Evan A. Thomas *Editor*

# Broken Pumps and Promises

## Incentivizing Impact in Environmental Health

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# Broken Pumps and Promises

# Foreword

In 2007, The Rockefeller Foundation convened a group of philanthropists, social impact leaders, and finance professionals at our Bellagio Center overlooking Lake Como to find new solutions on how to mobilize private capital to solve humanity's greatest challenges.

It might seem an odd place, seemingly so far away from the problems of the real world, to discuss such consequential topics. But that's precisely the Center's power: its serene location encourages those attending the conferences within its gates to dream big. And that's exactly what this distinguished group did, coining the term "impact investing" for a field that would help investors invest with the intention of both profit and social and environmental impact.

While the idea of using private capital to help solve humanity's greatest challenges wasn't itself novel, this new approach of double-bottom-line investing would lay the groundwork for new products and processes to channel more money, more effectively, towards these goals. And it comes at a critical time for philanthropy, as global philanthropic funds, even when combined with the development or aid budgets of governments, add up to billions of dollars. Meanwhile, the cost of solving the world's most critical problems runs into the trillions, including an estimated $2.5 trillion annual funding gap needed to achieve the Sustainable Development Goals (SDGs) in developing countries alone. Private capital is urgently needed in order to fill this gap and address pressing global challenges.

Since that meeting at Bellagio, the field of impact investing has taken root with the help of new infrastructure built with $40 million funded by The Rockefeller Foundation, including the creation of the Global Impact Investing Network, the rise of B-corporations, and the establishment of the Impact Reporting and Investment Standards and GIIRS analytics, now considered the "gold standard" for measuring a company or fund's social and environmental impact.

But there is still great opportunity for growing and developing the metrics and measurement tools that enable us to evaluate what is working and what is not. For those investors who seek to align payments with performance, innovations in both technologies and organizations will be needed.

At The Rockefeller Foundation, we are working to help support many of these innovations through Zero Gap, an effort dedicated to mobilizing large pools of private capital for social good. To do this, we are identifying the next generation of innovative finance products, partnerships, and processes that have the potential to create outsized impact. Employing a venture philanthropy model, Zero Gap supports early-stage design and leans heavily on collaboration and experimentation with both private and public sector partners. Whether it is pay for performance mechanisms or new institutional investment models, the solutions we are pursuing will all require objective data, feedback loops, and incentives for demonstrating that impact is actually achieved.

In the pages that follow, contributors discuss some of the emergent innovations in measuring the impacts of investment, with a specific look at poverty reduction. Edited by Professor Evan A. Thomas, this collection will be a valuable addition to the discourse on how we can better incentivize and evaluate impact across range of issues.

As an engineer and an entrepreneur working in global health, Professor Thomas has assembled compelling examples of technology, finance, and feedback that offer intriguing opportunities to close the gap between intent and impact. For example, the high adoption of mobile phones can help to accelerate the time it takes to make data actionable, while closing gaps in distance and subjectivity. Meanwhile, crediting systems, such as energy metering or carbon finance credits, can help align payments flowing from communities, donors, and investors with performance measures.

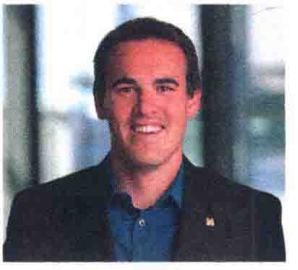
The development of such systems will be critical to supporting shared goals of mobilizing larger amounts of private capital to have more measurable and meaningful impact. Professor Thomas has edited much of this book while overlooking the same grounds as the pioneers of impact investing suggests that the Bellagio Center has once again inspired dreams that will transform lives around the world.

Judith Rodin, Ph.D.
The Rockefeller Foundation
New York, NY, USA

# Acknowledgments

This volume is a collaboration between all of the chapter co-authors as well as the numerous collaborators, funders and partners involved in the efforts presented. Particular thanks to Springer Editor Sherestha Saini and Portland State graduate student Emily Bedell. The Editor, Evan A. Thomas, dedicates this book to his wife, Lauren Alstot, and his mother, Anne Beirne.

# Editor Biography



**Evan A. Thomas, Ph.D., PE, MPH** is an Assistant Professor and Director of the Sweet (Sustainable Water, Energy and Environmental Technologies) Laboratory, and a Faculty Fellow in the Institute for Sustainable Solutions at Portland State University. He works at the interface of engineering, environmental health, and social business, with professional experience working in government, industry, non-profits, and academia. He holds a Ph.D. in Aerospace Engineering Sciences from the University of Colorado at Boulder, is a registered Professional Engineer (P.E.) in Environmental Engineering in the State of Texas and holds a Masters in Public Health from the Oregon Health and Science University.

He is also a social business entrepreneur engaged in global health programs. Evan was a founding volunteer with Engineers Without Borders–USA in 2002, which led to co-founding Manna Energy Limited in 2007. In 2012, he co-founded SWEETSense Inc., an Oregon technology company. He also served as the Chief Operating Officer of DelAgua Health, a social enterprise partnered with the Government of Rwanda.

Prior to joining PSU, Evan worked as a civil servant at the NASA-Johnson Space Center in Houston, Texas. At NASA, he was a principal investigator and project manager in the Life Support and Habitability Systems Branch working on concepts and flight hardware for sustainable Moon and Mars spacecraft.

# Contents

# Chapter 1
# Introduction

**Evan A. Thomas**

**Abstract** Global environmental health efforts are motivated by a sense of common responsibility and opportunity. These programs take forms large and small, from community groups to the World Bank. The methods likewise take varying, and sometimes competing forms, from watershed restoration to road building to community engagement, with funding provided by charities, loans, microfinance and big business. Once these projects are installed, typically the implementers are their own evaluators. When resources allow, some may invite external experts to visit the projects. Under the best of circumstances, funding is available to run a randomized controlled trial to rigorously evaluate if the projects are improving the intended environmental, health or other outcomes. But, usually sooner rather than later, the funding runs out for that particular project, and often organizations move on. This has resulted in sad statistics. For example, half of the water pumps installed in some African countries are broken a few years after they're installed. We propose an alternative – moving the mindset of funders toward pay-for-performance models of humanitarian and environmental interventions, backed by objective measurement tools and metrics. Instead of pushing money toward projects based on promises, pay interventions for successfully demonstrating impact that meets a stated intent.

**Keywords** Millennium development goals • Sustainable development goals • Impact • Intent • Pay for performance

## 1.1 The Intent to Impact Gap

The United Nations Sustainable Development Goals (SGDs) were announced with fanfare in September 2015. Replacing the retired Millennium Development Goals (MDGs), the 17 SDGs promise to deliver an ambitious range of impacts globally, including "End poverty in all its forms everywhere," "Ensure access to water and

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sanitation for all," "Ensure access to affordable, reliable sustainable and modern energy for all", and "Revitalize the global partnership for sustainable development" (UN 2015).

While the intent is ambitious, what is less apparent is how impact and success will be measured. At release, the United Nations provided no objective standards or statistical indicators. These standards will no doubt be informed by the favorable interpretation of the progress made with the MDGs. In many cases, the United Nations claimed that the MDG goal targets were met. For example, the UN claimed to have, "met the target of halving the proportion of people without access to improved sources of water, five years ahead of schedule," (WHO/UNICEF 2012). Unfortunately, it has become apparent that the standards and measurements used for the MGDs were in many cases insufficient to actually meet these goals. As a result, the doubling-down with SDGs may equally fall short if measurement standards are not directly aligned with the impact intended.

Only a month after the SDGs were announced, the United States Government Accountability Office (GAO) released a report examining the United States Agency for International Development (USAID) efforts in water and sanitation. The title was straightforward – "USAID has Increased Strategic Focus but Should Improve Monitoring" (GAO 2015). The report commended USAID's water and sanitation efforts, but highlighted that, even by USAID's own metrics, they were likely overstating impact.

USAID's recommended standard and custom indicators include "Number of people gaining access to an improved drinking water source", and "Number of people gaining access to an improved sanitation facility". These indicators are intended to be collected annually for programs implemented in the previous year and have no meaningful consideration of monitoring over a period of years, measurement of water quality or sanitation level, or health impact. And yet, even with these demonstrably low quality indicators, USAID failed in many cases to collect data, and, in the view of the GAO, may have overstated their impact in claiming that millions have been provided access to safe water and sanitation.

Rather than an indictment of USAID or the United Nations, these examples instead highlight the status quo in delivering well-intentioned environmental health interventions. The finite and fickle flow of funds begets incentivizing new projects, and not sustained delivery of services.

## 1.2 Sustaining Impact

In contrast to piped water supplies, sanitation disposal or electrical grids in countries like the United States, service provisioning in many developing countries takes the form of household water filters, community hand-driven water pumps, improved wood, charcoal or kerosene cookstoves, and pit latrines. Access to these improved drinking water, sanitation systems and clean burning stoves could benefit the billions who suffer from diarrheal disease and pneumonia, two of the leading

causes of death for children under five globally (UNICEF 2015). Billions of dollars are spent annually by governments, donors, non-profits and private sector institutions on technology interventions designed to provide these environmental services and address these public health issues.

The resilience of environmental service provisioning globally is dependent upon credible and continuous indicators of reliability, leveraged by funding agencies to incentivize performance among service providers. In the United States, these service providers are usually utilities providing access to clean water, safe sanitation, and reliable energy. However, in rural areas of developing countries, there remains a significant gap between the intent of service providers and the impacts measured over time.

This status-quo generally calls for finite funding and timelines of typically a few years to deploy, maintain and monitor such interventions. Impact is nominally evaluated by implementers directly. In some cases, funding may be available to employ health epidemiologists or development economists to run randomized controlled trials to rigorously evaluate if the projects are improving environmental, health or other outcomes. Yet, even when a positive impact is measured, the majority of these environmental service interventions are supported by implementers for only a few years. As a consequence, there is increasing evidence that much of the services provided in developing countries have failed to continue to positively deliver services.

Driving along a rural dirt road in many developing countries you see frequent evidence of this generous intent of global humanitarian aid agencies. Most tangible are hand driven water pumps that dot the landscape. These pumps are the concrete and steel outputs of a global intent to provide more clean water to more people. Thousands are installed every year, funded and implemented by organizations large and small. But, sadly, in many cases a flip of a coin may be your best judge of if the next water pump you pass will be surrounded by people, often women and children, filling their jerry cans, or if you'll see a decrepit artifact of wasted resource.

In rural sub-Saharan Africa, where hand pumps are a common technology, 10–67 % of improved water sources are non-functional at any one time, and many never get repaired (Foster 2013). While the proximate failures may be a leaky seal, a broken riser or a missing handle, these are only symptoms of the ultimate failure in how we fund, incentivize and monitor these efforts.

Presently, the impact of interventions may not always be aligned the intent originally sought. Improved regulations, standards and metrics that closely match intent, programs can be directly evaluated for compliance with those metrics and funders may incentivize and reward implementers for demonstrating impact.

Many organizations are now recognizing that a lack of objective data on program performance is contributing to a subsequent lack of accountability and misallocation of resources. Emergent tools and policy mechanisms may be able to respond to these issues. Improved and transparent feedback on the actual impact of global health and environmental programs may ensure the success of these efforts. Rather than infrequent data collection, more continuous feedback may improve community partnerships through continuous engagement and improved responsiveness. This approach seeks to raise the quality and accountability of these projects internationally

by separating project success from advocacy. Additionally, by providing monitored data on the appropriateness and success of pilot programs, investors and the public can make more informed funding decisions.

In this book, we highlight some of the challenges in the current models of global environment and health efforts, and offer case studies that leverage feedback mechanism that can ultimately prove, and improve, impact. The status-quo is critically reviewed (Chap. 2) and evaluated by leading experts in development economics (Dennis Whittle of Feedback Labs, Chap. 4) and public health (Thomas Clasen of Emory University, Chap. 5).

On institutional levels, contributions from the Rockefeller Foundation, the Yunus Social Business and the World Bank provide frameworks for performance-based payments (Forward, Chaps. 3, and 16).

Programmatically, versions of these tools are demonstrated by the Freshwater Trust leveraging clean water crediting for ecological restoration (Chap. 7), and DelAgua Health using carbon credits to provide water and air quality public health interventions in Rwanda (Chap. 8 and 9).

Technologies such as cellular sensors and mobile money payments are use by Oxford University to deliver water pump services (Chap. 6), ethnographic researchers to evaluate sanitation interventions (Chap. 13), social enterprises including Sanergy Inc. to deliver sanitation services (Chaps. 12 and 14), and numerous small enterprises to deliver energy services (Chap. 15).

Finally, new models for monitoring, modeling and monetizing health impacts of interventions such as cookstoves are presented by Kirk Smith's research group at the University of California, along with program developers at CQuest Capital and NexLeaf Analytics (Chaps. 10 and 11). As Kurt Vonnegut said, "Another flaw in the human character is that everybody wants to build and nobody wants to do maintenance." With these innovations perhaps this flaw in global environmental health may soon be addressed.

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# Chapter 2
# Performance Over Promises

**Kristi Yuthas and Evan A. Thomas**

**Abstract** Globally, stories of environmental health efforts are filled with good intentions and broken promises. Linking payments directly to long term social and environmental change can in some cases provide a solution. Pay for performance is now being used in a wide range of interventions and programs, but the potential of this approach is only beginning to be understood in the social sector. We explore theories that underlie pay for performance and lay the groundwork for understanding why and how this approach works. We then describe our Intent-to-Impact cycle—a four-stage model of Intent, Interventions, Evidence, and Pay for Performance that closes the loop between good intentions and impacts delivered. The challenge now is to use knowledge from this cycle to identify, explore, and learn from funding approaches that have and have not worked in important fields within the sector.

**Keywords** Pay for performance • Intent • Impact • Environmental health • Management theory • Global development

## 2.1 Pay for Performance

The common goal of nonprofits and social enterprises is to create positive social and environmental change. Yet the effectiveness of organizations in creating these changes varies greatly and the positive contributions of some organizations is debatable. In the absence of positive impact, some organizations are cost-ineffective in use of valuable resources that could be put to better use in making positive change.

When organizations fail to deliver promised impacts, donors can become skeptical and redirect their donations, taxpayers may push to reduce their governments' support of change efforts, and socially-oriented financiers may withdraw financial

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support or further emphasize financial returns. Such changes can greatly restrict the resources available to tackle devastating and persistent social problems.

### 2.1.1 Focus on Performance

One widely-promoted solution to this problem is increased accountability and transparency. Many funders are increasing their requirements for project monitoring and reporting and have encouraged more systematic evaluation and communication of activities and performance. These funders want evidence that their investees are doing the promised work and delivering the agreed upon outputs. But meeting these demands for accountability doesn't guarantee that the desired social changes have been achieved.

To ensure that these investments are having an impact, there has been an ongoing push toward providing hard evidence. The "gold standard" for reliable evidence comes from randomized control trials (RCTs). In this approach, measurements are taken before any action is taken, and groups are randomly assigned either to receive or not receive a funded intervention. At the end of the intervention, the organization or some external auditor measures whether the group that received the intervention is better off than the group that did not.

Although trials can be valuable, they are only useful for a fraction of investments, because they require very careful control of the intervention and they don't allow for any course corrections during the delivery of the program. This isn't possible in turbulent environments. And evidence about one intervention can rarely be generalized to another, because local conditions and populations vary so widely. This has left the sector with insufficient guidance on how to more efficiently and effectively address the needs of beneficiaries and to create the desired impacts.

Nonprofits and social enterprises in many fields are acutely aware of this challenge. As funds remain tight and problems remain massive in number and scope, the sector is looking for new ways to improve resource allocation and efficiency so that providers can do more with less. Pay for performance has begun to emerge in various forms in the social sector as organizations and their funders begin to recognize the potential for this paradigm.

At its core, pay for performance is the payment of money or other resources contingent on achievement of a performance goal. The increased recent interest in this approach results from the belief that funding can be designed to increase an organization's social performance through impacts such as improved quality of services, higher number of beneficiaries positively affected, or increased efficiency of service provision.

Donors have always cared about performance, and it has been common practice to link performance in one time period to funding in the next. However, like most ongoing funding, this performance-based funding has typically linked funding to inputs and activities rather than outcomes (Klingebiel 2012). This status quo is simplified in the following image.

Funders pay for successful performance in the delivery of services, such as the installation of solar panels or latrines. But whether these services have the intended

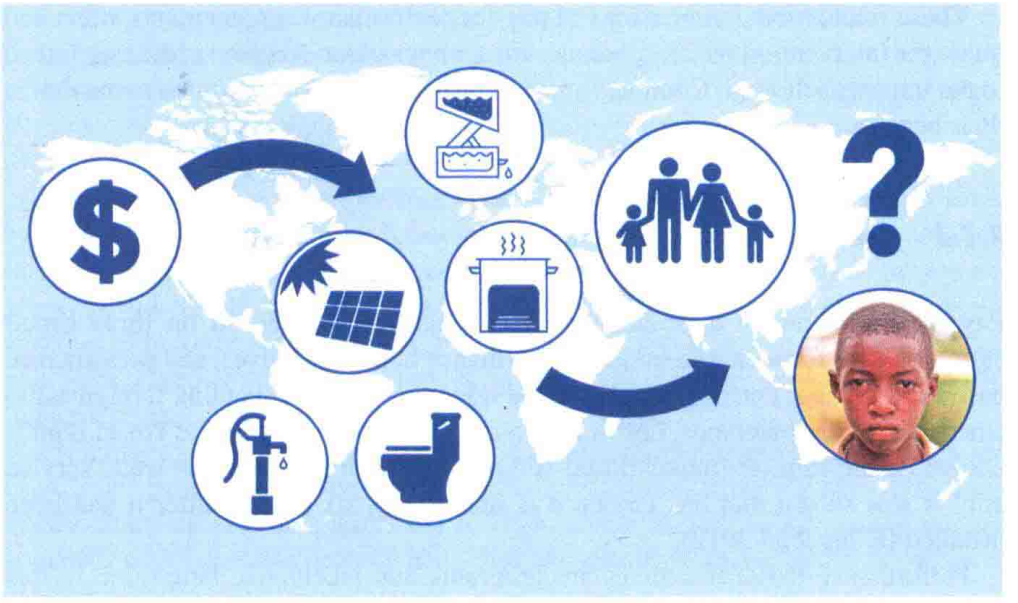

**Fig. 2.1** The status-quo in many environmental health interventions includes linear flow of funding that does not result in continuous or reliable feedback on impact for beneficiary communities

impact on the populations they're intended to serve remains unknown. So funders and service providers alike are left with little feedback for improving their operations or for more effectively directing resources (Fig. 2.1).

### *2.1.2 Elements of Pay for Performance*

Pay for performance provides an approach and incentives to help ensure that the question of impact will be answered and the answer will be that positive performance outcomes have been achieved. Three key elements are important when designing and managing performance-based contracts:

Performance: The agreements made between partners will include process for measuring and evaluating performance. Outcome and/or impact goals are specified and related performance indicators are identified. This forces parties to be clear about both the end conditions they seek to achieve and the path through which these conditions flow from activities and outcomes.

Incentives: In performance-based contracts, at least part of the payment is linked to performance outcomes. Financial and non-financial incentives are developed to align the risks and objectives of the parties so that when an implementer produces the desired impacts, both the funder and implementer will benefit.

Risk: Linking rewards to performance creates increased risk for implementing partners. In traditional contracts, funders select implementers based on their past and expected future performance. The only recourse funders have for poor performance is the drastic measure of terminating the contract. In pay for performance, parties have incentive to refocus and innovate to continually improve performance outcomes.