the World Bank Group Phase I: An Evaluation of World Bank Win-Win Energy Policy Reforms*. Independent Evaluation Group. Washington, DC: World Bank.
- . 2009b. *Climate Change and the World Bank Group Phase II: The Challenge of Low-Carbon Development*. *Climate Change and the World Bank Group*. Independent Evaluation Group. Washington, DC: World Bank.
- . 2010a. *Climate Change and the World Bank Group Phase III: Adapting to Climate Change: Assessing the World Bank Group Experience*. Independent Evaluation Group. Washington, DC: World Bank.
- . 2012a. *Getting to Green: A Sourcebook of Pollution Management Policy Tools for Growth and Competitiveness*. Washington, DC: World Bank.
- . 2012b. *Toward a Green, Clean, and Resilient World for All: A World Bank Group Environment Strategy 2012–2022*. Washington, DC: World Bank.
- . 2013. "The Arab Republic of Egypt: For Better or Worse, Air Pollution in Greater Cairo." Report 73074-EG, World Bank, Washington, DC.
- . 2014. *World Bank Group Support to Public-Private Partnerships: Lessons from Experience in Client Countries, FY02–12*. Washington, DC: World Bank.
- . 2016a. *The Cost of Air Pollution: Strengthening the Economic Case for Action*. Washington, DC: World Bank.
- . 2016b. *Forward Look: A Vision for the World Bank Group in 2030*. Washington, DC: World Bank Group.
- . 2016c. *Lessons from Environmental Policy Lending*. Independent Evaluation Group, Learning Product. Washington, DC: World Bank.
- . 2016d. *The World Bank Group's Support to Capital Market Development*. Independent Evaluation Group. Washington, DC: World Bank.

- . 2016e. *Ethiopia, Mali, Morocco, South Africa, Tanzania, Tunisia – Africa Stockpiles Program*, Project Performance Assessment Report, Independent Evaluation Group. Report No. 108524, Washington, DC: World Bank.
- . 2017a. *Data for Development: An Evaluation of World Bank Support for Data and Statistical Capacity*. Independent Evaluation Group. Washington, DC: World Bank.
- . 2017b. *Mobile Metropolises: Urban Transport Matters—An IEG Evaluation of the World Bank Group’s Support for Urban Transport*. Washington, DC: World Bank.
- . 2017c. *Republic of Croatia: Agriculture Pollution Control Project*. Independent Evaluation Group, Project Performance Assessment Report 115691, Washington, DC: World Bank.
- . 2017d. *Results and Performance of the World Bank Group 2016*. Independent Evaluation Group. Washington, DC: World Bank.
- . 2017e. *A Thirst for Change: World Bank Group’s Support for Water Supply and Sanitation*. Independent Evaluation Group. Washington, DC: World Bank.
- WEF (World Economic Forum). 2015. *Outlook on the Global Agenda 2015*. Geneva.
- WHO (World Health Organization). 2014. “Burden of Disease from Household Air Pollution for 2012: Summary of Results.” http://www.who.int/phe/health_topics/outdoorair/databases/HAP_BoD_results_March2014.PDF?ua=1.
- . 2014a. “Data on the Size of the HIV/AIDS Epidemic: Number of Deaths Due to HIV/AIDS.” Global Health Observatory Data Repository. <http://apps.who.int/gho/data/node.main.623>.
- . 2014b. “Deaths: Estimated Deaths, Data by Region.” Global Health Observatory Data Repository. <http://apps.who.int/gho/data/view.main.14117?lang=en>.
- . 2016a. *Ambient Air Pollution: A Global Assessment of Exposure and Burden of Disease*. Geneva.
- . 2016b. “Air Pollution Levels Rising in Many of the World’s Poorest Cities.” News Release. 12 May. Geneva.

APPENDIXES

TOWARD A CLEAN WORLD FOR ALL

An IEG Evaluation of the World Bank Group's
Support to Pollution Management



IEG
INDEPENDENT
EVALUATION GROUP

WORLD BANK GROUP
World Bank • IFC • MIGA



Appendix A. Methodology

Evaluation Questions

The objective of this evaluation is to enhance the World Bank Group’s effectiveness in supporting client countries to achieve progress toward the World Bank Group’s strategic objective of a “clean world for all” by obtaining evidence-based findings, developing broadly-applicable lessons across all World Bank Group institutions and global practices, and proposing appropriate recommendations.

The evaluation objective inspired the overarching evaluation question which guided the collection and analysis of data and the framing of its findings and recommendations. The overarching evaluation question was defined as, “How relevant, effective, and efficient has the World Bank Group been in addressing pollution concerns in client countries through (i) targeted interventions and (ii) the use of safeguards and Performance Standards in pollution-heavy industries (as these concerns relate to the poor)?” Subordinate questions were subsequently designed to break down this overarching question into answerable components in the areas of relevance, effectiveness, efficiency, and work quality (see box A.1).

Box A.1. Lines of Inquiry Guiding the Evaluation

Relevance—To what extent has the World Bank Group...

- Supported client countries in addressing the most important pollution concerns, that is, is the World Bank Group targeting the relevant concerns in its client countries affecting the poor?
- Used the right instruments—is the World Bank Group addressing the key “upstream” issues (including policy, regulations, institutions, subsidies, incentives, and so on) and “downstream” investments?
- Used the right diagnostic tools to assess pollution issues in client countries, including the special circumstances of project beneficiaries, including the poor, women, the elderly, or children?

Effectiveness—Has the World Bank Group been effective in...

- Building the required awareness, public disclosure mechanisms, knowledge, capacity, and institutions and setting up regulatory frameworks to deal with pollution-related issues through its public sector-focused systemic/upstream interventions and are these outcomes sustainable?
 - Addressing pollution issues through its lending operations and public investments in pollution reduction, and through its safeguards (World Bank) and what were the effects?
-

- Curbing pollution through its private sector-focused interventions (enhancing the private sector capacity and addressing pollution issues through Performance Standards (IFC/ MIGA)?

Efficiency

- Is the World Bank Group positioned to address pollution issues in an efficient manner? What is the World Bank Group's comparative advantage, given its range of interventions and services?
- What is the World Bank Group's role vs. other development partners (multilateral development banks or international financing institutions) in providing knowledge or funding?
- What do we know about the efficiency of proposed abatement options? Are end-of-the-pipe solutions or the promotion of more comprehensive cleaner production/technology concepts prevalent?

Work quality and working as one World Bank Group

- Is the World Bank Group effectively managing factors within its control and is the World Bank Group meeting its established work quality standards in monitoring, reporting, and supervision?

Are the different World Bank Group institutions leveraging synergies through adequate coordination knowledge sharing, and sequencing of interventions?

This study focused on local and regional pollution phenomena, as opposed the global concerns of climate change or ozone depleting substances. Climate change issues have already been addressed by IEG by a series of three evaluations (World Bank 2009a, 2009b, and 2010a). This study will analyze the nexus of pollution and poverty while recognizing that many Bank Group interventions are broad-based, that is are not pro-poor targeted, but represent the underlying foundation for subsequent pro-poor interventions. The study will focus on those pollution phenomena that matter most for poor countries and the poor who live in these countries that is, indoor and outdoor air pollution, water pollution, and waste.

Principles

Three central principles motivated the evaluation design: multilevel analysis, theory-based evaluation, and mixed-methods. First, the evaluation adopted a multilevel perspective because the assessment covered the sectoral, national, and global dimensions of World Bank Group support to pollution management. Second, the evaluation was grounded in a theory of change—a reconstruction of how the various World Bank Group upstream (systemic in nature) and downstream (directed technical assistance and finance) interventions supported client countries in addressing their most pressing pollution concerns through better prevention, treatment, and monitoring. This theory of change was developed using an iterative design process and was validated with key stakeholders both internal and external to the World Bank Group. Third, the evaluation followed a mixed-methods approach. This

approach combined a range of data collection efforts—that is internal project-level data, external country-level data sets, Project Performance Assessment Reviews (PPARs), semi structured interviews, case studies, and literature reviews—which were sequenced to build on each other as depicted in figure A.1. Systematic triangulation across these methods ensured the robustness of the findings.

Overview of Methodological Design

Table A.1 provides a summary of the key evaluation components. More details on each component can be found in section below “Detailed Description of Methods”.

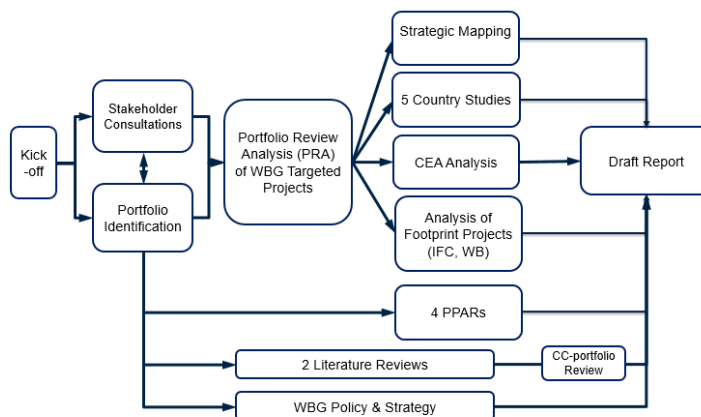
Table A.1. Evaluation Components and Their Descriptions

| Evaluation Component | Description |
|---|--|
| Literature reviews | Structured review of academic, evaluation, and other literature on climate change cobenefits and economic development and pollution trade-offs |
| Interviews with internal and external stakeholders | Semi structured interviews with subject-matter experts within IEG, the broader World Bank Group, and external stakeholders such as academics and research institutes |
| Reconstruction of Theory of change | Reconstruction of how the outcomes sought by the World Bank Group in pollution management were expected to happen |
| Portfolio review (targeted projects) | Systematic desk review and assessment of targeted pollution projects, gathering and analyzing project design features, results indicators and drivers for success and failure |
| Portfolio review (climate change cobenefits) | Systematic desk review and assessment of a random sample of climate change projects to identify the climate change / pollution cobenefits components |
| Analysis of strategic relevance (data analysis) | Data analysis exercise mapping the most pressing pollution concerns including ambient air pollution, indoor air pollution, wastewater treatment, and solid waste management against the World Bank Group response. IEG used data from WHO, IHME, and components from Yale’s Environment Performance Index to support this analysis. Portfolio data was subsequently laid over these indicators. |
| Analysis of IFC and MIGA Performance Standards (footprint projects) and World Bank safeguards | In-depth data analysis using the IFC and MIGA Performance Standards database across three pollution areas—air, water, and soil pollution—at the industry and regional level. For the World Bank, a qualitative review of Safeguards Category A projects using appraisal and evaluation documentation was conducted to understand to how safeguards were implemented in these cases and which mitigation actions were proposed and delivered. |
| Country Environmental Analyses review | Systematic review of World Bank Country Environmental Analyses aimed to analyze the extent to which CEAs influenced national strategy actions and World Bank Group own strategy in targeting pollution concerns |
| Relevance assessment of country strategies and diagnostics | Systematic review of CAS/CPS/SCDs in 72 client countries where pollution is a key concern* relative to other countries. The purpose of this exercise was to reveal the level of alignment and coherence between World Bank Group strategy and key pollution concerns. |

| Evaluation Component | Description |
|--|---|
| Field-based country case studies | *countries with at least one indicator in quartile one as per strategic mapping In-depth, field-based assessment of the World Bank Group’s support to managing pollution concerns in 5 client countries (Colombia, Croatia, the Arab Republic of Egypt, Ghana, Indonesia). All targeted pollution projects were assessed as well as nonproject activities such as policy dialogue and engagement and coordination with key partners. |
| Field-based Project Performance Assessment Reports | In addition to field-based country case studies, the evaluation conducted four Project Performance Assessment Reports with fieldwork in Morocco, Tanzania, Ethiopia, (covered in one report), China, Croatia, and the Arab Republic of Egypt to deepen the evaluative evidence base. Projects were selected to represent a diversity of lending instruments (specific investment loan (SILs), financial intermediary loans (FILs), and DPLs) and operational approaches that cover a wide spectrum of pollution concerns. |

Figure A.1 is a schematic of the overall evaluation design and evaluation process management. It provides a summary of the complementarity of evaluation components and their sequencing from evaluation kick-off to final draft report.

Figure A.1. Methodological Design: Evaluation Components and Their Relationship



Note: IFC = International Finance Corporation; WB = World Bank; WBG = World Bank Group; CC = climate change.

Ensuring Validity of Findings

To ensure the validity of the evaluation’s findings, IEG embedded quality control measures throughout the evaluation process from kick-off to draft report. These measures included the use of protocols, intercoder reliability measures, triangulation, and other external validation mechanisms.

IEG used coding protocols and codebooks as well as intercoder reliability measures to guarantee a consistent approach to coding and analysis across evaluation components and across team members. Protocols were used to ensure a common framework and evaluative lens across case studies and project reviews while codebooks served as an organizing principle for categorical data analysis. IEG designed these protocols and codebooks based on a review of project- and case-relevant literature and documentation and in consultation with IEG staff knowledgeable on evaluation methods and relevant subject matter (see appendix D for a full description). In addition, IEG pilot-tested these protocols to ensure they were answerable based on the available data and information. The pilot phase also served to ensure the team was on the same page about the issues and questions being asked—that is to strengthen measurement consistency. Additional efforts to ensure intercoder reliability were embedded into the project coding lifecycle and included establishing a daily peer review quota and weekly meetings to review common questions and concerns.

The team also applied triangulation at multiple levels, first by crosschecking evidence sources within a given methodological component. Within case studies, for example, the team compared and contrasted evidence from interviews with country counterparts (including environmental protection agencies), academia, civil society organizations (CSOs), domestic and international nongovernmental organizations (NGOs), development partners, and World Bank staff on the same topic. Second, the team applied triangulation across evaluation components—for example, cross validating findings from case studies with findings from portfolio analysis and literature reviews.

The evaluation team also applied external validation mechanisms at various intervals during the evaluation process. For example, IEG identified the portfolio of interventions through an iterative process in dialogue with World Bank Group staff and management and subsequently shared the finalized list of interventions with these same stakeholders. Three peer reviewers provided feedback at the approach paper stage and at the final report review stage.

Detailed Description of Methods

Literature Reviews

Two structured literature reviews informed the evaluation on two important subtopics—namely on the pollution cobenefits of climate change interventions and on the trade-offs between economic development and pollution. The Climate Change literature review identified an extensive set of academic and evaluation literature to better understand how interventions that are designed to reduce GHG emissions can also reduce the emissions of conventional pollutants such as SO₂ or particulate matter—that is, the climate change to


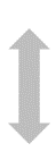
pollution “cobenefits.” Findings from the literature review were mapped against the evaluation’s Climate Change portfolio to better understand the World Bank Group’s relevance and effectiveness along the broad spectrum of pollution management interventions. Similarly, the trade-offs literature review identified an extensive set of academic and evaluation literature but in this case to better understand the tension between these two consequential features of sustainability—economic development and pollution management—and bridge this important knowledge gap.

Evaluation Conceptual Framework and Theory of Change

The evaluation conceptual framework served as an organizing principle that encapsulated the diversity of World Bank Group interventions that support pollution management in client countries. Pollution management is a theme that cuts across the World Bank Group organizational structure—activities are present in many sectors, industry groups, and global practices. Defining concisely the set of interventions that support pollution management was a challenge but also an opportunity to shed light on the diversity of approaches to pollution management delivered by the World Bank Group. IEG designed the evaluation conceptual framework to reflect this diversity, identifying three clusters of projects: projects that “target” pollution concerns in their development objectives or components, those that reduce the pollution “footprint” of sectors and industries through the application of safeguards (World Bank) and Performance Standards (IFC/MIGA), and projects that aim to curb the emissions of greenhouse gases (GHG) in pursuit of Climate Change mitigation. A review of relevant literature and project-level documentation together with consultations with internal and external subject-matter experts informed the design of the evaluation conceptual framework. Figure A.2 visualizes the evaluation framework.

The evaluation theory of change links the evaluation conceptual framework with the relevant pollution management outputs and intended outcomes. As with other evaluation instruments, the theory of change underlying the evaluation is a simplification of an otherwise complex system. It relies on stylized relationships to facilitate the analytical linkage between inputs and intended outcomes and impacts and makes cognizant decisions about conceptual boundaries (that is defines what is in and what is out) to ensure the evaluation is left with a functional scope. Like the design of the evaluation conceptual framework, IEG reconstructed the theory of change underlying the World Bank Group’s support to pollution management using an iterative learning process substantiated by systematically consulting relevant literature, project documentation, and internal and external subject-matter experts. Figure A.3 visualizes the theory of change underlying the evaluation.

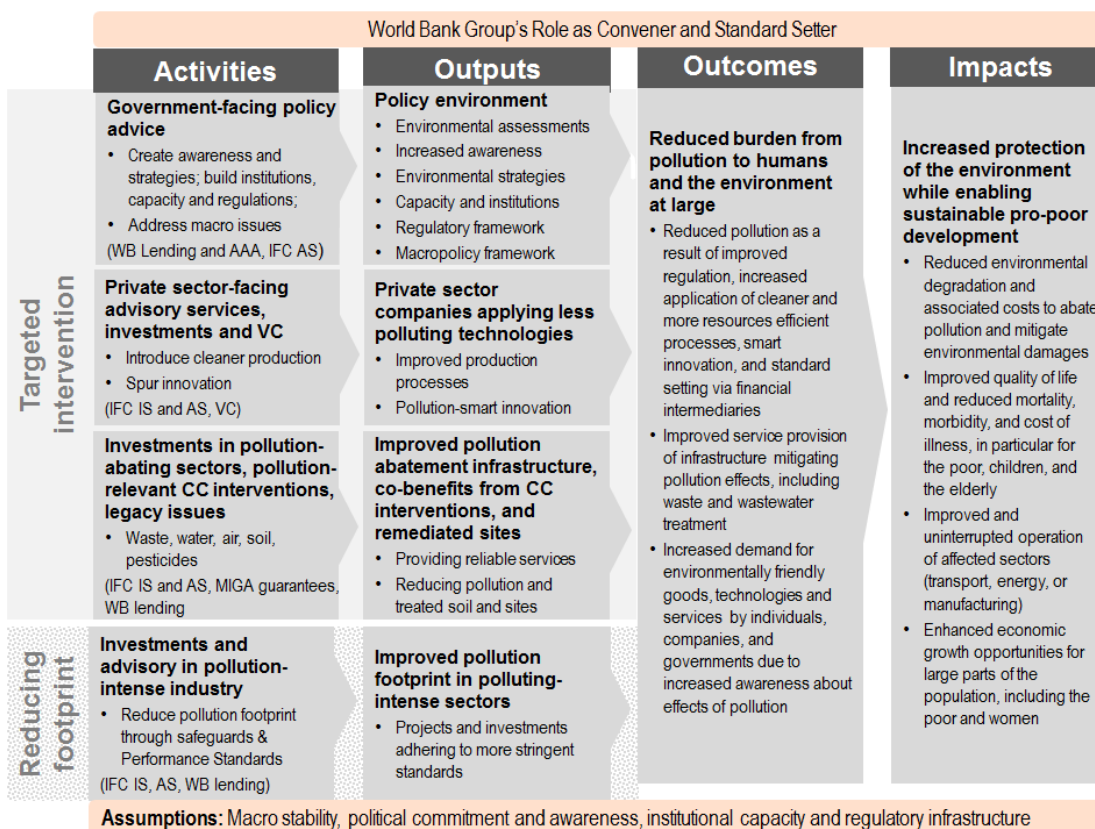
Figure A.2. Evaluation Conceptual Framework of World Bank Group Pollution Interventions

| | | | |
|-------------------------------|--|---|--|
| Targeted Interventions | Government-facing policy advice • Create awareness, strategies, and regulations • Macro policy framework | WB Lending and Non-Lending IFC Advisory |  Focus of the Evaluation |
| | Private sector-facing advisory services, investments and VC • Introduce cleaner and resources efficient processes • Spur pollution-smart innovation | IFC Advisory IFC CP Facility IFC CleanTech VC | |
| | Investments in pollution-abating sectors, pollution-relevant climate change interventions, and legacy issues • Solid-waste and waste-water treatment • Air pollution (indoor and outdoor) • Co-benefits from climate change • Other concerns (e.g. POPs, waste, soil, toxic chemicals) | WB Lending IFC Investments IFC Advisory MIGA Guarantees | |
| Reducing Footprint | Investments and advisory in pollution-intense industry to reduce pollution footprint through the application of Safeguards and Performance Standards • Manufacturing (Iron, Steel, Cement, Glass, Brick, P&P ..) • Energy, mining and transport • Agriculture and agribusiness • Utilities (other than water and solid waste treatment) | IFC Investments IFC Advisory MIGA Guarantees WB Lending |  Transmission Channels |
| Climate Change | Government and private sector-facing advisory and investments to reduce GHG emissions • Regulations and standards • Energy efficiency, technology upgrading, fuel switching, and renewables | WB Lending and Non-Lending IFC Investments and Advisory MIGA Guarantees | |

Source: Independent Evaluation Group portfolio review and interviews with World Bank Group subject-matter experts and management

The evaluation scope follows the evaluation conceptual framework and theory of change, covering the entire spectrum of World Bank Group pollution activities. This includes lending, nonlending, ASA, investment and policy lending, advisory services, and guarantee projects, approved fiscal years (FY)04–17. The study focuses on local and regional pollution phenomena, as opposed to the global concerns of climate change or ozone-depleting substances, with special emphasis on those that matter most for poor countries and the poor who live in these countries that is, indoor and outdoor air pollution, water pollution, and waste. [i]The safeguards system and Performance Standards are not subject to evaluation per se[ii], but the report assesses the effects of these standards on abating pollution in pollution-intense industries.

Figure A.3. Theory of Change Underlying the Evaluation



Source: Independent Evaluation Group portfolio review and interviews with World Bank Group subject-matter experts and management

Note: ASA = Analytical, Assessment and Advisory, AS = advisory services, CP = cleaner production, CC = climate change, IS = investment services, WB = World Bank, VC = venture capital

Project- and Country-Level Systematic Document Review

The evaluation's portfolio review entailed a thorough identification, codification, and analysis of World Bank Group support to pollution management. IEG identified a portfolio of nearly one thousand "targeted" investments, policy operations, and advisory and analytical activities approved between fiscal years 2004 and 2017. The pollution portfolio covered all regions and spanned over 100 countries.

The evaluation's portfolio review of targeted activities aimed to provide a better understanding of the nature of World Bank Group activities in support of pollution management to a systematic assessment of their performance. Once identified, IEG conducted a systematic review of project documentation to better understand the interventions and mechanisms used by the World Bank Group to support pollution management in client countries, using a portfolio framework that mirrored the overall

conceptual framework and theory of change. The team also assessed their performance using a structured ratings framework that relied on project indicators and qualitative findings from project evaluation documents.

IEG also conducted a series of systematic document reviews to complement the evaluation's targeted portfolio review.

The first of these complementary reviews is the systematic review of the World Bank's Country Environmental Assistance (CEA) which aimed to analyze the extent to which CEAs influenced national strategy actions and World Bank Group own strategy in targeting pollution concerns. The CEA is an analytical tool designed to integrate environmental considerations in country assistance strategies (CASs) or country partnership strategies (CPSs), Poverty Reduction Strategy Papers, development policy lending (DPL), and country-level development strategies and programs (World Bank 2008; Pillai 2008). To analyze CEA influence, Independent Evaluation Group reviewed a sample of 30 CEAs delivered between fiscal years 2005 and 2017 using an analytical framework that mapped CEA recommendations to country strategies delivered concurrently with or after the CEA.

IEG also conducted a systematic review of Climate Change projects to better understand the distribution of climate change components with potential for ambient air pollution cobenefits. A random sample of 145 projects was drawn from the population of the 804 Climate Change projects identified at that time (~7pct error, 95pct confidence). A portfolio review framework was developed to systematically categorize project components into mutually exclusive clusters including: cobenefits component, GHG sink components, Climate Change adaptation and resilience components, and a remainder of neither Climate Change nor pollution-relevant components.

Finally, a systematic review of country strategy documents was conducted to better understand the level of alignment and coherence of World Bank Group country-level strategy and a country's key pollution concerns. IEG first identified all the countries in the lowest quartile of at least one of the major pollution concerns (ambient air pollution, indoor air pollution, wastewater treatment, and solid waste management). This resulted in the identification of 78 countries. To assess the alignment between strategy documents and pollution concerns, Independent Evaluation Group reviewed the latest country strategy document—CAS or CPS—and, in the cases where it was available, the team also reviewed the country's Systematic Country Diagnostic (SCD). A categorical array was developed to systematically assess the extent to which strategy documents address pollution concerns (see table A.2). This categorical array was not mutually exclusive, that is a response could include one or more of the categorical options as a response, for example, a pollution concern may be both substantially discussed and be part of the work program.

Table A.2. Assessment of Country Strategy Alignment: Definitions of the Categorical Array

| Category | Definition |
|-------------------------------|--|
| No mention | CAS/CPS or SCD does not mention the pollution concern anywhere in the document |
| Brief mention | CAS/CPS or SCD mentions the pollution concern in at least one sentence but does not provide deep coverage of its issues (for example, source of pollution or resulting effects on the environment and health of the exposed populations) |
| Substantial discussion | CAS/CPS or SCD mentions the pollution concern and provides deep coverage of its issues (for example, institutional analysis, analysis of root causes and sources of pollution, resulting health effects on the exposed populations) |
| Part of proposed work program | World Bank Group has at least one project or activity that aims to manage the pollution concern |

Case Studies and PPARs

IEG conducted field-based cases of the World Bank Group’s support to pollution management in five countries and four Project Performance Assessment Reports (PPARs) in six countries. The purpose of the five cases was to identify drivers of success and failure; assess the long-term outcomes of interventions that are typically not captured in project-level evaluations; assess nonlending and advisory work, including ASA and technical assistance that might have provided diagnostics of the country’s environmental status; address issues of balancing upstream vs. downstream work; and assess the sequencing and synergies across World Bank Group institutions. Contribution analysis was used to assess the World Bank Group role in advancing the pollution agenda, given the multiple stakeholders in the process and the general economic developments in a country.

The fieldwork covered the World Bank Group’s work around the most important pollution concerns relating to air, water, and waste while providing an opportunity to delve deep into specific sector issues, intervention types, and the use of unique instruments or approaches. Air pollution, one of the major killers, will be covered in six of the ten countries. Two of these countries include indoor air pollution concerns while outdoor air pollution concerns were covered through the industry lens in targeted projects such as the Arab Republic of Egypt’s pollution abatement series as well as through footprint projects in heavy industry. Waste management concerns were covered in four out of the five country case studies, for example, through the Colombia DPL series and related investments in solid waste management. Waste water management will be covered in all country case studies through targeted and footprint projects. In Croatia, for example, the World Bank’s Coastal City Pollution Control supported investments in sewerage networks, pumping stations, and wastewater treatment plants while IFC investment and Advisory Services work supported the animal processing sector to better manage wastewater.

The country selection process followed a two-step approach. The first, larger sample of countries was selected using a criteria-based filtering methodology while the final five countries were selected purposefully from this larger sample. As field-based country case studies are often a more fruitful source of knowledge if they contain a certain minimum number of World Bank Group interventions, IEG applied the following criteria to its first-level sampling: (i) countries should have at least two of the five pollution-relevant instruments (World Bank investment loans, IFC loan or equity investments, MIGA guarantee projects, IFC Advisory Services, and World Bank Advisory Services and Analytical activities) and (ii) countries should have a mature portfolio with evaluated projects (for example, including Implementation Completion and Results Reports, Implementation Completion and Results Report Reviews, Expanded Project Supervision Reports, Project Completion Reports, and Public Expenditure Review). After applying these criteria to the list of 148 countries yielded the first-stage sample of 25 eligible countries. The subsequent purposive sampling of five countries was based on the following principles:

- Coverage of the most prominent issues related to air, water, and waste pollution (see table A.3 for resulting coverage);
- The complementarity of interventions (that is, work that supports the enabling environment to those investing in pollution-intense industries subsequently or funding relevant pollution management infrastructure);
- Coverage of the various sectors across pollution-intense industries;
- Coverage and depth of analytical work and investment lending
- Geographic, regional, and income level considerations; and
- Institutional capacity to drive the country's environmental agenda

Table A.3. Field-Based Country Case Study Coverage

| Method Type | Country Name | Coverage | Air Indoor | Air Outdoor | Waste Water Mgt. | Solid Waste Mgt. | Other ^a |
|--------------------|-------------------------------|-------------------|------------|-------------|------------------|------------------|--------------------|
| Country Case Study | Colombia | CCS | X | X | X | X | |
| | Croatia | CCS + PPAR | | | | X | |
| | Egypt, Arab Rep. | CCS + PPAR | | X | X | X | X |
| | Ghana | CCS + Co-mission | X | X | X | X | X |
| | Indonesia | CCS | | X | X | X | |
| PPAR | Morocco / Tanzania / Ethiopia | PPAR | | | | | X |
| Co-mission | China | Co-mission + PPAR | | X | | X | |
| | India | Co-mission | | X | | X | |

Note: a. For example, POPs. Mgt. = management.

In addition to these country missions, the evaluation conducted four PPARs with fieldwork in Morocco, Tanzania, Ethiopia, China, Croatia, and the Arab Republic of Egypt to deepen the evaluative evidence base. Projects were selected to represent a diversity of lending instruments (SILs, FILs, and DPLs) and operational approaches that cover a wide spectrum of pollution concerns. The Africa Stockpile Program (P075776-FY06) was selected given its focus on eliminating obsolete pesticide stockpiles and associated waste and implementing measures to reduce and prevent future related risks; visits to three countries were planned in the context of this PPAR (Morocco, Tanzania and Ethiopia). The PPAR of the Thermal Power Efficiency Project in China (P098654) assessed the outcomes of this targeted intervention, but also represented an opportunity to look at World Bank Group’s broader involvement in air pollution abatement in China and into cobenefits of climate change projects. In Croatia, the GEF Agriculture Pollution Control Project (P100639-FY08) was selected given its investment to support the use of environmentally friendly agricultural practices by farmers in the country’s Danube River Basin to reduce nutrient discharge from agricultural sources to surface and groundwater. Unlike previous attempts in other countries, the World Bank’s Second Pollution Abatement Project in Egypt (P090073) successfully used a line-of-credit approach directed at abating industrial pollution and was hence suggested as a fourth PPAR. The project leveraged an innovative, multidonor approach, supported the capacity of the Egyptian Environmental Affairs Agency, and contained a stand-alone carbon finance subprogram.

Parallel IEG missions to China, Ghana, and India were also designed to feed into the pollution management evaluation. By coordinating with IEG missions to China, Ghana, and

India conducted by the urban transport and water and sanitation evaluation teams, this evaluation increased the diversity and coverage of fieldwork in these two important countries. Given that the pollution portfolio overlaps both the urban transport (through efficient public and mass transit interventions) and water and sanitation (through wastewater treatment) portfolios, questions posed on the effectiveness and sustainability of these interventions was directly relevant to the pollution evaluation irrespective of which evaluation team lead the field mission. As part of the collaboration effort, however, the pollution evaluation team drafted specific pollution-relevant questions for these case studies to ensure the data collected met the evaluation's own case study needs. For example, the pollution evaluation reviewed the China field mission urban transport projects and provided specific questions with regards to air quality monitoring—for example, in cases where air quality monitoring was included in project design, what motivated this choice and what did the data show in terms of improvement or worsening of air quality; in cases where there was no air quality monitoring, what were the barriers.

Limitations

Limitations to the evaluation design fell broadly into two categories: limitations from conscious choices about scope and limitations with regards to the availability and quality of existing data and documentation and the challenges of generating new quality data.

Scope related limitations included: (i) the necessary trade-off between breadth and depth of analysis and (ii) the field-based case studies selection strategy which favored countries with a significant pollution management portfolio at the expense of those where pollution management efforts were less prevalent. To reduce the breadth and increase the depth of analysis, the evaluation made the necessary choice with regards to scope by focusing on the analysis of targeted and footprint projects as opposed to the pollution effects from the entire portfolio. This choice was informed by the literature and stakeholder consultation and by an evaluability assessment that showed that World Bank Group systems are not set up to capture the pollution effects of its entire portfolio.

Data and documentation limitations included the following:

- the identification of projects relied on internal coding systems (which are not always accurate) and keyword searches in text-based data sets (which are not always complete)
- the classification of project interventions relied on project-level documentation (which is not always available or consistent)
- the effectiveness analysis relied on a limited number of projects with evaluative information specifically on the pollution management intervention (projects often

describe results and success factors at the project level and not at the intervention level therefore hindering the analysis of the pollution management intervention which is often one of many total interventions carried out by a project); in addition, even when effectiveness results are presented at the pollution management intervention level, results are not reported on in a consistent manner (for example, some projects report intervention-level results at the output level while fewer report results at the outcome level); and finally, given the limited number of projects with results at the pollution management intervention level, the effectiveness analysis relied on simple correlations and cross-tabulations

- the analysis on both efficiency and sustainability relied mainly on case study evidence because of the limited and unsystematic evidence available in project documents (of efficiency or sustainability in general but in particular with regards to specific pollution abatement options) and, similar to the effectiveness analysis, evaluation documents report on efficiency and sustainability at the project level as opposed to the intervention level, which hinders the analysis when pollution management is one of many interventions
- the analysis of knowledge influence at the country level relied the presence of an important analytical piece delivered by the World Bank (that is, the CEA which covered a limited number of countries) while selected case studies provided a more outward looking view on the World Bank Group's convening power at the country level by placing the World Bank Group's support in context with other actors supporting the pollution management agenda in a country (namely other public sector actors and multi- and bilateral development partners)
- the relevance and strategic mapping analysis relied on external data sets which often had limitations of their own (for example, limited coverage, changes to methodology, latest available version is old or outdated).

With respect to reliability and generalizability concerns, the evaluation faced several limitations, the fact that interventions are heterogeneous and multidimensional and the fact that the scope of the intervention was often far smaller than the scope of the problem. With regards to this final point, while it may be desirable to assess the results of World Bank Group operations in terms of improved environmental conditions, such an assessment would require data on actual emissions or similar. While the evaluation tried to analyze such data, it was bound by the available project-level information present in evaluation reports.

Portfolio Framework and Identification Methodology

Identification Methodology

Underpinning the portfolio identification methodology employed by IEG are extensive consultations with stakeholders and experts across the World Bank Group as well as the review of available internal and external literature and strategy documents. These interactions and review of the literature informed the evaluation approach by highlighting important concepts and frameworks as well as revealing industry coding, system flags, and keywords that would facilitate the identification of the portfolio and its classification into relevant portfolio subsets. During the evaluation phase, IEG shared the identified list of projects together with relevant World Bank Group departments to ensure completeness and accuracy of the project universe.

IEG's identification methodology leveraged the World Bank Group's industry coding and system-based flags together with text analytics strategies to systematically capture and categorize the relevant portfolio subsets. In addition to consultations with relevant stakeholders, IEG used the following steps to identify the evaluation's portfolio of projects: (i) identify relevant system flags (for example, sector codes), (ii) for projects that do not contain at least one of the relevant system flags, perform a targeted keyword search, and (iii) manually review the projects identified in steps (i) and (ii) to remove false positives. IEG subsequently categorized these projects in a systematic manner to achieve a unified portfolio view.

For the World Bank, IEG identified six sector and theme codes as key to the evaluation: pollution management and environmental health, environmental institutions, other environment, climate change, energy efficiency, and renewable energy. Projects were selected for review if they contained at least one of these codes (table A.4). IEG also performed a targeted keyword search of all project abstracts, keyword tags, and prior actions. This resulted in a list of approximately 1,500 projects (or about 34 percent of the portfolio) which were manually reviewed (step iii) to identify the targeted pollution and climate change portfolio subsets (275 and 271 projects respectively). World Bank "improving footprint" projects were identified based on sector coding where projects contained at least one sector code in agriculture, energy, transport, and urban development. Given the lack of documentation available for World Bank ASA, these projects were identified using only the targeted sector code pollution management and environmental health. This resulted in a list of 362 targeted pollution ASA (or about 3 percent of the portfolio).

Table A.4. World Bank and ASA System Codes Used to Identify Pollution-Relevant Subsets by Intervention Type

| | |
|-------------------------|---|
| Source | OPCS Sector and Theme Codes: http://www.worldbank.org/projects/sector?lang=en&page= http://www.worldbank.org/projects/theme?lang=en&page= File from World Bank Business Intelligence Portal and Analysis for Office Application |
| Targeted interventions | Sector Codes: WB—Solid Waste Management; WT—Wastewater Collection and Transport; WV—Wastewater Treatment and Disposal Theme Codes: 82—Environmental Policies and Institutions; 84—Pollution Management and Environmental Health; 86—Other Environment and Natural Resources Management |
| Footprint interventions | Sector and Theme Codes for: Agriculture, Energy, Transport, and Urban Development |
| Climate change | Sector Codes: LA—Energy Efficiency in Heat and Power; LE—Renewable Energy; LR—Other Renewable Energy Theme Codes: 81—Climate Change |

Source: Independent Evaluation Group review and interviews with World Bank Group subject-matter experts and management.

For IFC Advisory, IEG identified key product lines relating to environmental sustainability, environmental standards, resource efficiency, clean energy, and sustainable energy finance. Projects were selected for review if they contained at least one of these product lines (table A.5). In addition, IEG performed a targeted keyword search of all projects using ASOP’s (Advisory Services Operations Portal) memo listings for objective and project description. This resulted in a list of approximately 450 projects (or about 15 percent of the portfolio) which were manually reviewed (step iii) to identify the targeted pollution and climate change portfolio subsets (101 and 220 projects respectively). IFC Advisory “footprint” projects were identified based on sector coding where projects contained at least one sector code in chemicals; oil, gas, and mining; plastics and rubber; primary metals; pulp and paper; and so on.

Table A.5. IFC Advisory and Investment Services System Codes to Identify Pollution-Relevant Subsets by Intervention Type

| | |
|-------------------------|---|
| | IFC Sector Names, Product Names, and Industry Group Codes |
| Source | File from iDesk (MIS Extract) and ASOP (Project Product Detailed Listing) |
| Targeted interventions | <p>Sector Names:</p> <p>Utilities:</p> <p>C-BA—Water and Wastewater Utilities</p> <p>C-DA—Waste Collection Treatment and Management</p> <p>C-DB—Waste-to-Energy—Waste</p> <p>Industry Group Codes: Water and Wastewater Utilities</p> <p>Product Names (IFC-Advisory Only): Environmental, Social and Trade Standards; Environmental and Social Sustainability Advisory</p> |
| Footprint interventions | <p>Sector Names:</p> <p>Agriculture: A-AA to A-BD</p> <p>Oil, Gas, and Mining: B-AA to B-FA</p> <p>Utilities: C-BA to C-DB</p> <p>Transportation and Warehousing: E-BA</p> <p>Food and Beverages: F-AA to F-BC</p> <p>Chemicals: G-AA to G-HA</p> <p>Nonmetallic Mineral Product Manufacturing: H-AA to H-CA</p> <p>Primary Metals: I-AA to I-BB</p> <p>Pulp and Paper: J-AA to J-AH</p> <p>Textiles, Apparel & Leather: K-AC</p> <p>Plastics and Rubber: L-AA to L-AC</p> <p>Industrial and Consumer Products: M-AA to M-AF; M-DA to M-DC; M-FA to M-FD</p> <p>Electric Power: V-AA to V-AE; V-CA; V-EA; V-IA</p> <p>Industry Group Codes:</p> <p>Agribusiness & Forestry: Beverages, Food processing, Livestock, Primary production, Pulp & Paper</p> <p>Infrastructure: Electric power; Urban transport</p> <p>Manufacturing: Chemicals & Fertilizers, Construction materials, Machinery, Transport Equipment, Other Manufacturing, Textiles, apparel & leather</p> <p>Oil, Gas & Mining</p> |

Source: Independent Evaluation Group review and interviews with World Bank Group subject-matter experts and management.

Given the nature of IFC investments and MIGA guarantee projects, a modified strategy was implemented to identify their relevant portfolio subsets. For IFC investments, 80 projects in the cleaner production and waste and wastewater projects were identified and included in the targeted pollution portfolio subset. An additional 900 projects were identified and included in the “improving footprint” portfolio subset based on sector coding; that is projects contained at least one sector code in chemicals; oil, gas, and mining; plastics and rubber; primary metals; pulp and paper; and so on (figure A.5). For MIGA guarantee projects, 18 projects in the waste and wastewater sectors were identified and included in the targeted pollution portfolio subset while an additional 154 heavy industry projects were

identified and included in the “improving footprint” portfolio subset based on sector coding; for example, agriculture, chemicals, infrastructure, manufacturing, mining, oil, power, transport, and so on (table A.6.)

Table A.6. MIGA System Codes Used to Identify Pollution-Relevant Subsets by Intervention Type

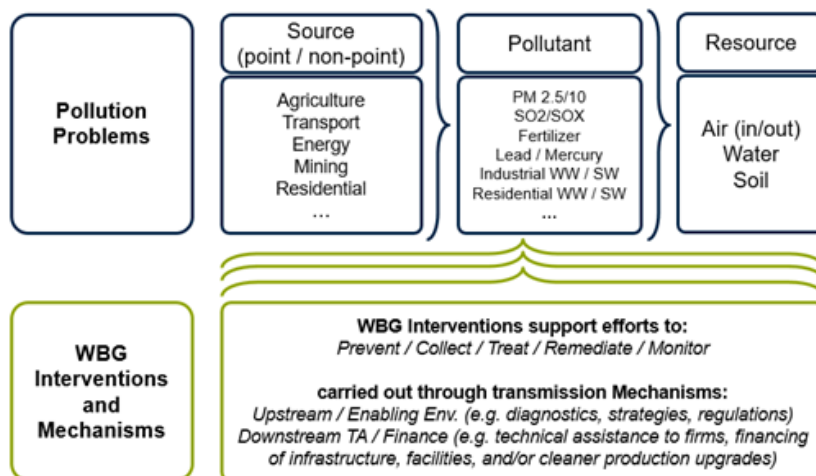
| | |
|-------------------------|---|
| Source | MIGA sector codes https://www.miga.org/Pages/Projects/AdvSearch.aspx File from MIGA Portal |
| Targeted interventions | Sector Codes: Solid Waste Management, Waste and Wastewater |
| Footprint interventions | Sector Codes: Agribusiness, Chemicals, Infrastructure, Manufacturing, Mining, Oil and Gas, Power, Transportation |
| Climate change | n.a. |

Source: Independent Evaluation Group review and interviews with World Bank Group subject-matter experts and management.

Portfolio Review Framework

IEG’s portfolio review framework is based on a logic framework that traces pollution issues from the source to the problem to the resource being affected and the World Bank Group interventions and mechanisms that attempt to address these concerns. IEG developed this framework using an iterative consultation process as well as two pilot exercises to test the internal validity of the instrument. The framework was applied to all “targeted” pollution projects. Below is a schematic of this logical framework as it was applied to project-level review (figure A.4).

Figure A.4. Stylization of Independent Evaluation Group portfolio review Framework



Source: Independent Evaluation Group review and interviews with World Bank Group subject-matter experts and management

The portfolio review framework was also used to understand the effectiveness of these interventions and mechanisms. The evaluation framework accounted for the fact that pollution management interventions may be one of many elements addressed by a project—for example, a World Bank investment lending project that contains a solid waste collection and treatment intervention may also address other urban development issues such as street lighting and water supply and sanitation. To understand the effectiveness of the targeted pollution intervention, IEG designed an effectiveness framework parallel to the intervention and mechanism framework depicted in figure A.7. This effectiveness framework relied on evaluative information available in ICR/ICRRs, XPSRs, PCRs, and PERs both in terms of indicators and their results as well as qualitative information on the achievement of intervention targets. A three-level categorical array was designed to capture this information; these categories include: positive results (that is, full or substantial achievement of targets), negative results (that is, modest or negligible achievement of targets), and no data or information available to assess achievement of targets.

Appendix B. Data and Portfolio

The World Bank Group’s Operational Engagement: A Snapshot

The World Bank Group has used a wide range of instruments and services that directly tackle pollution concerns over the period fiscal years (FY)04–17. The portfolio is expansive both in terms of project numbers as well as commitments. It spans the three World Bank Group institutions and multiple sectors by World Bank Global Practices (GPs). The top three GPs are Water; Environment and Natural Resources (ENR); and Social, Urban, Rural, and Resilience (SURR). These GPs are also the ones which have the most projects with substantial pollution-focused components, together with Energy and Extractives. For Transport and ICT projects, pollution components mostly complement public transport interventions. The Independent Evaluation Group (IEG) identified 534 projects with a total commitment of \$43 billion that “target” pollution management directly. These are the primary focus of this evaluation and include 317 World Bank investment and policy operations, 77 International Finance Corporation (IFC) investments, 123 IFC Advisory Services and 17 Multilateral Investment Guarantee Agency (MIGA) guarantee projects. In addition, the World Bank delivered 397 Advisory Services and Analytics (ASA) projects, bringing the total number of activities to 931 (table B.1).

Table B.1. World Bank Group Pollution-Targeted Interventions by Institution, FY04–17

| Institutions | Targeted | |
|-----------------------------------|----------------|-----------------|
| | Projects (no.) | With evaluation |
| World Bank Lending (IBRD/IDA/GEF) | 31,71 | 144 |
| IFC Investments | 77 | 7 ^a |
| IFC Advisory Services | 123 | 31 |
| MIGA guarantee projects | 17 | 4 ^b |
| Subtotal | 534 | 186 |
| World Bank ASA (ESW/TA) | 397 | — ^c |
| Total | 931 | 186 |

Source: Independent Evaluation Group portfolio review (FY17 projects as of March 2017).

Note: The World Bank portfolio includes an additional 86 additional finance and supplements, increasing the number of operations to 403. Volumes include these additional finance and supplements. a. Advisory services and analytics is not evaluated at the project level, so no evaluative evidence is available. b. Few evaluated projects are available as more than 80 percent of these projects were approved on or after 2010 and are thus not yet operationally mature. — = not available; IBRD = International Bank for Reconstruction and Development; IDA = International Development Association; ESW = economic and sector work; TA = technical assistance.

During this period, the World Bank Group also approved a substantial number of projects that address pollution concerns indirectly through the application of Performance Standards and safeguards. In this regard, the World Bank Group approved 956 IFC investments and

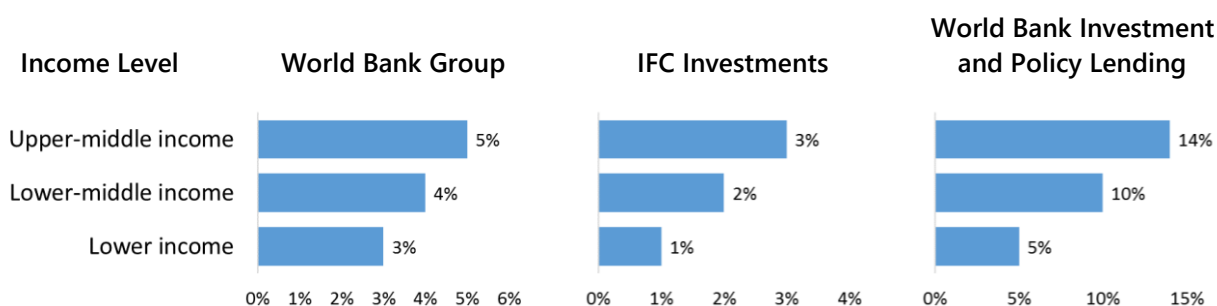
168 MIGA guarantee projects during the evaluation period. Through the application of Performance Standards (IFC/MIGA) and safeguards (World Bank) the World Bank Group has the potential to reduce the pollution “footprint” of these projects, albeit indirectly. These portfolios therefore complement the analysis of the targeted portfolio. The assessment approach employed is also different and concentrates solely on the role played by Performance Standards and safeguards in managing pollution. While the safeguards (World Bank) and Performance Standards (IFC) are applicable to all projects, this evaluation focuses on those projects where pollution concerns played a major role and a pollution-related standard came to application. These are, for IFC, investments in pollution-intense industries, including cement; brick, tile, and ceramic; textiles; glass; pulp and paper; chemicals; primary metals; oil, gas, and mining; power; food and beverage; animal production; and agriculture. For World Bank, this evaluation will focus on projects with elevated environmental risks, that is, category A projects.

The World Bank Group also has also approved 804 climate change projects. These interventions either aim at GHG reduction or pursue adaptation or resilience as their objective. From those that aim at reducing GHG emission, one can expect that they also reduce the emission of conventional pollutants, that is have so-called “cobenefits.” Although these “climate change–only” projects are outside the scope of this evaluation, their cobenefits were analyzed to reflect a comprehensive and fair picture of World Bank Group’s fight against air pollution.

Country-Level View of the World Bank Group’s Portfolio

Low-income countries take on pollution projects less often than countries in other income levels. Targeted pollution management interventions account for 3 percent of the World Bank Group’s support to low-income countries, these projects account for over 4 percent of total projects in lower-middle-income countries and almost 5 percent of total projects in upper-middle-income countries, that is, an approximate 67 percent increase compared with low-income countries. This trend remains true for individual institution’s portfolios and is particularly strongly pronounced for financing levels: Targeted pollution management in low-income countries accounts for just under 1 percent of all IFC investments and 5 percent of World Bank investment and policy lending. MIGA guarantee projects are the exception, however, with one project allocated in 1 low-income country, 13 in lower-middle-income countries, and 3 in upper-middle-income countries.

Figure B.1. percent of Targeted Pollution Management to Total Projects by Income Level



Source: Independent Evaluation Group portfolio review (FY17 projects as of March 2017).

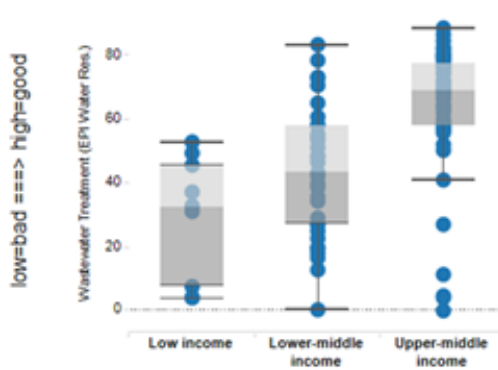
But pollution concerns appear to be the most severe in low- and lower-middle-income countries; yet the data summarized at the income level does not tell the full story as many countries face severe pollution constraints despite having achieved a higher income level. Figure B.2 summarizes four variables relating to pollution concerns by income level. These box plots show that while the median value by income level improves from low-income to upper-middle-income across all variables, many countries face similar levels of pollution concerns irrespective of their income level status. For example, in the case of outdoor air pollution, Nepal (low income), Pakistan (lower-middle income), and China (upper-middle income) are all low-measure outliers.

Despite the low number of interventions, those few World Bank Group interventions that address indoor air pollution focus on countries where indoor air pollution is the most serious problem. Almost half of World Bank lending interventions are in support of countries that have the highest exposure to indoor air pollution (Fig B.5a).² Likewise, World Bank analytical support (ASA) is also focused on countries that need it the most. Note, however, that the support to indoor air pollution is stable and has not accelerated over time.

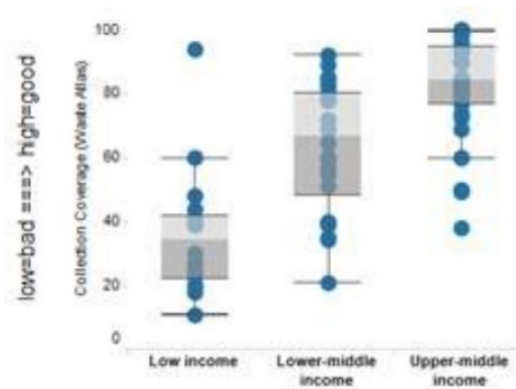
Interventions that target outdoor air pollution directly are also relatively few, compared with the magnitude of global deaths caused by it. About 33 percent of World Bank Group pollution portfolio address air pollution concerns while outdoor air pollution is responsible for about 42 percent of global death per year.³ When considering all GHG mitigation projects into account, as outlined above (paragraph **Error! Reference source not found.**), the World Bank Group’s response to indoor air pollution would be more commensurate with the health effects its causes.

Figure B.2. World Bank Group Targeted Pollution Management Portfolio by Pollution Problem Addressed and Income Level

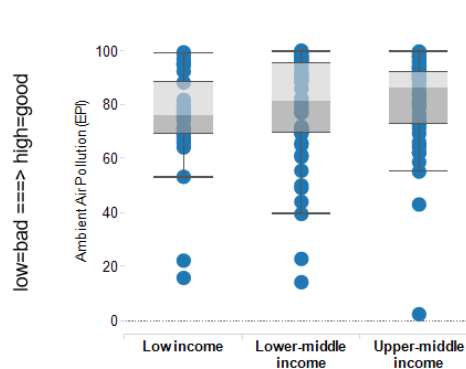
a. Wastewater treatment



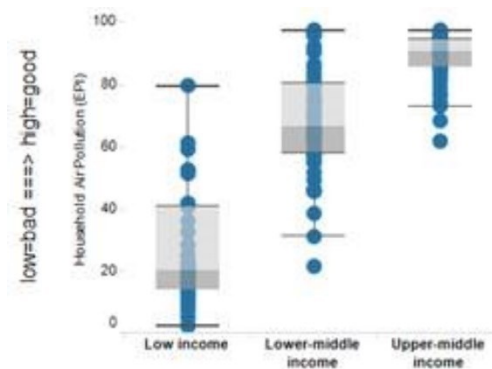
b. Unsound disposal of solid waste or solid waste collection rate^a



c. Outdoor air pollution



d. Indoor or household air pollution



Source: IEG analysis based on WHO 2016, The Waste Atlas, Yale Environmental Performance Index.

Note: Each data point represents one country and its associated pollution level, expressed in (a) “wastewater treatment rate”; (b) “solid waste collection coverage”; (c) “Ambient Air Pollution Index according to the Yale Environmental Performance Index; and (d) indoor or household air pollution index according to the Yale Environmental Performance Index. a. Trend looks similar also for rates of “unsound disposal.”

But the World Bank Group has recently increased its efforts to support client countries in managing air pollution, in particular to those countries that suffer the most from air pollution. See main text for details.

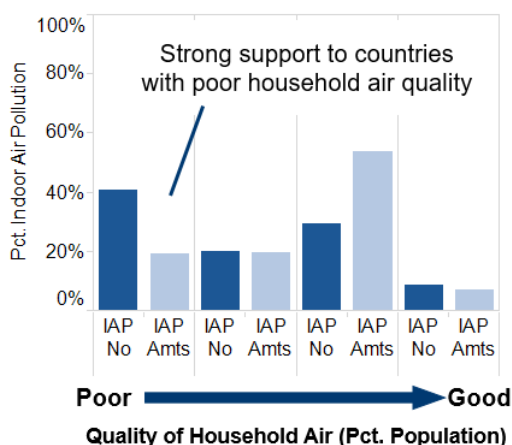
Yet, there is a “missing middle” of countries that do not take on support for their air pollution problems. When it comes to the quartile of countries with the second-most polluted ambient air, the relative World Bank Group coverage is disproportionately low. Only 12 percent of projects reach these countries. While countries like Ghana, Morocco, and Turkey received support, about half of the 32 countries in this quartile have never received

World Bank Group support in air pollution (figure B.5b). The limited support to this “missing middle” holds also for World Bank ASA, IFC Advisory Services and Investments.

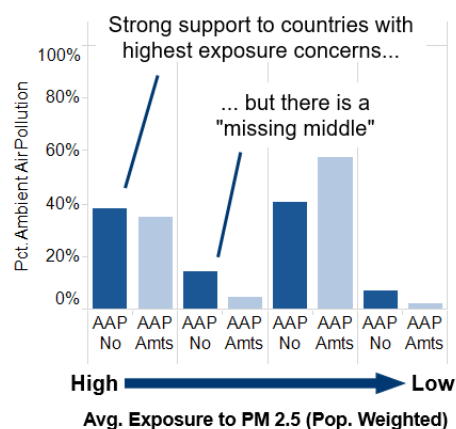
When low-income countries take on World Bank Group operations for pollution, pollution concerns are often integrated into loans supporting other sectors, in particular when it comes to development policy lending. In low-income countries, most pollution concerns are integrated into broader policy operations that are not focused on environmental or pollution concerns directly (73 percent), such as macro and fiscal management and finance and markets. For upper-middle-income countries that share is 50 percent—a 23-percentage point difference.

Figure B.5. World Bank Group Targeted Pollution Management Portfolio by Pollution Problem Addressed and Income Level

a. Household air quality quartiles



b. Average PM_{2.5} exposure



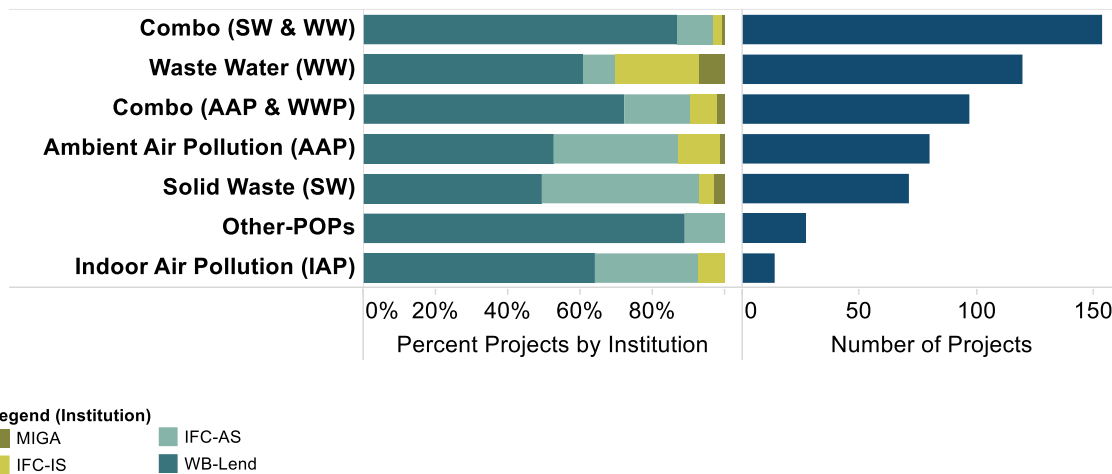
Source: IEG analysis based on Yale environmental performance Index

Note: IAP = indoor air pollution; AAP = ambient air pollution; No = number of; Amts = full project-level amounts.

Institution-Specific Portfolio Snapshots

Overall, most of the World Bank Group’s targeted pollution efforts address waste and wastewater treatment. The World Bank Group’s portfolio is concentrated on waste and wastewater as these are the most frequently addressed pollution concerns across all countries and across all income levels (figure B.6). Often waste and wastewater is addressed in conjunction. This is followed by projects that address both waste and wastewater pollution in conjunction with ambient air pollution problems and stand-alone ambient air pollution; projects dealing with indoor air pollution concerns represent the smallest share across all income levels.

Figure B.6. World Bank Group Targeted Pollution Management Portfolio by Pollution Concern and Income Level



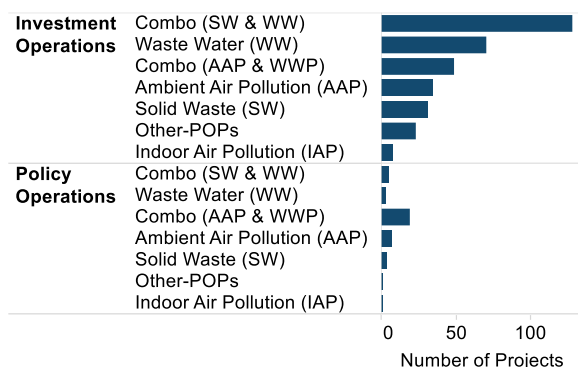
Source: Independent Evaluation Group portfolio review (FY17 projects as of March 2017).

Note: AAP = ambient air pollution; IAP = indoor air pollution; WW = wastewater; SW = solid waste; POP = persistent organic pollutants; MIGA = Multilateral Investment Guarantee Agency; IFC = International Finance Corporation; IS = investment services; AS = advisory services; WB = World Bank

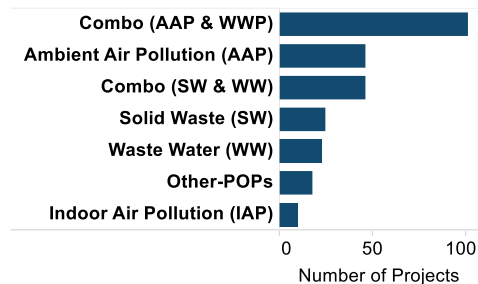
For the World Bank, while the overall portfolio covered the breadth of pollution concerns, the portfolio shows a concentration around wastewater management (figure B.7); though there are differences by product line, lending instrument, and global practice. Most of the support through investments operations, for example, focuses on solid waste and wastewater management while Advisory Services and Analytics activities had a stronger emphasis on informing policy makers of the concerns surrounding largely urban wastewater and ambient air pollution concerns. While there are far fewer policy operations, their support is relatively more focused on ambient air pollution concerns through stand-alone and combo projects. There are additional differences in the uptake of pollution concerns by GP. For example, SURR has the largest number of stand-alone solid waste projects. In terms of the pollutants addressed by World Bank wastewater projects, while the Water GP and SURR are mostly concerned with residential or commercial waste and wastewater (almost 100 percent and 85 percent respective), almost 40 percent of ENR is concerned with industrial waste and wastewater pollution.

Figure B.7. World Bank Operations and Activities by Pollution Concern Addressed

a. Investment and policy operations



b. Advisory services and analytical activities



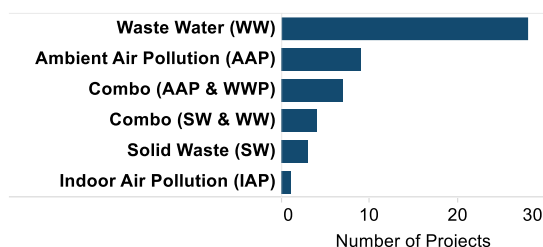
Source: Independent Evaluation Group portfolio review (FY17 projects as of March 2017).

In addition to World Bank investments and policy operations, the World Bank also managed a portfolio of Global Environment Facility (GEF) projects that support pollution management over the evaluation period. Although GEF projects are often paired with an IBRD or IDA parent project, when accounting for each institution’s individual contributions as a separate project (or activity), GEF projects have accounted for approximately 18 percent of projects over the period under consideration. But this support has ranged over time with a peak of 32 percent in 2004 to a low of 2 percent in 2011.

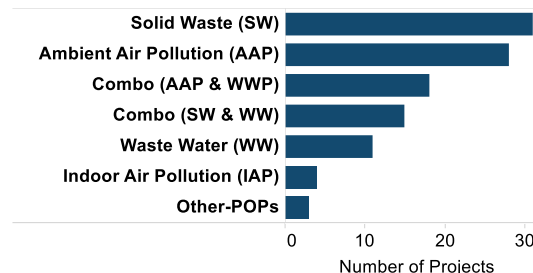
Similarly, for IFC and MIGA, the overall portfolio of investments and Advisory Services activities covers the breadth of pollution concerns but shows a concentration around wastewater management (investments and guarantee projects) and solid waste and ambient air pollution (Advisory Services; figure B.8). For IFC Advisory, support has come largely from the institution’s CAS-Energy and Cross-Industry Advisory Services PPP practices, while for IFC Investments support has come through the Utilities sector group. For MIGA, support has been split between the sectors that cover water and wastewater and solid waste management.

Figure B.8. IFC Investments and Advisory Services and MIGA Guarantee Projects by Pollution Concern Addressed

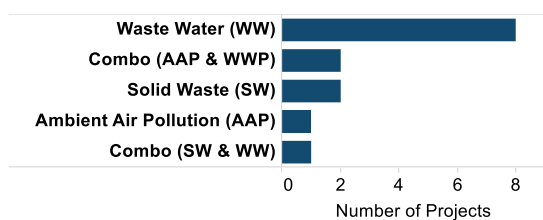
a. IFC investments



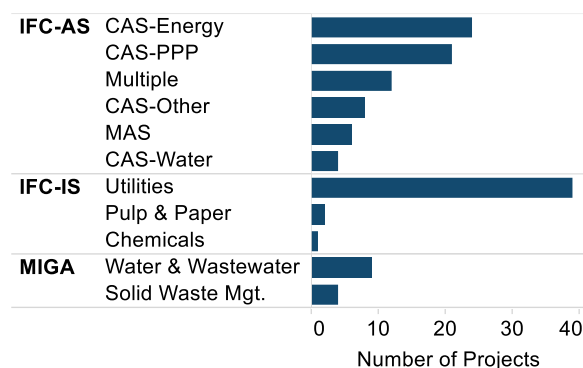
b. IFC advisory services



c. MIGA guarantees



d. Institution by product line and sector



Source: Independent Evaluation Group portfolio review (FY17 projects as of March 2017)

Analysis of Country Strategies and Country-Level Diagnostics

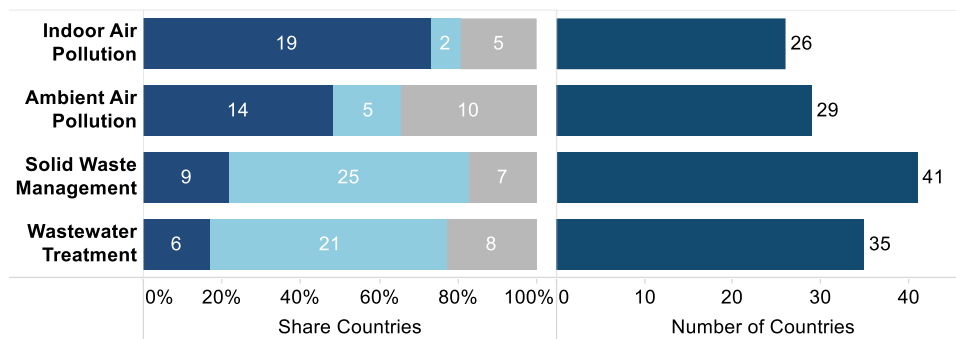
The review of 72 countries revealed that pollution priorities are often not reflected in the country strategies. Of the 72 countries, 57 had CASs within the evaluation time frame. Countries without strategy documents within our period include, among others, Hungary, Iran, Somalia, Vanuatu, Zimbabwe. Only 28 percent of CAS/CPS's adequately reference the actual pollution concerns, that is only in 16 of the 57 countries were all relevant pollution priorities identified from which the country suffers. Of these 16 countries, most had only one quartile 1 pollution priority (that is 14 countries). An additional 9 countries (16 percent) reference at least one of the pollution concerns, but failed to refer to others. Most strategy documents (56 percent) do not mention pollution concerns at all even though these 57 countries had at least one top pollution concern according to global databases. In addition, while most strategy documents 44 documents (accounting for 77 percent) identify the spectrum of pollution concerns (that are either a top pollution priority or other important pollution concerns that are less problematic in relative terms), a third of these (19 CAS)

identified pollution priorities that are not the most pressing ones. Of those 44 CAS where at least one pollution concern was identified, 22 (or 50 percent) referred to an upcoming World Bank Group portfolio addressing at least one of the pollution concerns.

The recently released Systematic Country Diagnostic (SCD) provides better identification of pollution priorities at the country level. The SCD is a diagnostic exercise to identify key challenges and opportunities for a country to accelerate progress toward development objectives that are consistent with the twin goals of ending absolute poverty and boosting shared prosperity in a sustainable manner. As of 2014, SCDs are required for the formulation of country-level strategies. SCDs more frequently identify pollution priorities correctly. Of 78 countries with the biggest pollution concerns, 28 have a SCD. Fifty-seven percent of these identify all pollution concerns correctly and an additional 18 percent at least one. This raises hopes that they will be reflected either in future CAS/CPS or World Bank Group portfolio.

The most frequently missed pollution concerns were outdoor and indoor air pollution (figure B.9). Only 12 percent address indoor air pollution (7 strategy documents of which 5 are top pollution priorities) while ambient air pollution is covered in just over a quarter of documents (15 documents of which 10 are a top pollution priority for the country). By contrast, solid waste management and wastewater treatment were mentioned more often (56 and 51 percent of documents respectively) though in most cases, these pollution concerns were not a top priority (25 of the 32 documents in the case of solid waste management and 21 out of the 29 in the case of wastewater treatment).

Figure B.9. Alignment of Pollution Priorities in Country Assistance and Partnership Strategies



Legend
 Priority Addressed
 Not a Top Pollution Priority
 Priority Missed

Source: Independent Evaluation Group review

¹ World Bank project number excludes additional finance and supplements. When counting additional finance and supplements, the total for World Bank operations increases to 403.

² For such a quantitative analysis, the universe of client countries was divided into quartiles, based on pollution exposure data. This division yielded four discrete categories (quartiles) depending on the level of pollution, that is, lowest, low, middle, and high pollution countries. Proxy measures for pollution exposure were for indoor air pollution (the household (HH) air quality) and for outdoor air pollution (PM2.5 exposure average), both according to the Yale Environmental Performance Index.

³ According to 2015 IHME data, deaths from ambient air pollution amount to 4.2 m (lower-bound = 3.7 and upper-bound = 4.8 m).

Appendix C. Summary of the Literature Reviews

Literature Review on Climate Change Mitigation and Local and Regional Pollution Reduction Cobenefits: A Summary of Findings

This evaluation on pollution and the World Bank Group commissioned a review of the empirical literature on pollution cobenefits from climate change mitigation interventions, emphasizing air pollution benefits. Such pollution is defined using parameters such as sulfur dioxide (SO₂), oxides of nitrogen (NO_x), and particulate matter (PM) for air emissions, and total suspended solids for water releases. The review used a multistage identification technique based on 40 keyword strings in google scholar, web of science, and scope to identify a universe of peer-reviewed articles. Papers were included only if they focused on developing countries. Additional papers were identified iteratively based on references from the initial papers. The final papers cited were based on expert judgment, with emphasis for studies published after 2010. A systematic search was conducted to locate relevant review articles and meta-analyses; no formal systematic reviews were found. Google was also used to identify non-peer-reviewed studies from reputable sources, such as the International Energy Agency, the US Environmental Protection Agency, and the World Bank.

The paper lays out the methods and models used in calculating pollution cobenefits, and then presents sector-by-sector results for energy, buildings, industry, transportation, solid and liquid waste management, agriculture, forests or other land use, and multiple-sector studies.

There exists a considerable quantitative literature estimating the local pollution cobenefits of climate change mitigation interventions. The sectors in which fuel combustion contributes to GHG emissions—energy, buildings, industry and transport—are the ones with the most significant air quality cobenefits, and the most substantial quantitative literatures. In energy and industry, the largest cobenefits come from replacing coal combustion with less-polluting fossil fuels, from replacing fossil fuels with renewable energy, from improving energy efficiency, and from improving the characteristics of coal via coal washing and briquetting. For buildings, the largest air quality cobenefits are typically linked to improvements in energy efficiency and modifications in cooking stoves. Transport studies typically aggregate the effects from a collection of interventions, including greater use of public transport and improving vehicle fuel-efficiency, but transport-related studies also often aggregate effects on health outcomes from other nonpollution effects such as benefits from increased walking and cycling.

For agriculture, forestry and land use change, there are many opportunities for environmental cobenefits, but the effects are particularly location specific and do not lend themselves readily to cataloging and quantification.

Carbon capture and storage is noted as having negative effects on air pollution, because of the loss of efficiency of electricity generation and associated increased in fuel consumption. In some cases, use of biofuels also led to increases in particulate matter and NO_x.

However, the size of these effects is highly uncertain, because substantial methodological variation across studies and the lack of any common standards in results reporting makes comparisons difficult. Point estimates of tons of pollution abatement per ton of carbon dioxide equivalent from an intervention can vary by an order of magnitude across studies, depending on modeling assumptions (which are often opaque). Context-specific details of interventions, existing fuel mix, and geography are also very important, especially for identifying cobenefits from renewable energy. The World Bank could consider carrying out such analysis for its own projects, and working to develop and disseminate standardized methodologies.

There also remain some notable gaps in the literature: the evidence base is relatively thin on effects of climate change mitigation on water quality, or on pollution cobenefits from forestry or land use or agriculture interventions. Studies on energy efficiency in buildings are dominated overwhelmingly by cases from developed countries. Studies on improved cookstoves have looked at air pollution effects but have seldom considered GHG emission benefits. And waste sector studies do little to document possibility of air pollution benefits from conversion to sanitary landfills or incineration, focusing instead on GHG emission benefits.

The table C.1 below presents some of these quantitative findings where it was possible to construct consistent comparisons. Note the very large ranges in estimates across studies for biomass and fossil fuel switching.

Table C.1. Variation across Studies for Air Pollution Cobenefits from GHG Mitigation (kg of pollutant per ton of CO₂ or CO₂^e)

| Sector(s) | Intervention type | Pollutant | | | | | |
|------------------|--------------------------|-----------------|-----------------|-----------|------|------------------|-------------------|
| | | SO ₂ | NO _x | TSP | PM | PM ₁₀ | PM _{2.5} |
| Energy/Industry | Coal washing/ | 28.8- | | 9.63- | | | |
| | Briquetting | 32.9 | | 13.29 | | | |
| Energy/Industry | Boiler improvements | 4.5-8.2 | | 2.66-10.2 | | | |
| Energy | Zero-emission renewables | 3.5-5.7* | 1.1-2.1* | | | | 0.23-0.45* |
| Energy | Biomass | -0.73-10* | -0.017-2.3* | | | | -0.039-1.1* |
| Energy | Waste | 0.33-2.0* | 0-0.51* | | | | 0.007-0.49* |
| Energy | Co-generation | 8.67 | | 4.0 | | | |
| Energy | Fossil fuel switch | 2.9-24* | 0.096-2.3* | | | | 0.51-1.60* |
| Energy | Efficiency | 4.1-5.8* | 1.1-1.7* | | | | 0.28-0.4* |
| School Buildings | Efficiency | 2.23 | 2.05 | | | 0.26 | |
| Cement | Mixed | 5.15 | | | 1.08 | | |
| Steel | Carbon tax | 1.20 | 0.57 | | | 0.21 | |
| Transport | Mixed | | 17.7 | | | 1.99 | |
| Transport | Mixed | 1.09 | 15.1-17.7 | | | 1.99-2.58 | |

Sources: Aunan et al. 2004; Rive and Aunan 2010; Vennemo et al. 2006.

Note: Blank spaces indicate that data is not available or the parameter is not applicable. This includes only studies for which reported results could be easily framed consistently in terms of kg of pollutant per ton of CO₂, and so draws heavily on three survey papers. *Indicates the units are.

Literature Review on Tensions between Pollution and Development: A Summary of Findings

The relationships between pollution and development are complex with several possible feedback loops that are predicated on drivers and consequences of economic growth.

Much of the literature has focused on testing the possibility of an environmental Kuznets curve (EKC), the suggestion that environmental and ecological damage was likely to occur over some range of initial development, after which a self-correcting mechanism would kick in to improve environmental performance. Many of the controversies have revolved around

the physical and temporal scale on which analysis is undertaken, the type of pollutant chosen, and the relative determinism of the pollution reduction effect with rising income. Empirical evidence has only marginally supported the result of a reduction of environmental harm with further development. For example, some studies show that air, noise, and water pollution follow an EKC, while other forms of harm such as land degradation, deforestation, and soil erosion do not. Yet even with supportive papers there can be unusual outliers, and results vary based on the specific chosen pollutant and country.

The EKC hypothesis presents the causal pathway through which development can lead to environmental conservation as through consumer pressure on government to engagement in more stringent regulation once a certain income level is achieved. Yet environmental activism is not necessarily correlated with greater income except at high levels of income. Some studies critique the typical modeling approach of EKC studies, noting that they may not capture issues such as changing trade patterns whereby pollution-intensive industries may relocate to poorer countries, while others argue that that rich countries have seen a gradual shift to greener imports.

Other literatures have looked at how rising incomes may increase pollution, as larger economies develop infrastructure to deliver key development outcomes such as access to transport, electricity, water and food, and that larger levels of disposable income lead to increased consumption of pollution-intensive consumer goods. Roads and other transport infrastructure are the most widely studied area, including both direct effects from vehicle emissions and as a conduit for further physical development. Much of the literature has focused on environmental effects of transport on forest cover, land degradation and biodiversity decline rather than pollution per se. A range of studies show that most near-term economic growth is likely to occur in development countries and would have serious pollution implications, particularly from effects of fossil fuel energy generation and impairment of waterways. Even in developing countries with relatively stronger environmental performance, there are correlations between development and increasing pollution loads at a local level. Other studies show that business cycle downturns can be associated with declining pollution.

Many developing countries avoid increasing stricter environmental regulation because they fear potential damage to economic growth. But there are relatively few studies that examine the cost of pollution abatement measures on economic growth in developing countries, in part because of study design challenges. Cost of pollution studies can be relatively common on rich countries especially from environmental protection agencies and industry groups, but most such studies are industry or sector specific. These studies also may not capture potential increases in productivity from localized pollution abatement. However, a number of studies have been carried out in China, looking for example, at the return on investment from investments in certain pollution abatement technologies. The costs of pollution

Appendix C
Literature Reviews

abatement are felt in the short-term and the benefits arrive in a stream over time (from avoided costs) and so the results can be highly dependent on assumptions about discount factors.

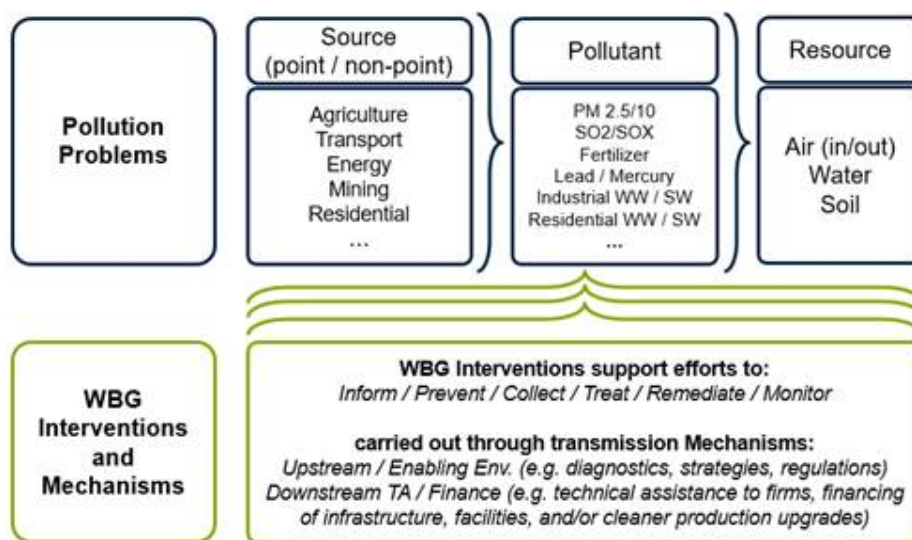
Some studies consider the negative effects of pollution on growth. There is substantial evidence on the negative costs of air pollution on human health, estimated in terms of costs from mortality and morbidity but also effects on worker productivity. Studies are more common for large and heavily polluted countries, particularly China, India, and Indonesia, with point estimates of annual costs from pollution at a local or regional level that are several percentage points of gross domestic product. Other studies look at the negative costs of pollution on natural resources, such as agriculture, forestry, or fisheries. Site-specific studies have looked at effects on productivity from indoor air pollution and noise pollution. Finally, there are studies that look at broader costs of pollution on the poor, including from social justice perspectives.

Appendix D. Typology of Pollution Interventions

Pollution Management Evaluation Framework

IEG’s pollution management framework is based on a logic framework that traces pollution issues from the source of the problem to the resource being affected and the World Bank Group interventions and mechanisms designed to address these concerns. The pollution management framework was designed to support the evaluation’s building blocks including the evaluation’s portfolio review, case studies, and strategic mapping (figure D.1).

Figure D.1. Stylization IEG Pollution Management Evaluation Framework



Source: Independent Evaluation Group review and interviews with World Bank Group subject-matter experts and management

Pollution Problems

The IEG evaluation focused on the key pollution problems affecting client countries. While it is difficult to disentangle pollution problems into neat categories—that is, most of these issues are not mutually exclusive and projects often address a multitude of concerns at once—the evaluation developed a simplified categorical array of pollution problem to facilitate analysis. Table D.1 lists these categories and summarizes their characteristics:

Table D.1. Pollution Categories and Characteristics

| Pollution Problem | Characteristics |
|-----------------------|---|
| Indoor air pollution | <ul style="list-style-type: none"> Indoor air pollution refers to the air quality situation within and around buildings and has linkages with quality of life and health effects which can be experienced soon after exposure as well as years later. World Bank addresses these concerns mainly by improving electrification conditions, particularly in rural, low-income areas, and by supporting energy efficiency efforts. In addition, World Bank projects often contained components that promoted cleaner cooking fuels and stoves. Similarly, IFC Advisory projects supported increased access to cleaner and safer lighting as well as cleaner cooking fuels and cookstoves. Consumer education was used as a mechanism to raise awareness of the benefits of cleaner fuels and stoves. |
| Ambient air pollution | <ul style="list-style-type: none"> According to the World Health Organization, ambient air pollution refers to the ambient exposure to fine particulate matter, most commonly associated with fuel combustion from mobile (for example, vehicles) and stationary sources (for example, factories). Such exposure is associated with a broad spectrum of acute and chronic illnesses. The World Bank Addresses this pollution concerns through the urban transport sector, focusing on mass transit solutions that provide a cleaner transportation alternative in conjunction with other service deliver benefits such as improved connectivity and safety. These projects often include components to monitor air quality, enforce air quality standards, and carry out assessments on air quality impacts. The World Bank also supports efforts to reduce SO₂ emissions in the heat and power sector and fuel switching often with the goal to mitigate GHGs and air pollution emissions. IFC Advisory and Investments promote cleaner production through the Cleaner Production Lending Facility. IFC Advisory provides advice to companies on cleaner production (through audits and assessments) that can improve resource efficiency and promote cleaner energy solutions while investment lending can be used for implementation. It also provides advice on waste-to-energy, focusing on, for example, converting animal waste into biogas and marketable fertilizer-like solids. |
| Wastewater | <ul style="list-style-type: none"> Inadequate wastewater treatment can have harmful effects to both humans and the environment. The World Bank's portfolio of projects that support proper wastewater collection and treatment focus on improving the quality, access, and efficiency of such services mainly in urban and rural residential areas. Other projects may focus on specific wastewater pollution concerns such as treatment of agricultural or industrial wastewater. IFC and MIGA also support client countries with investments and guarantees in wastewater treatment facilities in municipalities and industry. |
| Solid waste | <ul style="list-style-type: none"> Solid waste management focuses on the collection, transfer, and disposal of solid waste generated by human activity (residential, commercial, and industry). Inadequate solid waste management can cause severe water pollution, air pollution, and odors, and waste disposed in landfills generate emissions that can be detrimental to the health and safety of those living in the area. The World Bank addresses solid waste management concerns through interventions that aim to improve collection and transfer practices as well as by supporting municipalities close open and informal dumps and open sanitary landfills instead that are managed in an environmentally sustainable way. IFC investments and MIGA guarantee projects also support municipalities in their effort to improve solid waste collection and disposal alongside |

| Pollution Problem | Characteristics |
|-------------------|---|
| | <p>other solutions such as recycling and composting. Similarly, IFC Advisory, supports solid waste management by laying the groundwork, improving the regulatory environment, and building capacity to facilitate private sector participation and investment in this space. IFC Advisory also promotes the development of SMEs in the waste management sector, focusing mainly on recycling initiatives.</p> |
| Other | <ul style="list-style-type: none"> • Persistent organic pollutants (POPs) are organic compounds that are resistant to environmental degradation and therefore accumulate in the environment—POPs have significant health and environmental effects. • The World Bank portfolio supports POPs management by safely managing and disposing of targeted stockpiles of obsolete pesticides, including POPs and polychlorinated biphenyls (PCBs), and removal of PCB-contaminated equipment. Improving the practices of the collection, separation, recycling as well as handling, transport, and elimination of toxic chemicals like POPs and PCBs can mitigate pesticide pollution and benefit the environment, particularly animal or plant species sensitive to toxic or persistent contaminants. Strengthening the regulatory and monitoring framework and capacity building for POP and PCB management is at the forefront of national planning. |

World Bank Group Support Mechanisms

Mechanisms are the “how-to” tools used by the World Bank Group to support pollution management efforts in client countries. More specifically, mechanisms answer the question “how does the World Bank Group support its client countries in addressing their pollution concerns?” These mechanisms are often clustered into the following two categories:

Mechanisms that support the enabling environment by (i) conducting diagnostics that inform policy making, (ii) designing and implementing strategies and action plans that help prioritize and make use of resource in an efficient and effective manner, (iii) setting and enforcing laws, regulation, and standards that provide the rules and incentives needed to achieve the intended objectives, and (iv) building and / or strengthening the capacity of public sector institutions that support the enabling environment.

Mechanisms that support implementation through technical assistance and financing by (i) providing technical assistance to implementing agencies or private sector actors charged with implementing the proposed solution and (ii) bridging the financing gap to build the needed infrastructure and other capital intensive activities such as setting up facilities, buying equipment, upgrading systems and technology, and so on This mechanism is often carried out through World Bank and IFC investments and MIGA guarantees. For example, a World Bank loan may be used to rehabilitate a wastewater treatment plant or to build a sanitary landfill while an IFC may likewise help finance a municipality’s wastewater treatment investment plan.

World Bank Group Intervention Typologies

Interventions describe the activities that the World Bank Group supports in an effort to manage pollution concerns in client countries. More specifically, interventions answer the question “what activities does the World Bank Group support in client countries to address their pollution concerns?” The answer includes support to client countries in their efforts to: prevent, collect, treat, remediate, and monitor pollution. Table D.2 summarizes their characteristics:

Table D.2. Summary of WBG Intervention Typologies

| Intervention Type | Description |
|--|--|
| Prevention | <ul style="list-style-type: none"> • Prevention as an intervention type is defined as activities carried out by World Bank Group projects that aim to prevent pollution from occurring in the first place (that is as opposed to reducing pollution from ongoing operations). Prevent pollution from occurring in the first place requires projects to address the enabling environment for pollution management (see mechanisms definition in section 2). Cleaner Production advisory also supports prevention efforts by improving underlying operations and therefore reducing how much pollution firms generate. • For the World Bank, this type of support often come through development policy operations (DPOs) and in some cases investment lending. For example, in Colombia, the Sustainable Development DPO series included actions that would strengthen the enabling environment for water management by setting requirements and policy guidelines on water pollution control and quality. For IFC Advisory, this type of support often comes in the form of cleaner production audits and assessments to support companies in waste minimization and lean production. |
| Treatment (including collection and remediation) | <ul style="list-style-type: none"> • Treatment as an intervention type is defined as activities that address pollution concerns that are ongoing—that is, either as part of residential and commercial activities (for example, wastewater treatment and solid waste management) or industry operations (for example, toxic effluents and industrial emissions). Broadly speaking, the treatment intervention categorically includes collection of waste (for example, through the pipelines that collected wastewater or the landfills that collect solid waste) and remediation (that is treatment of legacy pollution concerns). • Similar to the prevention intervention, projects with a treatment intervention often support the enabling environment (see mechanisms section 2), in particular by setting the standards and regulations that specify how much waste needs to be treated by cities and industry before it can be allowed into the environment (that is atmosphere, water bodies, land). • Unlike the prevention intervention, projects with a treatment intervention often address pollution concerns through the financing of infrastructure and facilities that treat these ongoing pollution concerns. |
| Monitoring | <p>Monitoring as an intervention is defined as the activities carried out by World Bank Group projects that aim to monitor pollution from residential, commercial, and industrial sources. In general, monitoring interventions are carried out by projects through the enabling environment—by setting the rules that require monitoring and strengthening the capacity of institutions to carry out monitoring activities. Monitoring can also be supported through directed finance that supports the purchasing and set up of monitoring equipment and</p> |

| Intervention Type | Description |
|-------------------|--|
| | <p>facilities. This intervention is mostly carried out by World Bank investments and policy operations and through recommendations in World Bank ASA. In Peru, for example, a World Bank investment in urban transport supported an improved air quality monitoring system by conducting a diagnostic study on environmental baseline and which consolidated historical data on air quality as well as by purchasing and installing new equipment to monitor air quality in the project's area of influence.</p> |
| Informing | <p>Informing as an intervention is defined as the Advisory Services and Analytics(ASA) work produced by the World Bank that informs client countries of pollution concerns. These are often designed to support the enabling environment for pollution management most commonly through the design and carry out of diagnostics (as described in the mechanisms section above). The classic example of such work is the World Bank's Country Environmental Analysis (CEA) which is designed to inform client countries of their most pressing environmental and pollution concerns. Other ASA are designed to also inform client countries of pollution concerns but may be more targeted in nature—that is focusing on a specific sector (for example, mining) or issue area (for example, indoor air pollution).</p> |