

Combining bottom-up monitoring and top-down accountability: A field experiment on managing corruption in Uganda

Research and Politics
July–September 2020: 1–9
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DOI: 10.1177/2053168020934350
journals.sagepub.com/home/rap

Mark T. Buntaine¹ and Brigham Daniels²

Abstract

Citizen monitoring of government performance is often ineffective at improving performance, perhaps because information from monitoring does not make it far enough up in the chain of bureaucracy where the authority to punish public mismanagement rests. In a field experiment, we test whether delivering regular, officially certified reports derived from citizen monitoring and describing specific problems with the implementation of public projects to high-level bureaucrats charged with overseeing the projects improved their delivery. We do not find evidence that this treatment improved the delivery of public projects. Follow-up interviews revealed that the targeted officials seemed to avoid knowledge of the monitoring, perhaps to avoid taking on the responsibility that would come from such knowledge. However, the treatment also provided information to citizens about what they should expect from local governments, which instigated several direct complaints that the targeted officials did not ignore. Based on this alternative channel, which we did not anticipate, we conclude that citizen monitoring must be deployed in ways that make knowledge of problems undeniable for authorities who have a responsibility to address them.

Keywords

Accountability, citizen monitoring, community-driven development, corruption

Introduction and theory

In a field experiment, we test whether providing senior bureaucrats with regular reports about implementation problems in public projects, derived from citizen monitoring, and delivered by a high-level government partner, improved the implementation of projects. We sought to understand how citizen monitoring can contribute to public accountability when monitored officials are not bound by social ties to the citizens who provide monitoring. In such settings, citizen monitoring might serve as a useful input to top-down methods of managing government performance, rather than enable citizens to punish or reward performance themselves.

Our study contributes to the growing literature about strategies to encourage bottom-up accountability from public officials and is unique because the monitoring intervention combines features of both bottom-up and top-down accountability. Bottom-up accountability, which involves citizens seeking better government performance themselves,

often has advantages related to information because citizens experience poor performance directly. Top-down accountability, which involves establishing public institutions to manage the performance of public officials, often has advantages related to credible sanctioning and rewarding of performance.

While there is some evidence that citizen monitoring can improve the performance of public officials who are bound by social ties to monitors apart from a link to top-down institutions (Björkman and Svensson, 2009), a number of studies have found more limited results when citizens provide monitoring directly to low-level officials with

¹University of California, Santa Barbara, USA

²Brigham Young University, USA

Corresponding author:

Mark T. Buntaine, University of California, Santa Barbara, 2400 Bren Hall, Santa Barbara, CA 93106-9010, USA.

Email: buntaine@bren.ucsb.edu



whom they do not share social ties (Banerjee et al., 2010; Buntaine et al., 2020; Grossman et al., 2018; Olken, 2007). Even the most promising intervention on bottom-up accountability (Björkman and Svensson, 2009) has produced less impressive outcomes in a scaled-up replication (Raffler et al., 2018).

The intervention that we study had several innovative features designed to link bottom-up and top-down methods of promoting accountability from governments: (a) citizen observations were delivered to a high-ranking bureaucrat with responsibility and authority to address the mismanagement of public programs; (b) the reports provided specific information about why problems had emerged; and (c) the reports were certified and delivered by another high-level government official, creating common knowledge among authorities about the problems. We expected that high-level officials with specific oversight responsibilities would face penalties—in terms of prestige, employment and promotion—for failing to address specific problems made known to them through monitoring, since knowledge of problems would trigger a responsibility to respond.

Specifically, we study the delivery of village-level projects chosen by residents, funded by a national park revenue-sharing program, and implemented by district and subcounty governments in Uganda. The experimental treatment involved informing residents that local governments had received a specific amount of funding to implement their chosen project and then collecting reports about the status of implementation over several months using a voice-response platform. Our research team aggregated monitoring from residents in treatment villages into district-level reports that flagged all villages where more than half of residents observed problems. The reports detailed the reasons for the problems. The Chief Warden of the national park personally certified the reports and delivered them to the chief administrator of the district government.

Counter to our expectations, we do not find evidence that the intervention improved the implementation of village-level projects. Projects were not finished or delivered more completely in treatment villages as compared to control villages, based on field audits. We do not find evidence that the intervention increased residents' satisfaction with projects, which might be expected given the lack of a positive main effect. In follow-up interviews with local officials, however, we uncovered three projects where the provision of information to residents about approved funding amounts through the treatment instigated direct complaints that resulted in officials being fired, transferred, or disciplined. While the treatment reports also contained consistent and negative information about these three projects, the high-level officials targeted by the intervention only got involved when their knowledge about mismanagement became unavoidable because of collective and non-anonymous complaints.

Our study contributes to the growing literature on bottom-up accountability by showing that high-level government officials may adopt strategies to avoid knowledge of problems when such knowledge would activate a responsibility to respond. Disseminating citizen monitoring in ways that are both hard for officials to ignore and that credibly signal a threat of escalation is a promising direction. While there have been a number of successful citizen monitoring programs that focus on individual officials (Callen et al., 2018; Muralidharan et al., 2019), the lack of impact in our study, interpreted in light of similar results in other settings (Banerjee et al., 2010; Buntaine et al., 2020; Grossman et al., 2018; Olken, 2007; Raffler et al., 2018), suggests that future strategies for bottom-up accountability related to complex governance outcomes should focus on disseminating monitoring in ways that officials cannot plausibly ignore given their formal responsibilities.

Research design

Setting and problem

Our study sites are the 91 villages that share a boundary with Bwindi National Park in western Uganda (Figure 1). The average household income in the area is less than US\$300 per year and most families engage in subsistence farming. Outside of towns that are the seat of district and subcounty governments, there is little evidence of formal state presence. The most significant evidence of state presence aside from the national park is the occasional grading of dirt roads. While no point around Bwindi National Park is more than 25 miles from another point, it takes several hours by vehicle to travel between more distant villages and it is not possible to travel around the park in a single day. The three district governments in the study area have limited capacity to monitor public projects.

Bwindi National Park is a World Heritage Site that attracts approximately 20,000 foreign visitors each year, most of whom come to see endangered mountain gorillas. Historically, the exclusion of local people from using park resources has created tensions with the park's management (Tumusiime and Sjaastad, 2014).

More than a decade ago, Bwindi National Park established a revenue-sharing program that funds village-level development projects with a portion of the gate fees that tourists pay. Revenue sharing is intended to deliver approximately US\$1300 for each village that shares a boundary with the park each year, roughly equal to the incomes of four to five households in villages that on average have approximately 200 households. The specific amount shared is determined by a formula that takes into account population and the length of the shared boundary.

Residents in each village elect a committee that decides what project or projects should be done with the funds after holding a community meeting. Residents have broad

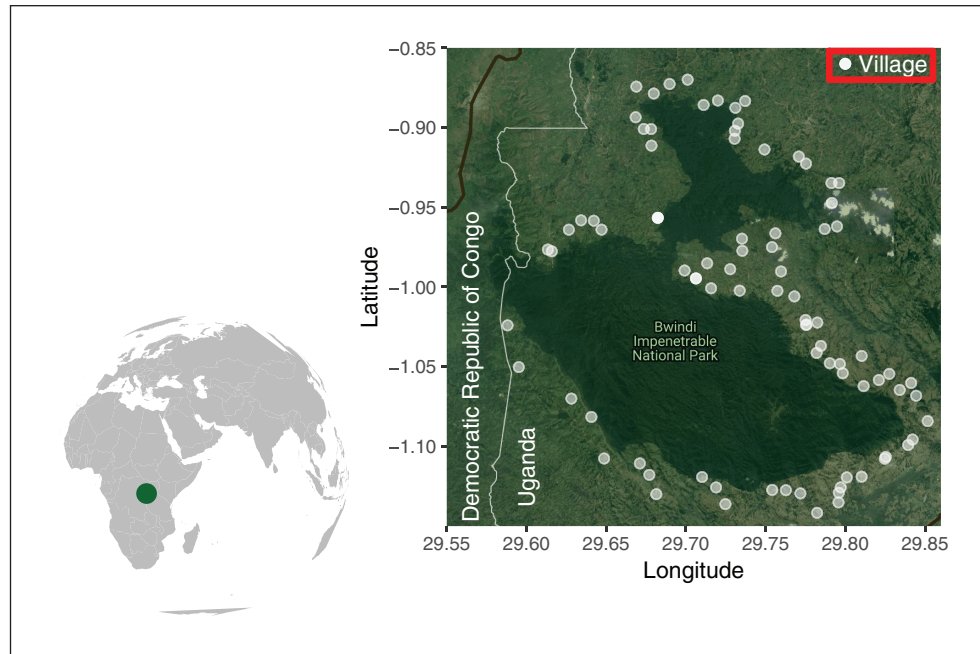


Figure 1. Map of the villages surrounding Bwindi National Park.

GPS locations recorded during audits by enumerators. Because of tablet malfunctions, four villages in the sample are not mapped. The satellite-based image of the park shows that agricultural land completely surrounds the park. Images courtesy and copyright of Google Maps.

discretion to choose projects. Previous projects have included everything from animal husbandry to water supply tanks. At the end of the selection process, residents send a proposal outlining their chosen project to the Uganda Wildlife Authority (UWA) for approval.

Upon reviewing and approving the proposed projects, UWA passes funds to the district government, which transfers funds to the subcounty government, which pays contractors selected by village- or parish-level committees to implement the villages' projects (Figure 2). By law, all public spending for local projects must be handled by district governments. UWA has no formal responsibility for the implementation of projects, other than an ability to monitor implementation and provide information to district governments.

This long chain of administration often results in funds being mismanaged (Adams et al., 2004; Archabald and Naughton-Treves, 2001; Buntaine et al., 2018; Laudati, 2010; Tumusiime and Vedeld, 2012). Previously, UWA officials estimated that up to 80% of revenue-sharing funds were diverted from their intended purpose. The revenue-sharing program makes up only a small amount of total district spending and the overhead allocated to districts to supervise projects is only 5% of the total revenue-sharing funding. Responsibility for planning and implementation is delegated to subcounties, which helps district-level officials avoid blame for problems. For their part, chief administrators at the subcounty level often decry the technical ineptitude of projects or highlight how they rely on village-level management and procurement committees to

advise them to release funds to contractors. These committee members are reportedly bribed by contractors who wish to be paid without delivering agreed outputs. At the root of many of these problems is the inability of the district governments to provide effective oversight.

Atop this administrative system is the Chief Administrative Officer (CAO) of the district government, who oversees all public spending by district and subcounty governments. This official must account for all spending to the Ministry of Local Government at the national level and is rated annually on performance. The CAO has authority to approve spending and discipline any bureaucrats who are part of the district and subcounty governments. Good performance of managing public funds is associated with favourable postings during staff rotations, promotions to the central ministry and professional recognition as part of annual rankings of districts, while poor performance often results in dismissal (interview V). In practice, CAOs have limited ability to provide oversight of revenue-sharing projects because of a large workload and a lack of information about implementation.

Treatment

We collected the mobile phone numbers of 4119 local residents over several years in all 91 villages that share a boundary with Bwindi National Park and enrolled them in a voice-response platform co-developed with park staff. Recruitment to the Bwindi Information Network was communicated as an opportunity to receive information about

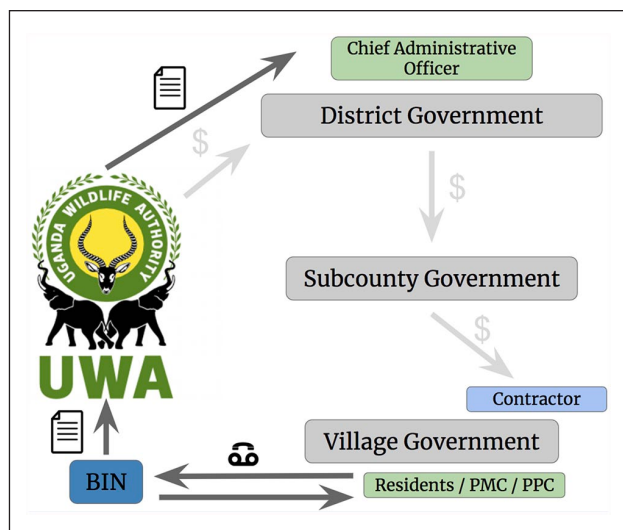


Figure 2. Flows of funds and information within the Bwindi National Park revenue-sharing process.

The Bwindi Information Network collected information from residents, compiled that information into reports, and delivered them to the Uganda Wildlife Authority, which hand-delivered the reports to the Chief Administrative Officer of each district government.

park management and provide input on ongoing decisions at the park. The reception of the program has been enthusiastic, with recruitment drives succeeding in signing up nearly every individual encountered who had access to a mobile phone.

The treatment for this experiment involved exchanging information with subscribers in treatment villages and passing along citizen monitoring to CAOs in four monthly reports. In terms of outgoing information, subscribers in treatment villages received bi-weekly reminders confirming the project or projects that had been approved and the amount of funds allocated in the form of voice messages

delivered by phone calls. This information was not readily available to residents from other sources. The platform also asked residents in treatment villages to respond to multiple-choice prompts using their dial pad and to provide voice reports about their village's revenue-sharing project five times. Subscribers in control villages received public health messages from a local hospital to hold contact rates constant across experimental conditions. For assignment of treatment, we used complete randomization of villages within subcounty blocks. An overview of the experimental design is displayed in Figure 3.

After receiving responses, our research team compiled the information into monthly reports at the district level four times. These reports broke down the responses of the residents and visually highlighted instances where a majority of reports indicated a problem with implementation (see Online Appendix C). The reports contained information on the number and proportion of residents who: (a) believed the approved project had been completed, (b) reported different reasons for the project not being completed, and (c) felt satisfied with the implementation of the project.

The Chief Warden of the park certified the reports in a cover letter and had his team physically deliver them each month to the CAO of each of three districts in the study. UWA managers informed the CAOs about the monitoring program upon delivery of the first report but did not communicate steps that would be taken to follow up on problems identified in reports. The treatment was intended to (a) lower search costs for problems, and (b) create common knowledge about problems which might activate responsibility to respond and raise the risks of not responding for the CAOs. Figure 2 earlier displays the basic administrative setup of the program. During the implementation, UWA and our research team conducted a joint audit of the quality of citizen reporting in 10 randomly selected villages, which

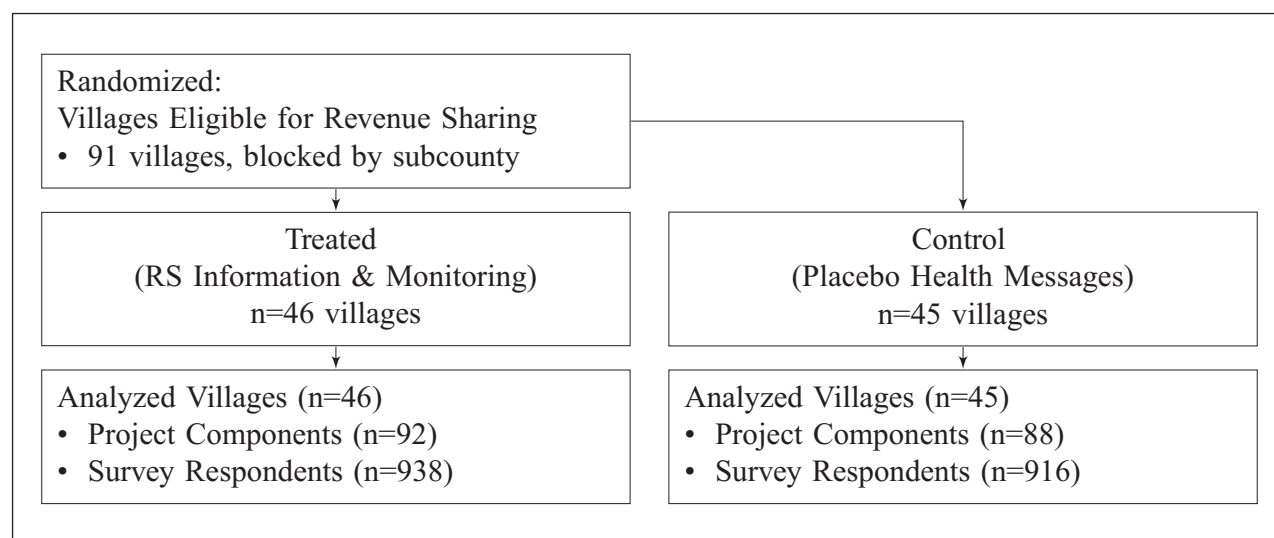


Figure 3. CONSORT diagram tracking study design.

found that delays in the delivery and implementation of projects were correctly noted by citizens. Further program details and a timeline are available at Online Appendix B.

Partnership

The downside of our partnership with UWA is that we did not have precise control of implementation. UWA insisted that our research team have no direct contact with district or subcounty officials, either for pretesting or for the delivery of reports. They wanted to take responsibility for the entire interaction to shield us from what they expected to be the risks associated with angering local officials.

Despite less control over implementation, the partnership provided at least three benefits. First, with UWA's cooperation, we had an opportunity to test whether creating a common knowledge of problems among high-level government officials could work to activate responsibility. Second, the design and formatting of reports was based on UWA's local knowledge about what might best spur action. Third, because UWA shaped and delivered the intervention, we avoided the frequently voiced concern about field experiments that implementation was not representative of real-world conditions (e.g., Berge et al., 2012).

Outcome measurement

We conducted independent audits of revenue-sharing projects, which involved photographing and describing all work completed in all 91 revenue-sharing villages. We entered every village and asked the village chair or designated substitute to guide our enumerators to document the revenue-sharing project or projects. We described and photographed all projects shown to us by the local guide, including if funds were spent on an approved project. We also recorded and photographed any evidence of labeling for revenue-sharing projects, which is required by guidelines. These audits provide our primary measures of the delivery of projects.

We also completed a survey with a representative sample of 20 residents in each village using a random walk to assess attitudes and opinions about the revenue-sharing program. As part of surveys, we asked residents to show us physical evidence of revenue-sharing projects. We used this physical evidence as a check on the audit results, particularly for items that were dispersed throughout villages. Descriptive statistics about survey respondents are displayed in Online Appendix Table A1.

Analytical strategy

We analyze average treatment effects for each audit and survey outcome using two strategies, as outlined in our pre-analysis plan. First, we compute simple difference-in-means between experimental conditions. Second, to increase precision, we specify an OLS model for each outcome that includes

the treatment indicator, block fixed-effects, and for individual-level analyses the following covariates: gender, age, income, and literacy. For both types of estimates, we report the standard errors and p -values of the sharp null hypothesis following the exact blocking (subcounty) and clustering (village) approach used to assign treatment. To compute this value, we exactly replicate the random assignment procedure 10,000 times assuming no treatment effect for any unit (i.e., sharp null hypothesis) and record the variance in the parameter estimate that results from the randomization design.

Results

Physical and resident audits

We observe no differences in project delivery between treatment and control villages inconsistent with the null hypothesis based on data from physical and resident audits (Table 1). Across a host of outcomes measured in physical audits, including whether the project implemented was the project approved by UWA, whether the project was completed, the number of dispersed items that could be located by village guides, and whether the project components were labeled, we find that treatment villages did not do better than control villages. Likewise, when we asked residents to report on whether an approved project was implemented and to show evidence of delivery, treatment villages did not do better than control villages. As displayed in SI Table G2, we do not detect spillover from contiguous villages.

Resident surveys

Consistent with the audits, we find no evidence that the treatment changed attitudes among residents. In Table 2, we show that there is no evidence that residents in treatment villages had increases in satisfaction with the implementation of revenue sharing, satisfaction with the management of Bwindi National Park, satisfaction with revenue sharing generally, the perceived importance of protecting Bwindi National Park, and the perceived value of revenue-sharing projects, as compared to residents in control villages. We find no evidence of heterogeneous effects based on whether survey respondents were subscribers to the Bwindi Information Network (SI Table H1).

Follow-up interviews

Perplexed by these results, we conducted interviews with each of the three CAOs in the relevant districts. We also interviewed elected and appointed subcounty officials, members of village- and parish-level project procurement committees that select contractors for projects, members of village project management committees, and elected village chairpersons. The list of interviews conducted is available in Online Appendix E.

Table 1. Results of revenue-sharing implementation from physical and resident audits.

Audit outcome	Treatment	Control	Difference (RI)	FE OLS (RI)	N
Approved project implemented	0.753 (0.052)	0.875 (0.034)	-0.122 (0.051) $p=0.993$	-0.110 (0.050) $p=0.987$	161
Complete (non-dispersed)	0.250 (0.136)	0.500 (0.162)	-0.250 (0.214) $p=0.891$	— (—) $p=0.996$	18
Pictures (dispersed)	5.918 (0.464)	7.114 (0.454)	-1.196 (0.447) $p=0.996$	-1.009 (0.430) $p=0.992$	143
Fully labeled	0.025 (0.024)	0.000 (0.000)	0.025 (0.025) $p=0.290$	0.020 (0.020) $p=0.335$	161
Partially labeled	0.198 (0.048)	0.200 (0.059)	-0.002 (0.077) $p=0.527$	-0.003 (0.079) $p=0.519$	161
Resident audit outcome	Treatment	Control	Difference (RI)	FE OLS (RI)	N
Project implemented	0.870 (0.042)	0.925 (0.030)	-0.055 (0.047) $p=0.875$	-0.055 (0.048) $p=0.870$	1,854
Picture shown	0.537 (0.056)	0.585 (0.051)	-0.048 (0.062) $p=0.776$	-0.036 (0.059) $p=0.722$	1,854

Variables: *Approved project implemented* measures the proportion of implemented or partially implemented projects that were approved by UWA. *Complete* is a binary indicator of whether non-dispersed projects were implemented completely or somewhat completely as revealed by field audits. *Pictures* is a numeric variable from 0 to 10 of the number of pictures of dispersed items captured during audits. *Fully labeled* is a binary indicator of whether project components were labeled according to guidelines. *Partially labeled* is a binary indicator of whether project components had some labeling, even if not fully in line with guidelines. Standard errors are computed by cluster-wise bootstrapping at the village level for the descriptive treatment and control conditions. Standard errors for the difference-in-mean and OLS fixed-effects models are the standard deviation of the randomization distribution of the assignment with village clustering assuming the sharp null hypothesis. p -values are one-way tests based on randomization inference. *FE OLS* includes block fixed-effects. For non-dispersed *Complete* outcome, not enough observations are available to estimate the pre-specified fixed-effects model.

All three CAOs in office during the study claimed that they had not seen the reports that were hand delivered to their district office by a UWA ranger or warden. UWA confirmed that they delivered a total of four reports, had phone calls and in-person meetings to explain the reports to each of the CAOs, and received acknowledgement that the reports had been received directly from the CAOs. Interviewee A was careful to note that while he had not seen the reports, it was possible that another staff member in his office had seen them. Interviewee B also stated the potential importance of the reports to his office, even though he had not seen them. Interviewee C indicated that his assistant had informed him about the receipt of the report from UWA, but that he had not personally looked them over. Interviewee C stated, “I was told about these reports from Bwindi by my assistant, who told me there was nothing big to attend to.” He also complained about the burden of reading a report and noted “when someone is busy, they become lazy to read these small fonts.” It is possible that CAOs avoided acknowledging the reports during our interviews to

avoid acknowledging responsibility for the lack of a response to their contents.

While the citizen monitoring intervention did not impact the delivery of projects, interviews with other local officials revealed that the treatment had positive impacts beside those that we measured in audits and surveys. Our interviews (E–U) revealed three instances where the information about the approved project and funding amounts sent to residents as part of treatment ultimately encouraged residents to complain to CAOs collectively and non-anonymously, leading to important follow-up actions that could not have been detected using audits or surveys. The reports delivered as part of treatment conveyed similarly negative information about these projects (Table D1 online) but did not instigate any follow-up action by the CAOs.

Cash instead of goats

Villagers in Kashekyera received messages informing them that they would receive goats for an animal

Table 2. Attitudes about revenue sharing from resident surveys.

Survey outcome	Treatment	Control	Difference (RI)	FE OLS (RI)	N
Satisfied RS implementation	1.985 (0.064)	2.023 (0.088)	−0.038 (0.107) $p=0.634$	−0.022 (0.109) $p=0.575$	1,849
Satisfied park management	3.369 (0.068)	3.380 (0.075)	−0.011 (0.107) $p=0.539$	−0.000 (0.106) $p=0.502$	1,844
Satisfied revenue sharing	3.257 (0.086)	3.213 (0.103)	0.044 (0.140) $p=0.379$	0.080 (0.140) $p=0.283$	1,854
Importance conservation	1.887 (0.015)	1.891 (0.018)	−0.004 (0.024) $p=0.556$	−0.002 (0.025) $p=0.534$	1,854
RS benefits valuable	2.840 (0.028)	2.790 (0.031)	0.050 (0.045) $p=0.139$	0.059 (0.045) $p=0.095$	1,853

Variables: See Online Appendix C for exact survey items. *Satisfied RS implementation* is satisfaction with implementation of revenue sharing (0, very dissatisfied; 3, very satisfied). *Satisfied park management* is satisfaction with overall park management (0, very dissatisfied; 4, very satisfied). *Satisfied revenue sharing* is satisfaction with revenue sharing (0, very dissatisfied; 4, very satisfied). *Importance conservation* is agreement with the importance of protecting Bwindi (0, not very important; 2, very important). *RS benefits valuable* is perception of whether benefits from revenue sharing are valuable (0, not at all; 3, very valuable). Standard errors are computed by cluster-wise bootstrapping at the village level for the descriptive treatment and control conditions. Standard errors for the difference-in-mean and OLS fixed-effects models are the standard deviation of the randomization distribution of the assignment with village clustering assuming the sharp null hypothesis. p -values are one-way tests based on randomization inference. FE OLS includes block fixed-effects.

husbandry project and the amount of funds allocated. One evening, the subcounty chief came to Kashekyera and tried to get villagers to accept cash rather than goats. He offered beneficiaries less money than had been allocated to pay for the goats. Some beneficiaries took the money and some did not. He told those who refused that if they refused the money, they would not receive anything as part of revenue sharing.

A subset of villagers, based on the information they had learned from the treatment messages, identified the difference in funds allocated versus those offered by the subcounty chief. They contacted UWA staff to complain and explained that (a) they had received messages, (b) the messages said to expect goats and that a certain amount of money would be spent, and (c) instead the subcounty chief had tried to get them to accept a lesser amount of cash. UWA told the villagers to contact the CAO and to copy UWA on the complaint. After receiving the complaint, the CAO asked UWA leaders, the subcounty chief, and the subcounty chairperson to meet. The subcounty chief denied the story. The CAO insisted the whole group visit the beneficiaries to find out what had happened. When they arrived, residents pointed at the subcounty chief and explained how they were told to take money or they would get nothing. Based on this information, the CAO took the subcounty chief to the disciplinary committee and attempted to fire him. Ultimately, the subcounty chief challenged this decision, and his punishment was settled at a several-month suspension and a transfer.

Shorting a village revenue-sharing funds

In Kahurire village, UWA had allocated 23,000,000 UGX for revenue-sharing projects, and the village had this confirmed in treatment messages. The subcounty chief told Kahurire village only to expect 15,000,000 UGX. Apparently, the subcounty chief had planned to send the additional 8,000,000 UGX to a different village in the subcounty to help fund a new school building. It was suspected by locals that the subcounty chief would somehow benefit.

Because the amount and project differed from the treatment amount the messages told them to expect, the villagers called UWA. The subcounty chief's actions were brought to the district's attention. Based on this interaction, the district CAO fired the subcounty chief. Funding was ultimately made available for Kahurire's revenue-sharing project.

Advance payment to missing contractor

Five villages in Buremba Parish requested to pool their revenue-sharing funds to build a tourism center. The tourism center would be built near a health center that a contractor had started but not finished. The subcounty chief opted to use the same subcontractor who had started to build the health center to build the tourism center. The subcontractor determined he would finish the health center instead of building the tourism center.

The treatment messages told the villagers that revenue-sharing funds were allocated for a visitor center along with the amount of funds allocated. Responding to the treatment

messages, the villagers complained to the subcounty that they should get a visitor center, not a health center.

The subcounty chief insisted that the health center building would have to suffice and authorized advanced payment to the contractor. This upset residents, who complained to UWA. The villagers were told by UWA to complain as well to the district CAO. Based on the complaint, the district auditor initiated a review. The subcontractor fled the subcounty and the work remains undone. The CAO has attempted to recover the funds from the salary of the subcounty chief.

Discussion

We expected that citizen monitoring that revealed specific problems and was directed to high-level officials would activate responsibility to correct known mismanagement of public funds. In the experiment, the CAOs who received the reports stated that they had not paid attention to them. Apparently, the anonymous and aggregate nature of the reports was not sufficiently threatening, even when delivered by another high-ranking official, and CAOs could claim they had been lost among other paperwork. In contrast, when citizens complained directly and non-anonymously about problems also indicated in the treatment reports, the CAOs acted. It is possible that direct citizen complaints made the threat of escalation more credible and diminished the ability of the CAOs to claim ignorance of problems.

In contrast to the results of this experiment, monitoring individual officials, rather than complex governance failures, seems more promising. Building expectations among officials that citizen monitoring will be used for their evaluation directly and shared with supervisors has had a modest impact on service provision (Muralidharan et al., 2019). Monitoring specific personnel on basic duties like attending work has achieved reductions in absenteeism (Callen et al., 2018).

For complex governance challenges, there may be no shortcut to disseminating monitoring in ways that officials cannot ignore, which seems most likely when citizens complain about government performance in vocal and public ways (Fiala and Premand, 2018). While the treatment we studied attempted to remove the risks of petitioning governments, the resulting crowd-sourced information contained less specific information and was delivered in a format that was too easy to ignore. Another possibility for why CAOs responded to direct complaints from citizens is that they activated social expectations or emotional responses that anonymous reports did not.

As might be expected given the limited responsiveness of the CAOs to reports from the platform, residents in treated villages did not report increased satisfaction with revenue sharing. This result is likely due either to residents failing to see any results of reporting or because they learned that additional mobilization was required to generate responsiveness. Satisfaction with a government

program is unlikely to be positively related to the need to make costly complaints about it. More practically, this result confirms that reporting platforms must credibly signal responsiveness from government to affect citizens' attitudes or behavior (Buntaine et al., 2019).

Our experiment was designed to test whether features of both bottom-up and top-down accountability could be combined to improve the management of public funds for community-driven development projects. While this combination might work in other contexts where there is a strong motivation by high-authority officials to respond to problems (Anderson et al., 2019), this study suggests that monitoring must be deployed in ways that make the threat of escalation credible and make it impossible for responsible officials to claim ignorance of problems.

Acknowledgements

We are grateful to Jeremiah Nahamya for his contributions to the design and implementation of this research as the project manager based in Uganda. Tanner Bangerter provided excellent research assistance. This project was conducted in partnership with the Uganda Wildlife Authority and we gratefully acknowledge the guidance and engagement of Pontius Enzuma, Raymond Kato, Aulea Tumwebaze, and Joseph Arinaitwe. We are grateful to Lisa Dellmuth, Aseem Prakash, and audiences at the University of Illinois and the 4th Annual Conference on Environmental Politics and Governance, the Working Group in African Political Economy, and anonymous reviewers for helpful comments on earlier drafts. This project was reviewed and approved by the UCSB Human Subjects Committee (UCSB protocols #4-18-0013 & #14-18-0385), the Uganda Mildmay Research Ethics Committee (protocol 0703-2015), the Uganda National Council for Science and Technology (protocol IS 111), and the Uganda Office of the President (ref: ADM 154/212/03). Author contributions: MB and BD designed and implemented the research. MB analyzed the data and wrote the paper. MB and BD edited the paper. An earlier version of this paper was circulated with the title "Diffuse Responsibility Undermines Public Oversight: A Field Experiment at Bwindi National Park, Uganda."

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This project was funded by the US National Science Foundation (collaborative grants # 1655459/1655513).

ORCID iD

Mark T. Buntaine  <https://orcid.org/0000-0002-7139-2078>

Supplemental materials

The supplemental files are available at <http://journals.sagepub.com/doi/suppl/10.1177/2053168020934350>

The replication files are available at <https://doi.org/10.7910/DVN/JPAP7Z>

Carnegie Corporation of New York Grant

This publication was made possible (in part) by a grant from the Carnegie Corporation of New York. The statements made and views expressed are solely the responsibility of the author.

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Supporting Information

Combining Bottom-Up Monitoring and Top-Down Accountability: A Field Experiment on Managing Corruption in Uganda

Research & Politics

Mark T. Buntaine¹ and Brigham Daniels²

¹University of California, Santa Barbara, buntaine@bren.ucsb.edu

²Brigham Young University, danielsb@law.byu.edu

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A Descriptive Statistics

Table A1: Subject-wise descriptive statistics from surveys

Variable	Pooled	Obs.	Min	Max	Treated	Control
Listed Beneficiary	0.81 (0.39)	1854	0	1	0.81 (0.39)	0.81 (0.39)
Expect to Benefit	0.87 (0.34)	1753	0	1	0.87 (0.34)	0.87 (0.34)
Satisfied with Planning	1.92 (0.81)	1849	0	3	1.90 (0.79)	1.95 (0.82)
Satisfied with Implementation	2.00 (0.77)	1849	0	3	1.99 (0.72)	2.02 (0.81)
Satisfied with BNP Management	3.37 (0.85)	1844	0	4	3.37 (0.85)	3.38 (0.86)
Satisfied with Revenue Sharing	3.24 (0.90)	1854	0	4	3.26 (0.87)	3.21 (0.93)
Importance of Conserving BNP	1.89 (0.32)	1854	0	2	1.89 (0.32)	1.89 (0.33)
Revenue Sharing Valuable	2.82 (0.41)	1853	0	3	2.84 (0.39)	2.79 (0.43)
Choose Project Again	0.54 (0.50)	1854	0	1	0.55 (0.50)	0.52 (0.50)
Age	41.32 (15.14)	1854	18	100	41.67 (15.41)	40.95 (14.86)
Female	0.47 (0.50)	1854	0	1	0.48 (0.50)	0.47 (0.50)
Monthly Income (1000 UGX)	57.80 (77.24)	1854	10	750	63.83 (84.49)	51.63 (68.53)
Fully Literate	0.24 (0.43)	1854	0	1	0.22 (0.42)	0.26 (0.44)
Bwindi Info Network Member	0.30 (0.46)	1854	0	1	0.29 (0.45)	0.31 (0.46)

B Program details

Bwindi Information Network The Bwindi Information Network is a co-developed, collaborative project between the author team and UWA management at the Bwindi Impenetrable Forest National Park in western Uganda. At its core, the messaging platform allows for short voice messages to be distributed in mass to subscribers around Bwindi National Park. During the experiment reported here, the platform was run using the *Viamo* voice-response platform with a toll-free and unique program number. This platform is offered in many countries as a paid subscription. A major advantage of this platform is that all information and prompts are verbal, making the platform accessible even to illiterate individuals.

Subscriber recruitment The significant majority of recruitment effort was completed in the field in waves prior to the launch of the study reported here. Every village around Bwindi has had at least two visits by program staff that offered the opportunity to join the platform. During field visits, program staff walked through villages offering the opportunity to join to anyone who they encountered. Often, large numbers of people would congregate to hear about the platform and would sign up as subscribers en mass at the single location. It was not uncommon for residents to mobilize their family, friends, or neighbors to present themselves to program staff for enrollment. Rates of refusal to participate have been extremely low. Likewise, in the years the platform has operated we have received less than 20 requests of subscribers to opt-out after enrollment, which can be accessed using the choice tree that is triggered when a subscriber calls the Bwindi Information Network.

We required subscribers to provide verbal consent about how the platform would be used for research, so we also called back referrals of potential subscribers that residents made during field visits. The pool of subscribers is not a representative sample of residents, both because of the recruitment procedure and because individual or shared ownership of a mobile phone was required to subscribe. In addition to field-based recruitment, any incoming calls to the platform not recognized as subscribers were sent to an enrollment voice tree. Program staff called such people back to complete subscriptions.

All interactions with the Bwindi Information Network are free for subscribers, including both incoming and outgoing calls. Outgoing messages are delivered to subscribers as recorded voice messages in the local language Rukiga. An outgoing telephone call can be initiated to subscribers in batches and at set times as programmed by staff. All outgoing telephone calls come from the unique program phone number. If the subscriber answers an outgoing call, the recorded message is delivered, along with any input trees that prompts the subscriber to select an option or leave an open-ended message. If the subscriber does not answer the call, the number and timing of additional attempts can be programmed. In practice, we attempted three calls over three days before considering any particular message or prompt undeliverable to a given subscriber.

Treatment delivery The author team collated responses to prompts about the status of revenue-sharing projects into district-level reports four times during the study period, based on guidance from UWA about the type and format of information that would be useful for the CAOs. The CAOs were not involved in the design of the program, nor were they informed specifically about the program prior to the first report being delivered. Managers at UWA physically delivered printed reports and called each of the CAOs individually to explain the reports and answer any questions about them. UWA managers did not explicitly convey any information about follow-up that would be triggered if there was not a response to the reports, but implicitly assumed that knowledge of specific problems would trigger a duty to respond by the CAOs. We are unaware of any UWA follow-up about the reports beyond calls to confirm receipt and answer questions.

Program timeline Figure B1 displays the program timeline. Roughly speaking, the program can be divided into three phases: (1) subscriber recruitment; (2) citizen monitoring and report delivery; (3) endline surveys, resident audits, and physical audits. The recruitment of subscribers occurred in several phases from 2014 up until just prior to random assignment in May 2017. Citizen reporting and the delivery of the four reports occurred from July - October 2017. The final endline survey and field-based project audits took place from December 2017 - January 2018.

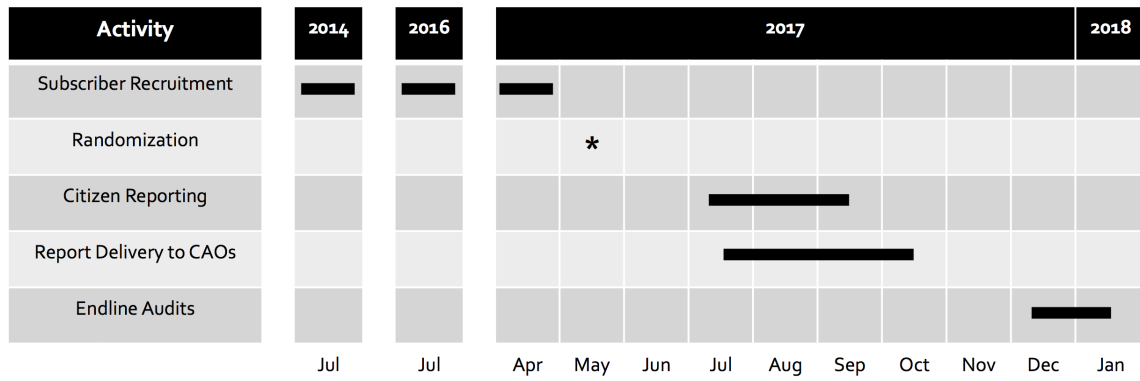


Figure B1: Program timeline of main activities

C Example report summarizing citizen monitoring

The following provides an example of one page of the typical report that the Uganda Wildlife Authority delivered to the Chief Administrative Officer in each district.

District Summary Statistics

Below we summarize the answers of the 25 villages in Kanungu District. For each village, we have **shaded the boxes** where less than half of the respondents indicate **a negative outcome**. We have *italicized the data in the boxes* where respondents altered their response from the previous report enough to change the collective response *from a positive to a negative outcome*. We have underlined the data in the boxes where respondents altered their response from the previous report enough to change the collective response from a negative to a positive outcome.

Note that one reason that we might see some villages moving from positive to negative in this report particularly is because we clarified the question we were asking to better differentiate between completed projects and those in progress.

	Completed Successfully (if as approved)	Reasons Not Completed As Approved	Satisfied with Project (any project)
Butogota Town Council			
Kanyabuhama	3 / 7	Not Started: 2 / 3 Short Funding: 1 / 3	1 / 3
Kanungu Town Council			
Butare	5 / 7	Not Started: 1 / 2 Short Funding: 1 / 2	2 / 6
Omumbuga	<u>7 / 10</u>	Short Funding: 1 / 3 Still in Progress: 2 / 3	3 / 8
Kayonza			
Buhoma	4 / 12	Not Started: 1 / 7 Still in Progress: 5 / 7 Different Project: 1 / 7	7 / 10
Iraaro	1 / 3	Not Started: 1 / 1	0 / 1
Kacerere	<u>7 / 14</u>	Not Started: 2 / 7 Still in Progress: 4 / 7 Different Project: 1 / 7	3 / 10

Figure C1: Example of report delivered to Chief Administrative Officers

D Information from citizen monitoring about three case studies

Reports sent to CAOs regarding the three projects used as case studies contained clear information indicating problems with implementation and resident satisfaction (Table D1). Nonetheless, these reports did not instigate any actions by the CAOs. The CAOs responded when residents in villages receiving these three projects petitioned directly.

Table D1: Content of reports delivered by UWA regarding three projects used as case studies

Village	Report 1	Report 2	Report 3	Report 4
<i>Project Completed Successfully</i>				
Kashekyera	7/22	4/17	5/21	4/15
Kahurire	11/15	9/16	7/17	8/20
Burema parish villages	9/47	15/52	8/42	10/45
<i>Satisfied with Project</i>				
Kashekyera	1/3	1/4	2/11	0/5
Kahurire	3/9	5/11	6/13	5/19
Burema parish villages	3/10	9/25	7/15	13/23

E List of semi-structured interviews with officials

- (A) Chief Administrative Officer, 16 May 2018
- (B) Chief Administrative Officer, 23 May 2018
- (C) Chief Administrative Officer, 1 June 2018
- (D) Senior Bwindi National Park staff, 12 June 2018
- (E) Sub-county Chief, 26 July 2018
- (F) Village Chairperson, 26 July 2018
- (G) Village Chairperson, 27 July 2018
- (H) Sub-county Chief, 27 July 2018
- (I) Sub-county Chief, 27 July 2018
- (J) Vice-chair of parish procurement committee, 28 July 2018
- (K) Village Chairperson, 28 July 2018
- (L) Sub-county Chairperson, 28 July 2018
- (M) Village Chairperson, 30 July 2018
- (N) Sub-county Chairperson, 30 July 2018
- (O) Member, Parish procurement committee & Village management committee, 30 July 2018
- (P) Sub-county Chief, 30 July 2018
- (Q) Village Chairperson, 31 July 2018
- (R) Vice-chair, Village procurement committee, 31 July 2018
- (S) Sub-county Chief, 31 July 2018

(T) Sub-county Chairperson, 31 July 2018

(U) Senior Bwindi National Park staff, 1 August 2018

(V) Chief Administrative Officer, 14 June 2019

F Audit and survey protocol

The document below is an exact copy of the training materials provided to enumerators and describes all of the data collected as part of fieldwork.

ENDLINE PROJECT AUDITS FOR BWINDI

UWA's Bwindi National Park announced and shared this year's (2016/17) revenue sharing funds to 94 villages that surround the Park in May. Different villages met and planned for project with the funds according to their allocations and selected different projects. Some projects selected were to benefit individuals while others were common-good projects like water systems or roads. After funds were dispersed, the implementation (including procurement) of the projects happened at the division, subcounty, and village levels.

The Bwindi Information Network has also for the last several months been sending out a request for reports about the status of revenue-sharing projects to 46 villages that surround Bwindi National Park. The polls taken by voice call allow village residents to report on the progress of revenue-sharing projects in their villages. The survey questions were asking the citizens whether or not they had seen any project being implemented in their villages, whether the project had been implemented as approved and how satisfied they were with their village's revenue sharing project of the year. Reports using these data were delivered by UWA to the Chief Administrative Officers of the three districts around Bwindi. The aim of these deliveries was to alert to most important administrative officer to problems in implementation while time was available for a response and to sort of irregularities.

We therefore intend to visit 94 villages that surround the Bwindi National Park and have shared this year's revenue sharing funds. The purpose of the visits is to find out how closely the implemented projects align with what UWA had approved for the villages and whether making reporting experimentally available to citizens increased the delivery of projects to villages.

The exercise is planned to begin in the mid-week of November 2017 (in accordance with UWA's timeline) and completed within 10 days (assuming the team covers 10 villages in a day). A team of 10 people will visit 10 villages each day using two cars (2 people visiting a village in the morning and another in the afternoon). This means the villages to be worked in shall be relatively close to each other or in the same zone. For villages that are distant from Buhoma, accommodation shall be provided in addition to meals, airtime and remuneration. The team shall also be asked to take some pictures during their field visits. The whole exercise is budgeted to cost approximately 16 million shillings (4572 USD).

OVERVIEW

The research team shall enter the village with a prior knowledge on which project was approved and the beneficiaries (whether individual or common project). The team will then conduct a physical audit of the approved revenue sharing program.

After completing the audit, the team interviews at least 10 people on the beneficiary list while other 10 people shall be got by random walks. Assuming that the project provides a collective good (e.g., a well), the random walk will be used to identify 20 beneficiaries. Therefore 20 formal interviews shall be conducted in each village however, more interviews can be done with local/project leaders, unintended subjects among others to give more evidence. The

enumerators may also use Local leaders or CCRs to confirm some observations as indicated in the protocol below.

Upon entering a village, the enumerators should first try to make contact with the LC1 chair, with a request that this individual guide the enumerator in recording evidence of the project. The LC1 chair may delegate a guide if appropriate. To the extent that the LC1 Chair is not available, members of the project management committee should be sought for this task.

PHYSICAL AUDIT

During the visits, the enumerators should take time to observe the following:

1. Is there **physical evidence** that the project was at least partially implemented? Check all the items that are observed. Record a photograph of the item and write a detailed description.
 - a. Tagged goat / sheep / piglets / hens
 - b. Newly constructed or graded road
 - c. Newly constructed water source
 - d. Newly constructed pit latrine
 - e. Problem Animal Management items — pangas and hoes
 - f. Sign posts
 - g. Constructed or rehabilitated community health center
 - h. Constructed or rehabilitated school or school facilities
 - i. Constructed or rehabilitated community house or center
 - j. Constructed or rehabilitated tourist facility
 - k. Plastic seats
 - l. Culverts
 - m. Community camp
 - n. Planting of edge crops for PAM
 - o. Solar lamps
 - p. Other [fill out reason]

[take photographs and notes to record as much evidence as possible]

2. Had the project been implemented as planned, what proportion of physical outputs that would have resulted are currently observable:
 - a. Complete evidence (almost all of the physical outputs that would have been produced by a completed project is available and recorded, 90-100%)
 - b. Mostly complete evidence (a majority of the physical outputs that would have been produced by a completed project is available and recorded, 60-90%)

- c. **Partially complete evidence** (about half of the physical outputs that would have been produced by a completed project is available and recorded, 40-60%)
 - d. **Mostly incomplete evidence** (a majority of the physical outputs that would have been produced by a completed project is not available and only a small amount is recorded, 10-40%)
 - e. **No or very limited evidence** (no or very little physical output is available that indicates the project was completed, 0-10%)
3. How objectively verifiable is it that the evidence comes from this cycle of the revenue sharing program (as opposed to from some other source)?
- a. **Verifiable** (objective evidence show it is all or mostly from the program)
 - b. **Somewhat verifiable** (some objective evidence exists, but it is not certain that all of the physical outputs come from the program)
 - c. **Not verifiable** (any physical evidence that exists requires taking the word of people on the ground about being from the revenue sharing program)
4. What reasons do the LC1 or members of the Project Management Committee give for why physical evidence may have existed previously, but is no longer available for observation? (check all that apply)
- a. Project was not delivered or only partially delivered
 - b. Project budget was insufficient to carry out planned project
 - c. Project was changed to one not approved
 - d. Livestock/animal sold or died
 - e. Road having been washed away by erosion
 - f. Labels removed or destroyed
 - g. Poor labels or lack of labels on delivery
 - h. Other [fill out reason]

[create a detailed, written log about all observations in the village]

SURVEY WITH RANDOM RESIDENTS

The enumerators should conduct surveys with 10 representative individuals from each villages, with the goal of generating a representative account of this years' revenue-sharing program. The questions mirror the kinds of questions that were asked as part of the Bwindi Information Network over the past several weeks.

To minimize bias the survey responses, a random walk shall be used by the research assistants after completion of the physical audits. Each of the research assistants will be provided with a dice with at least four numbered sides which shall be tossed at every intersection in the village. An intersection may be a crossing of any road, path or alley inside the assigned village. An intersection might take several minutes to find in any given village. On reaching an intersection, the enumerator shall assign a number to each of the directions before tossing the die and shall walk into the randomly chosen direction. The research assistant shall only turn around after reaching a dead end or the end of the assigned village. Each random walk will last for three minutes (timing should be emphasised) between interviewees whom should also be selected using the given guidelines (beneficiaries vs non beneficiaries). We use a quota sampling technique that requires at least 10 beneficiaries and 10 non-beneficiaries are sampled in each village. To the extent that the village project is a public good that renders all residents beneficiaries, then 20 interviews with adults identified as a part of a random walk is acceptable. Assuming that the project provides a collective good (e.g., a well), the random walk will be used to identify 20 beneficiaries. The Project Manager will provide an indicative list of such villages prior to the enumeration effort.

Survey

Enumerator entry in Kobocollect based on respondent files:

- Enumerator name

My name is _____. I would like to ask you several question about your opinions of Bwindi National Park and its Revenue Sharing program. The goal of the survey is to understand people's experiences with the Revenue Sharing program this year, including both the planning for project and the implementation of projects. Your participation is strictly voluntary and your individual answers to the questions will never be disclosed to anyone. You can skip any and all questions that you do not want to answer. We will never share your individual answers with anyone, including the Uganda Wildlife Authority or local leaders. If you complete this survey, we will give you 1000 shillings, though you can still skip any questions you do not want to answer. May we ask you a few questions?

- 1) Do you voluntarily agree to participate in the survey?
 - a) Yes
 - b) No
- 2) What is your first name?
- 3) What is your mobile phone number?
 - a) Number _____

- b) No mobile phone
- c) Refused

E6) What is your gender?

- a) Male
- b) Female
- c) Refused

E7) What is your age? [enter number]

E8) What is your approximate monthly income?

- a) 20,000 shillings or less
- b) 20,000 - 100,000 shillings
- c) 100,000 - 200,000 shillings
- d) 200,000 - 500,000 shillings
- e) 500,000 - 1 million shillings
- f) 1 million shillings or more
- g) Refused

E9) Can you read?

- a) No, I cannot read at all
- b) No, but I have a close family member who can read
- c) Yes, I can somewhat read
- d) Yes, I can read very well
- e) Refused

4) Did you receive messages through the Bwindi Information Network over the last several months?

- a) Yes
- b) No
- c) Refused

5) Were you designated as a beneficiary of this year's revenue-sharing project in your village?

- a) Yes
- b) No (If "no", ask for an introduction to a beneficiary at the end of the survey)

6) UWA has approved for <<<village>>> to spend its revenue sharing funds on <<project>>. <<village name>> was allocated shs <<amount>> for <<project>>.

- 7) Have you seen this project completed in your village since June of this year?
- a) Yes
 - b) No
- 8) [If NO] What is the reason why you have not seen the revenue sharing project completed?
- a) No project has been started
 - b) Started and is still in progress
 - c) Village has received less than described but the project is finished
 - d) The project delivered is a different than described
 - e) Other [allow for self description]
- 9) [If different project] Describe the different project that has been implemented.
- 10) Has the different projected been completed?
- a) Yes
 - b) Still in progress
- 11) Overall, how satisfied are you with the implementation of this year's Revenue Sharing project, not taking into account planning of the project?
- a) Very Dissatisfied
 - b) Somewhat Dissatisfied
 - c) Somewhat Satisfied
 - d) Very Satisfied
 - e) Refused to answer
- 12) Overall, how satisfied are you with the planning of this year's Revenue Sharing project, not taking into account implementation of the project?
- a) Very Dissatisfied
 - b) Somewhat Dissatisfied
 - c) Somewhat Satisfied
 - d) Very Satisfied
 - e) Refused to answer
- 13) Would you choose the same project again given how it was planned and implemented?
- a) Yes
 - b) No
 - c) Refused to answer

B2) How satisfied are you with the overall management of Bwindi National Park?

- a) Very dissatisfied
- b) Somewhat dissatisfied
- c) Neutral
- d) Somewhat satisfied
- e) Very satisfied
- f) Don't know
- g) Refused to answer

B3) How satisfied are you with Bwindi National Park's Revenue Sharing Program?

- a) Very dissatisfied
- b) Somewhat dissatisfied
- c) Neutral
- d) Somewhat satisfied
- e) Very satisfied
- f) Don't know
- g) Refused to answer

B5) Have you or your family ever directly benefited from Bwindi National Park's Revenue Sharing Program?

- a) No
- b) Yes
- c) Don't know
- d) Refused to answer

B6) In your opinion, how important is it to protect the forest and wildlife in Bwindi National Park?

- a) Not at all important
- b) Not very important
- c) Somewhat important
- d) Very important
- e) Don't know
- f) Refused to answer

B11) How satisfied are you with your current opportunities to communicate with the Uganda Wildlife Authority about the Revenue Sharing Program?

- a) Very dissatisfied
- b) Somewhat dissatisfied
- c) Neutral
- d) Somewhat satisfied

- e) Very satisfied
- f) Don't know
- g) Refused to answer

B12) How much do you agree or disagree with the following statement: I know the right person [in my village or at UWA] to contact if I have concerns about the Revenue Sharing Program.

- a) Disagree
- b) Somewhat disagree
- c) Somewhat agree
- d) Agree
- e) Don't know
- f) Refused to answer

B13) In your opinion, how valuable are the economic benefits provided to your village through the Revenue Sharing program?

- a) Not at all valuable
- b) Not very valuable
- c) Somewhat valuable
- d) Very valuable
- e) Don't know
- f) Refused to answer

E1) The allocations from revenue sharing are distributed fairly among members of the village:

- a) Disagree
- b) Somewhat disagree
- c) Somewhat agree
- d) Agree
- e) Don't know
- f) Refused to answer

E3) Has corruption ever been a problem with your village's previous Revenue Sharing projects?

- a) Yes
- b) No
- c) No Reply

E4) Did you participate in any RS meetings during the last several months?

- a) Yes
- b) No
- c) No Reply

14) Would you like to receive notices through the Bwindi Information Network in the future?

- a) Yes
- b) No

15) Is there anything else you would like to tell us about living near Bwindi National Park or the Revenue Sharing program?

We would like to now ask you a few separate questions about alcohol abuse.

16) How much do you agree or disagree with the following statement?

Drinking alcohol is an important part of being a man.

- a) Strongly Agree
- b) Somewhat Agree
- c) Somewhat Disagree
- d) Strongly Disagree

17) What is the best way to overcome alcohol abuse?

18) How much do you agree or disagree with the following statement?

People do not need medical treatment for alcohol abuse because they can overcome alcohol abuse by making better choices.

- a) Strongly Agree
- b) Somewhat Agree
- c) Somewhat Disagree
- d) Strongly Disagree

19) How much do you agree or disagree with the following statement?

The hospital closest to me has good treatment programs for alcohol abuse.

- a) Strongly Agree
- b) Somewhat Agree
- c) Somewhat Disagree
- d) Strongly Disagree

Enumerator Notes (please make note of anything about the survey that the research team should take into account when considering the responses)

INFORMAL INTERVIEWS

In addition to the physical audit and surveys listed above, enumerators are encouraged to talk to the individuals that they encounter about the following kinds of questions. After leaving each village, enumerators should immediately record detailed notes about who they talked to and what their responses were to the following questions in a field log:

1. Do you think the amount allocated to your village this year was wholesomely used
2. Did the project actually benefit the intended people or group of people?
3. Is the person being asked a beneficiary in this year's project?
4. Was there any kind of corruption in this year's revenue sharing funds in your village?
(Mention an example if any)
5. If yes, are you happy with the project? If no, are you happy with this year's project?
6. Generally, how satisfied are you with this year's revenue sharing program?
7. If you were to choose a project for next year, would you choose the same project? If no, give reasons and suggestion on what you would select.
8. Can you give suggestions on how the program can be improved?

G Spillover

We did not anticipate at the time of the pre-registration that a small number of villages would share projects with other villages within their sub-counties. Projects of this type include building tourist facilities and pooling funds to grade common feeder roads into proximate villages. Because these types of projects raise clear issues of spillover when shared between treatment and control villages, we exclude them from our analysis. As displayed in Table G1 there is balance in village-components that are not shared and shared by experimental condition (χ^2 test, $p = 0.702$).

Table G1: Shared Status of Village Project Components by Experimental Condition

	<i>Not Shared</i>	<i>Shared</i>
Control	80 (0.909)	8 (0.091)
Treatment	81 (0.880)	11 (0.120)

Notes: This table shows the rates of shared projects by village-project pairings (row-wise proportions are in parentheses). The lack of meaningful difference between groups suggests that exclusion is balanced across experimental conditions.

Even after this exclusion, it is plausible that spillover between villages would complicate analyses through multiple channels. First, if monitoring and oversight were prompted by the treatment, it might be easy to oversee nearby control villages, especially if field visits were involved. This pathway would attenuate treatment effects. Second, it is possible that the presence of the treatment generally caused the districts to update their standard operating procedures and oversight measures everywhere, which would again attenuate treatment effects. Third, it is possible that knowledge of the treatment villages would cause the districts and their subordinates to re-allocate oversight effort away from control villages and toward treatment villages, which would amplify treatment effects.

To investigate the potential for spillover, as pre-registered, we consider the number of contiguous villages that are treated for each village. Because all villages are exactly contiguous with two villages and all villages have an equal probability of assignment to treatment, all villages have an equal probability of being exposed to spillover effects from a neighboring village according in

this spillover model. We test for spillover by including an interaction between treatment and the number of contiguous villages that were treated in the estimation of each outcome variable. The results of the spillover analysis are included below in Table [G2](#). We do not detect any outcomes where treatment effects are moderated by spillover.

Table G2: Implementation of project components recorded by field audits, considering spillover

	<i>Dependent variable:</i>			
	Approved Project	Complete (Non-dispersed)	Pictures (Dispersed)	Labeled Partially Labeled
Treated	-0.176 (-0.402, 0.051)	-0.500 (-1.589, 0.589)	-1.657 (-4.769, 1.455)	-0.018 (-0.053, 0.018)
S1	-0.065 (-0.232, 0.103)	-0.071 (-1.246, 1.104)	0.695 (-2.250, 3.640)	-0.017 (-0.043, 0.009)
S2	-0.133 (-0.367, 0.101)	0.500 (-0.589, 1.589)	-0.574 (-3.747, 2.600)	-0.003 (-0.012, 0.007)
Treated X S1	0.042 (-0.228, 0.312)	0.271 (-0.982, 1.525)	0.828 (-2.512, 4.169)	0.060 (-0.005, 0.124)
Treated X S2	0.167 (-0.242, 0.576)	-0.000 (-1.541, 1.541)	0.922 (-3.610, 5.453)	0.018 (-0.024, 0.060)
Observations	161	18	143	161
Adjusted R ²	0.210	-0.164	0.366	0.362

Outcome Variables: *Approved Project* measures the proportion of implementation or partially implemented projects that were approved by UWA. *Complete* is a binary indicator of whether non-dispersed projects were implemented completely or somewhat completely as revealed by field audits. *Pictures* is a numeric variable from 0-10 of the number of pictures of dispersed items captured during audits. *Verifiable* is a binary indicator of whether project components could be definitively linked to revenue sharing. *Somewhat verifiable* is a binary indicator of whether project components could be partially linked to revenue sharing. **Treatment Variables:** *Treated* is direct treatment at the village level. *S1* is when one of the two contiguous villages are treated. *S2* is when both of the contiguous villages are treated. **Confidence intervals** are computed from robust standard errors clustered at the village level.

H Heterogeneous Effects

Table H1: Heterogeneous Effects on Survey Outcomes Based on Subscriber Status

	<i>Dependent variable:</i>				
	Satisfied RS Implementation	Satisfied Park Management	Satisfied Revenue Sharing	Importance Conservation	RS Benefits Valuable
Treated	−0.002 (−0.239, 0.236)	−0.030 (−0.254, 0.193)	0.099 (−0.215, 0.412)	−0.002 (−0.052, 0.048)	0.060 (−0.031, 0.152)
Subscriber	0.102 (−0.058, 0.263)	−0.045 (−0.182, 0.093)	0.158 (−0.031, 0.348)	0.001 (−0.060, 0.062)	−0.008 (−0.081, 0.064)
Treated X Subscriber	−0.066 (−0.280, 0.149)	0.101 (−0.089, 0.291)	−0.058 (−0.317, 0.200)	−0.001 (−0.076, 0.074)	−0.006 (−0.085, 0.074)
Observations	1,849	1,844	1,854	1,854	1,853
Adjusted R ²	0.077	0.018	0.042	0.003	0.025

Variables: See SI Appendix C for exact survey items. *Satisfied RS Implementation* is satisfaction with implementation of revenue sharing (0, very dissatisfied - 3, very satisfied). *Satisfied Park Management* is satisfaction with overall park management (0, very dissatisfied - 4, very satisfied). *Satisfied Revenue Sharing* is satisfaction with revenue sharing (0, very dissatisfied - 4, very satisfied). *Importance Conservation* is agreement with the importance of protecting Bwindi (0, not very important - 2, very important). *RS Benefits Valuable* is perception of whether benefits from revenue sharing are valuable (0, not at all - 3, very valuable). **95 % Confidence intervals** (displayed in parentheses) are computed from robust standard errors clustered at the village level. **FE OLS** includes block fixed-effects.