

## Reaping What You Sow

A look at underspending on irrigation in five countries

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### KEY POINTS

- Global data suggests that many countries tend to underspend their economic affairs budgets, and especially their agriculture budgets. In 13 countries for which we have relevant data, a major area of this underspending is on irrigation.
- Over the period 2009-2017, these 13 countries underspent their irrigation budgets by an average of 20 percent, double the rate of underspending for agriculture as a whole.
- We try to link this underspending to implementation of irrigation projects in five focus countries, all of which have significant budget deviations in irrigation and at least three years of data, and find that:
  - Inconsistent and often minimal disaggregated data, along with narrative failures to explain underspending, make this task challenging.
  - Nevertheless, there is at least some evidence that underspending impedes rehabilitation and construction of irrigation projects, such as dam building and creation of model farms, and in turn undermines achievement of key nonfinancial targets in the budget.
- Failure to spend irrigation budgets and execute projects means that countries are less likely to meet the Sustainable Development Goals (SDGs), especially those related to agricultural productivity and food security.
- Poor quality and limited access to data can hinder public debate about spending in the irrigation sector, making it difficult to identify and remedy implementation challenges. Governments should promote better transparency around irrigation spending and nonfinancial implementation of the budget as one step toward improving budget credibility.

## THE ISSUE

Agriculture provides employment for more than a quarter of the working age population around the globe. Its significance as a source of employment is even greater in low-income countries, where the average share of the labor force engaged in the sector exceeds 60%. Clearly, this sector is crucial to sustainable development, with a role to play not only in increasing food security but also towards ending extreme poverty. Appropriately, the Sustainable Development Goal (SDG) framework includes targets and indicators that are directly related to the sector – such as target 2.3 to “double the agricultural productivity” and indicator 2.A.1 on “the agriculture orientation index for government expenditures,” both of which contribute to the goal to “end hunger, achieve food security and improved nutrition, and promote sustainable agriculture.”

Yet, our recent work points to significant and worrisome under-execution of agriculture budgets – most notably on irrigation projects. Across several countries where data was available, we found average underspending of irrigation budgets was greater than for the agriculture sector as a whole over the period 2009-2017. Because irrigation investment is associated with higher productivity and more diverse cropping patterns that contribute to reducing poverty, severe underspending of this part of the budget is likely to slow the achievement of sustainable development.

To explore the nature and implications of this phenomenon, we looked more closely at five countries where the data indicated the irrigation budget was significantly underspent – Albania, Brazil, the Dominican Republic, Kenya and Mozambique. This brief explains our research process and summarizes the findings. More detailed country case reports are available online.

## OUR RESEARCH PROCESS

Our concern with underspending on irrigation projects stemmed from our recent cross-country assessment of budget credibility, which relied on data from the World Bank’s BOOST initiative. BOOST provides detailed and disaggregated expenditure data, either from budget transparency portals or from data sets produced by the government in collaboration with World Bank teams. Our study found that, relative to the approved budget, “economic affairs” is one of the most underspent areas of government expenditure. Within economic affairs, agriculture tends to be among the most underspent. And, within agriculture, irrigation was most significantly underspent.

BOOST data on the irrigation subfunction is available in 13 of the countries covered by our study. Ultimately, we chose to hone in on five of these, where: (1) the irrigation budget was underspent by more than 20% on average, (2) the underspending in irrigation was substantial relative to spending on agriculture, economic affairs and the

economy in aggregate, and (3) at least 3 years of data were available. This led us to focus on: Albania, Brazil, the Dominican Republic, Kenya and Mozambique. While our review covered cases in three different regions of the world, we do not make an assumption that these results are representative of other countries.

In each country, we used the BOOST data to establish and understand underspending in the irrigation sector, identifying specific areas or categories of spending that were most affected. We then compared and supplemented this data with expenditure data from the country's own budget documents, made available by the Ministry of Finance (MoF) or the agriculture sector-related agency. Next, we collected data on nonfinancial targets and performance from public documents. Resources used in each country are listed in Annex Table 1.

From the data we collected, we attempted to find evidence for the impact of low budget credibility on actual outcomes. This generally involved: (1) comparing the financial and nonfinancial performance of individual projects, (2) searching for specific cases of underperformance, for which explanations were provided, and (3) drawing conclusions from the narratives about a specific project.

Failure to meet nonfinancial targets can be the result of underspending, but it can also be due to other factors. Isolating the causal impact of underspending in terms of underperformance of nonfinancial targets is often difficult, and sometimes impossible, especially given that data on both financial and nonfinancial sides are rarely consistent across budget documents or available at a detailed level. We treat this limitation as a finding of this research, as it illustrates how the lack of transparency and clarity around budget credibility can prevent the public from understanding and participating in a debate about poor budget execution.

Our research findings, summarized below, were reviewed by collaborating partner organizations in each country. In many cases, our partners also helped us reach out to people with expertise in their country's irrigation sector. We are grateful to those that aided in the research process and provided invaluable feedback. These individuals are acknowledged in each respective country report.

## LOW EXECUTION OF IRRIGATION BUDGETS

On average, about 20% of the irrigation budget was not spent across the 13 countries, based on the available data for each over varying time periods. More frequently than not, the extent of underspending on irrigation tends to be greater than what we find in the agriculture sector, the economic affairs function, and aggregate expenditure for all of government. Table 1 presents average budget deviations in each country for each of these categories.

Table 1. Average budget deviation for irrigation: as compared to agriculture, economic affairs, and aggregate government expenditure<sup>1</sup> (%)

Country	Years	Irrigation	Agriculture	Econ affairs	Aggregate
Albania	2010-17	-26.6	-19.9	-18.4	-15.1
Armenia <sup>2</sup>	2009-17	11.9	9.9	5.5	1.4
Brazil	2009-16	-76.7	-49.0	-27.2	-14.1
Cameroon	2014-15	-58.7	-12.0	-20.4	-6.1
Dominican Republic <sup>3</sup>	2014-16	-50.8	-12.1	8.8	-2.0
Kenya	2014-17	-35.2	-19.9	-18.0	-14.6
Kyrgyz Republic	2011 only	-3.3	-4.7	-5.2	3.2
Mexico	2009-16	-14.3	-3.7	12.2	5.9
Moldova	2009-15	-0.9	5.3	-7.7	-2.6
Mozambique	2009-17	-59.2	-37.8	-32.2	-8.8
Myanmar	2010-17	26.3	18.3	-0.2	5.0
Peru	2009-16	18.7	13.1	29.4	6.7
Tajikistan	2010-11	-12.6	-20.4	14.6	4.6
<b>Average across countries</b>	<b>2009-17</b>	<b>-21.4</b>	<b>-10.2</b>	<b>-4.6</b>	<b>-2.8</b>

<sup>1</sup> A similar table was featured in a recent paper cited above by de Renzio, Lakin, and Cho, with one significant difference. Here we only review the Dominican Republic (DR) between 2014-2016, whereas in the paper the DR was reviewed from 2009-2016; we have found earlier data (where irrigation was overspent) to be incomparable to the more recent years of data and thus only review the DR data from 2014 in this table and brief. See table footnote #3 here and the country brief for more information.

<sup>2</sup> Deviations shown are positive mostly due to 2017, when capital expenditure was overspent by more than 140%.

<sup>3</sup> Here, deviation in actual expenditure by the institute responsible. Data on years 2009-2013 are not used here; they included only transfers from the central government to the institute (with an average deviation of +27.6%).

Source: World Bank BOOST database

In the five countries we examine in greater detail, irrigation is underspent by roughly 50%, on average. Capital expenditure – which on average represents 82% of the total irrigation budget across these countries – tends to be the most affected by this underspending. Donor financing also plays a significant role in countries like Mozambique, where in 2016 externally financed investments accounted for 85% of the revised budget for irrigation and was reportedly underspent by 100%.

We also find that most public documents compare actual expenditure to the revised budget, which is inconsistent with global standards and tends to underestimate the severity of credibility challenges. As expected, in-year modifications to the budget helped lower budget deviations in all country cases except the Dominican Republic (Table 2).

Table 2. Nature and extent of underspending in the irrigation sector – 5 country case examples

Country	Years	Average deviations in irrigation expenditure		Budget area or category most affected
		vs. approved budget	vs. revised budget	
Albania	2010-17	-24% <sup>1</sup>	-14%	Tangible fixed assets expenses (-40% vs. approved) within capital budget (-37% vs. approved)
Brazil	2010-16	-77% excl. arrears	-72% excl. arrears	Investment budget (-86% vs. approved, excl. arrears)
Dominican Republic	2014-16	-51%	-55%	Construction and rehabilitation of dams (-96% vs. approved)
Kenya	2014-17	-37% excl. county spending	-32% excl. county spending (MoF)	Acquisition of non-financial assets within the National Irrigation Board's development budget (-70% vs. approved)
Mozambique	2014-18	-43%	-28% (MoF)	External investment expenditure (-38% vs. revised)

<sup>1</sup> Differs slightly from the figure presented in Table 1 due to additional adjustments regarding transfers.

Source: World Bank BOOST database, unless otherwise noted

## LINKING BUDGET PERFORMANCE TO NONFINANCIAL TARGETS

Some countries offer both financial and nonfinancial data at the project level, although information is often limited and inconsistent. Of course, the interpretation of a link between spending and nonfinancial performance depends crucially on whether the nonfinancial targets were realistic in the first place, and we do not have information on that.

Nonetheless, looking at selected irrigation projects in three country cases, we find some correlation between budget credibility and nonfinancial performance. Among the flagship projects in the Dominican Republic, for example, the Piña dam project experienced both the highest budget execution (or lowest deviation) and the greatest progress in 2017. Meanwhile, the Monte Grande project showed 0% budget execution (or 100% underspend) and 0% physical advance (Table 3).

Table 3. Budget execution and nonfinancial target achievement for selected projects in 3 countries

Country	Year	Project	Budget execution (% of budget spent)	Nonfinancial performance (% of target realized)
Brazil	Over 2012-15	Bebedouro / PE revitalization project	1% (31% incl. arrears)	58%
		Formoso / BA revitalization project	13% (68% incl. arrears)	78%
		Marrecas-Jenipapo / PI construction	31% (71% incl. arrears)	63%
		Nilo Coelho / PE revitalization project	13% (84% incl. arrears)	70%
Dominican Republic	2017	Construction of Azua II irrigation system	31%	0% for all outputs
		Monte Grande dam construction	0%	0% for all outputs
		Piña dam construction	48%	92% average for all outputs (values between 28-100%)
Kenya	2016/17	Community based small holder program	99%	91%
		Expanded National Irrigation Program	100%	47% <sup>1</sup>
		Galana Kulalu irrigation development	55%	50% <sup>2</sup>
		Mwea irrigation development (Thiba dam & irrigation area)	39%	0% for construction
				0% for irrigation area
		100% for land settlement		

<sup>1</sup> According to the sector report, the program funds were used to clear pending bills; but it is unclear for what these bills were accumulated.

<sup>2</sup> Both for the achieved area under irrigation and for the area of model farm planted. The figure for irrigated area was revised to 33% (3,300 of 10,000 acres) in the next year's report on the same period.

*Note:* Nonfinancial performance is calculated as achieved targets as a percentage of planned targets, except for Brazil (where performance is presented in percentage). For instance, the number of acres irrigated under the Expanded National Irrigation Program was 7,000, relative to 15,000 acres planned, in Kenya 2016/17.

Source: PPA evaluation report for Brazil, INDRHI accountability for the Dominican Republic, and EPWNR sector report for Kenya – see Annex Table 1 for links

We also find evidence that issues during budget implementation, especially relating to disbursement and procurement, have impeded the execution of some irrigation projects. This, in turn, has prevented governments from meeting nonfinancial performance targets in the sector. Examples of how these governments explain their performance in this area are offered in Table 4.

The explanations provided for these budget deviations are often general in nature (i.e., not specific to irrigation or to the project) or are generic (i.e., do not spell out the mechanism that actually caused poor performance). For example, payment problems might be general if they refer to cash flow problems that would affect multiple programs and not a single project. Even if these issues are specific to the project, more information is needed to understand why this specific project experienced payment problems; otherwise this remains a generic reason. Other explanations suggest poor budgeting in the first place; for instance, a couple of Brazilian cases suggest that projects were not executed because they are “complex” or time-consuming, which is both generic and sounds like something that should have been anticipated when the budget was approved.

Table 4. Examples of explanations provided for nonfinancial underperformance in public documents

Country	Underperformance documented	Explanations provided	Source
Albania	<b>Water Resources and Irrigation Project:</b> progress rated moderately unsatisfactory, January 2014	Procurement packages (mainly related to dam rehabilitation) encountered delays from “exogenous factors”	World Bank, Implementation Status Results Report: Seq. 02
Brazil	<b>Marrecas-Jenipapo project:</b> was scheduled to complete in early 2016, but at 63% of execution as of May 2016	Budgetary and financial backlogs need to be cleared before the works are resumed	Ministry of Economy, 2012-2015 PPA Evaluation Report
	Only 18% of the target for <b>expansion of the irrigated area</b> achieved (26,844 of 148,920 ha) over the multi-year period	“Complexity of implementing a public irrigation project” means that some projects require more than 4 years to complete	
	<b>Land regularization</b> implemented for 7 of 61 targeted projects	Implementation adjusted to “availability of existing resources”	
	0 of 117,234 ha served by <b>fully revitalized infrastructure</b>	No project fully completed because revitalization is “a time consuming and costly process”	
	0 of 40 <b>social interest enterprises</b> revitalized	“Extension and complexity of the works and ongoing actions”	
Dominican Republic	<b>Las Yayas River project</b> not completed as of 2017 (target was to build 1.4 km of suitable channel by 2014)	Activities were paralyzed due to lack of payment	Sector agency (INDRHI), 2017 accountability report, “Analysis of Compliance with the Strategic and Operational Plan”
	<b>Jura River project</b> not completed as of 2017 (target was to build 5.1 km by 2014)		
Kenya	Less than 50% of the <b>National Irrigation Board’s overall acreage target</b> (14,100 of 30,000 ha) achieved in 2015/16	Budget cuts (likely referring to supplementary budget changes) and delayed exchequer releases	Treasury, EPWNR sector report, Table 2.1: Sector Program Performance Review
Mozambique	No progress made in the <b>construction of dams</b> , which are required to meet the target for water storage capacity	“Lack of release of funds” or “lack of disbursement of funds”	Ministry of Public Works, 2017 Performance Evaluation Report for the WRM area



In several other cases, we can infer that similar challenges have hampered efforts to produce intended outputs in the irrigation sector. For instance, in Mozambique, an assessment produced by the Ministry of Agriculture notes that the Agricultural Irrigation Program shows a “significant shortfall” towards achieving the multi-year goal regarding the expansion of irrigated area, set by the National Agricultural Investment Plan. The report also highlights that “under this program, almost no funds were disbursed to implement its activities as the gap between budgeted and disbursed funds is over 90% in all years [from 2013 to 2016].”

Our findings provide some indication that budget credibility is relevant and can affect actual outcomes of a program. Yet, as previously explained, establishing a direct link between budget execution and nonfinancial performance is still difficult given the quality of information available. Table 5 discusses various limitations and complications we faced during the research, which illustrate the challenge of assessing the impact of underspending. These factors hinder better understanding of budget credibility issues and public engagement around the issue.

Table 5. The challenge of connecting financial and nonfinancial data – examples from 5 countries

Country	Research challenges
Albania	<p><b>Estimated rather than actual data; not fully comparable data:</b> Medium-term budget program provides expenditure and output data: “viti aktual” for the baseline year and “shpenzimet e planifikuara” for the next 3 years. “Actual” values, however, are estimated or forecasted values, not true actuals. Executed or realized values are available in the monitoring report, but this 1) only compares actual spending to the revised budget and 2) provides nonfinancial data on a selective basis, often without the targeted value.</p>
Brazil	<p><b>Not enough disaggregated data on nonfinancial performance:</b> Some nonfinancial information is available, including for the projects shown in Table 3, but targets are generally presented at the aggregate level. For example, the goal to “finish the infrastructure to expand the irrigated area by 148,920 ha” is not broken down by project. As a result, we are not able to compare the achievement of individual projects (e.g., infrastructure implemented in 4,600 ha through the Salitre project) to the respective target.</p>
Dominican Republic	<p><b>Inconsistent data within and across sources:</b> We find inconsistencies in both financial and nonfinancial data across and within documents. Some of this may be due to the timing of each publication and revisions in between. For example, the 2017 target for flow regulation is 716.76 m<sup>3</sup>/s in the 2013-2017 sector agency’s strategic plan, 207.75 m<sup>3</sup>/s in the original version of the national multi-year plan, 277.25 m<sup>3</sup>/s in the sector agency’s accountability report, and 407.75 m<sup>3</sup>/s in the 2018 update to the national multi-year plan. In addition, the accountability report and the national multi-year plan show “expected results” for the sector agency that are not in the strategic plan.</p>
Kenya	<p><b>Difficulties locating irrigation programs and inconsistent data:</b> Expenditure and key performance indicator data are available, but there are concerns regarding their reliability and consistency. Some of this is due to frequent restructuring of program budgets and revisions in nonfinancial targets. The program for irrigation was moved from one sector agency to another and renamed twice over the 4-year period, which made it difficult to locate. The acreage target for 2015/16 was 36,000 in the program-based budget but 63,000 in the sector report; achieved acreages for 2013/14 was 42,785 in the 2015/16 sector report but 21,515 (for the same year) in the 2016/17 and 2017/18 reports.</p>
Mozambique	<p><b>Difficulties matching information and lack of project-level data:</b> While the government claims that they are “aligned,” the government’s 5-year plan and the National Agricultural Investment Plan (PNISA) cover different time periods and present different objectives or indicators for the irrigation sector. At the project level, there is not much information available – if at all – in the Ministry of Agriculture’s performance assessment of the PNISA.</p>

## CONCLUSION

Despite the importance of irrigation in the agriculture sector and in the broader agenda for sustainable development, in our full sample of 13 countries, a significant portion of government budgets directed to irrigation investment tends to be unspent at the end of each fiscal year. Further, while a lack of transparency and consistency across documents makes it difficult to establish a clear relationship, our research on five of these countries does indicate that this underspending is likely to have a negative impact on project implementation and on nonfinancial target performance in the sector.

The selected country cases illustrate how lack of budget credibility can undermine the efforts to achieve domestic targets in sectors that are critical to achieving the SDGs. However, they also demonstrate the challenge of understanding the direct impact of underspending. It is vital that governments play their role in promoting better budget credibility, for example by improving the planning process and addressing bottlenecks in budget execution. Enhancing the quality of and public access to information is also vital to allow for a meaningful public debate about credibility challenges and how to resolve them.

Annex Table 1. List of references (in addition to BOOST) for each country case

Country	Databases or documents
Albania	<ul style="list-style-type: none"> <li>• Monitoring reports: <a href="https://bit.ly/2okhjS4">https://bit.ly/2okhjS4</a> (from Ministry of Finance) and <a href="https://bit.ly/2p4YPPi">https://bit.ly/2p4YPPi</a> (from Ministry of Agriculture)</li> <li>• Sectoral strategy for rural and agricultural development 2014-2020: <a href="https://bit.ly/2oiZymw">https://bit.ly/2oiZymw</a></li> <li>• Medium-term budget programs: <a href="https://bit.ly/2p6lbpI">https://bit.ly/2p6lbpI</a></li> <li>• World Bank documents on the Water Resources and Irrigation Project: <a href="https://bit.ly/2noRBMu">https://bit.ly/2noRBMu</a></li> </ul>
Brazil	<ul style="list-style-type: none"> <li>• Federal Budget Panel: <a href="https://bit.ly/2nBH8NJ">https://bit.ly/2nBH8NJ</a></li> <li>• SIGA Brasil: <a href="https://bit.ly/2fsdiEz">https://bit.ly/2fsdiEz</a></li> <li>• 2016-2019 multiannual plan (Plano Plurianual, or PPA) and 2016 evaluation report: <a href="https://bit.ly/2XeCGI5">https://bit.ly/2XeCGI5</a></li> <li>• 2015 evaluation report for 2012-2015 PPA: <a href="https://bit.ly/35kCHrH">https://bit.ly/35kCHrH</a></li> </ul>
Dominican Republic	<ul style="list-style-type: none"> <li>• Budget execution report: <a href="https://bit.ly/2oZkhMg">https://bit.ly/2oZkhMg</a></li> <li>• Annual evaluation report of physical and financial execution: <a href="https://bit.ly/2odhUVO">https://bit.ly/2odhUVO</a></li> <li>• Budget law: <a href="https://bit.ly/2p4enJW">https://bit.ly/2p4enJW</a></li> <li>• National pluriannual plan for the public sector (2018 update): <a href="https://bit.ly/2mFNEm9">https://bit.ly/2mFNEm9</a></li> <li>• INDRHI 5-year strategic plans: <a href="https://bit.ly/2obCMNb">https://bit.ly/2obCMNb</a></li> <li>• INDRHI accountability report and detail of expenses incurred: <a href="https://bit.ly/2okq7Y9">https://bit.ly/2okq7Y9</a></li> <li>• Request for access to public information: <a href="https://saip.gob.do/">https://saip.gob.do/</a></li> </ul>
Kenya	<ul style="list-style-type: none"> <li>• Sector working group reports (agriculture, rural &amp; urban development and environmental protection, water &amp; natural resources): <a href="https://bit.ly/2ofAgFP">https://bit.ly/2ofAgFP</a></li> <li>• Budgets (program-based budgets, appropriations and supplementary estimates): <a href="https://bit.ly/2p4BWCq">https://bit.ly/2p4BWCq</a></li> <li>• Year-end reports, retrieved from the Open Budget Survey budget document library</li> <li>• News articles for updates on the Galana Kulalu project</li> </ul>
Mozambique	<ul style="list-style-type: none"> <li>• General state accounts and state budget execution reports: <a href="https://bit.ly/2oXomAz">https://bit.ly/2oXomAz</a></li> <li>• 5-year plan of the government: <a href="https://bit.ly/2nxjiGN">https://bit.ly/2nxjiGN</a></li> <li>• Economic and social plan of the government: <a href="https://bit.ly/2nBpwI5">https://bit.ly/2nBpwI5</a></li> <li>• Performance assessment of the 2013-2017 national agricultural investment plan (Plano Nacional de Investimento no Sector Agrário, or PNISA): <a href="https://bit.ly/2odU78k">https://bit.ly/2odU78k</a></li> <li>• Annual performance evaluation report on the water resource management area from Ministry of Public Works: <a href="https://bit.ly/2mKry1S">https://bit.ly/2mKry1S</a></li> <li>• World Bank Implementation completion report on PROIRRI: <a href="https://bit.ly/2mEXBA8">https://bit.ly/2mEXBA8</a></li> </ul>