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POLICY BRIEF

Converging Opportunities: Environmental compliance and citizen science

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Complexity and Enforceability

One glimpse into the challenges governments face in understanding—let alone regulating—complex systems is the observation of Alan Greenspan, former Chairman of the U.S. Federal Reserve, in which he recalled regularly asking his staff what they knew about increasingly complex and opaque products like synthetic derivatives (Tett, 2013).

Following the 2007 financial crisis brought about by these opaque products that shielded toxic assets, the answer to Greenspan's surprising question admission was most likely: "Not much."

A similar question could be asked of agencies responsible for environmental regulations. There is no shortage of national and sub-federal environmental laws, regulations, guidelines and standards. Broadly, these are intended to address a range of environmental objectives, from limiting or banning contaminants that may cause harm to human health and the environment, to regulations specifying production technologies and setting out procedures for project review and development.

The problem is not a paucity of national regulations and standards; it is their implementation. A well-travelled path for environmental policy, when faced with problems, is to craft new solutions, instruments and approaches at the domestic and international level, as opposed to focusing efforts in administrative implementation.[1] However, the challenge of effective regulatory implementation becomes more pressing as major cities in developing and middle-income countries face high levels of air and water pollution, and some industrialized countries—including the United States—turn to regulations to tackle the most intractable of environmental issues—reducing greenhouse gas (GHG) emissions.

[1] In a 2012 report that examined the historic collapse of the British Columbia salmon fisheries, the Commission of Enquiry noted the following tendency of the Canadian federal government to develop new approaches as opposed to putting their weight behind the implementation of existing measures:

> At the higher levels within the department, I perceived a preoccupation with the development and revision of policies—an attitude that the solution to any problem is a new policy. I am not opposed to policies, and I do not presume to say how many are sufficient. However, creating a policy is not enough; it is through implementation that policies bring change. (Cohen, 2012, Chapter 3, p. 4)

Implementation Challenges

Nearly all jurisdictions struggle to implement environmental regulations. In a 2012 survey of both developed and developing countries, national auditing offices were asked to identify the greatest obstacle ministries face in environmental protection. They responded unequivocally: the single greatest challenge is implementing laws and regulations already on the books (Working Group on Environmental Auditing, 2013).

The good news is that challenges around regulatory implementation are receiving more attention, in part because governments are under increasing pressure to demonstrate measurable environmental impacts of their actions, and to show value-for-money in their actions as competition for public budgets intensified with the economic recession. Due to these twin pressures of showing results and delivering value from a budgetary perspective, coupled with fatigue in searching for new breakthroughs in the international arena, governments are emphasizing the importance of measurement, transparency and accountability as tools to ensure that expenditures in environmental protection are delivering measurable benefits.

For example, the Netherlands Environmental Assessment Agency cautioned in a 2013 report that maintaining environmental quality levels requires the government to "invest heavily in enforcement and monitoring" (PBL Netherlands Environmental Assessment Agency, 2013, p. 12). A comprehensive series of reforms released by China's Third Plenary Session of the 18th CPC Central Committee in November 2013—among the most important and far-reaching to be announced in that country in decades—make a similar commitment to regulatory implementation. They will:

> Reform environmental protection and management systems. Establish a system in which all pollutants are monitored and regulated. Release timely environmental information, and improve the reporting system to strengthen social supervision. Improve the pollutant-discharge licensing system and control the pollutants. Polluters who damage the environment must compensate for the damage and could receive criminal sanctions. ("Party sets course for next decade," 2013)

The strong statement by China sets out an unambiguous message: polluters that break environmental laws will be punished. The question is, how will they first be caught?

Tough on Environmental Crime

Actions taken by governments to enforce environmental regulations instil public confidence that laws on the books are making a difference. Nothing tells a better story about being tough on environmental crime than the Criminal Enforcement Program of the U.S. Environmental Protection Agency (EPA).[2] Each year, the Program publishes the results of its environmental enforcement efforts. For 2012, these included 320 new environmental crimes cases, 231 environmental criminals being charged and over US$250 million in environmental fines (EPA, 2012).

The EPA has also helped explain the consequences of these actions where they matter most—in improving environmental quality or reducing environmental risk. Measurement of the impacts of enforcement actions is evolving quickly, encompassing both traditional measurement of averted levels of pollution as well as broader measurement of

[2] See, for example, the U.S. Environmental Protection Agency (EPA) experience in risk assessment under the U.S. Toxic Substances Control Act (TSCA).

the effects of averted pollutants such as avoided respiratory illnesses or other indicators. For example, the Compliance and Enforcement Annual Results report for 2011 (EPA, 2011) estimates that EPA enforcement action reduced emissions of particulate matter, sulfur dioxide, nitrogen oxides, and volatile organic compounds (VOCs), resulting in between 1,800 and 4,500 avoided premature deaths, 2,800 avoided non-fatal heart attacks, 230,000 days of avoided lost work due to illness, and some US$15 to US$36 billion in estimated health and environmental benefits.

CIVIL ENFORCEMENT RESULTS	
Pollution Reduced, Treated or Eliminated (Pounds)	1,800,000,000
Hazardous Waste Treated, Minimized, or Properly Disposed of (Pounds)	3,600,000,000
Contaminated Soil to be Cleaned Up (Cubic yards)	33,000,000
Contaminated Water to be Cleaned Up (Cubic yards)	900,000,000
Stream Miles Protected or Restored (Linear Feet)	62,000
Wetlands Protected or Restored (Acres)	2,900
People Protected by Safe Drinking Water Act Enforcement (# of People)	350,000
Hazardous Waste Prevented from Release (Cubic Yards)	24,000
Liquid in Underground Storage Tanks Prevented from Release (Gallons)	10,000,000
People Notified of Potential Drinking Water Problems (# of People)	670,000
Underground Injection Wells Prevented from Leaking (# of Wells)	1,000
Lead-Based Paint Contamination Prevented (# of Housing Units, Schools, Buildings)	7,600
Volume of Oil Spills Prevented (in Gallons)	64,000,000
Pesticides or Pesticide Products Prevented from Distribution, Sale or Use due to Mislabeling or Improper Registration (Pounds)	2,900,000

Source: EPA, 2011.

Few (if any) countries match the sheer volume of EPA enforcement tallies. For example, the federal Ministry of Environment of Canada (Environment Canada) reported its total enforcement actions for 2010–2011 covering 53 key regulations of toxic substances—benzene, phosphorous, persistent and bio-accumulative pollutants, dioxins, PCBs and other substances. The net result of regulatory enforcement covering those regulated or banned substances comprised 600 written warnings, zero court injunctions, zero ministerial orders, two prosecutions and zero convictions for all of Canada (Commissioner of the Environment and Sustainable Development [CESD], 2011).

The contrast between the U.S. and Canadian annual enforcement statistics is striking. Even if the results were weighted by the overall size of the two economies and their regulated communities, Canada's enforcement actions are significantly lower than that of the United States.

The question is: does that matter? Are criminal punishments like jail time a more effective response to non-compliance than written warnings?

The purpose of enforcement is rarely to tackle individual violators, as satisfying as that is from a public perspective in reinforcing the perception that governments will be tough on environmental crime. In practice, it is impossible for any

government to effectively monitor all rates of regulatory compliance and catch all major violators. However, tough enforcement action is critical in sending a signal throughout the regulated community that pollution violators face serious consequences if caught.

Put another way, enforcement is not about settling scores but preventing violations in the first place, and prompting companies inching towards non-compliance to inch back into compliance, and hopefully to propel them beyond.

These wider signals are important, largely because it is impossible for any country to oversee all of its regulations through inspections and follow-up actions. Indeed, most countries continue to struggle with all stages of their environmental regulations, from the design and stringency setting (discussed below) to actual implementation.

Weak Design, Weaker Outcomes

The list of reasons why regulatory implementation becomes stalled is a long one, from dwindling public interest after an environmental law has been introduced; lobbying by the regulated community; poor regulatory design, and basic administrative obstacles including insufficient budgets, poorly trained inspectors, and out-of-date laboratories needed to verify that a contaminant was found on a given site.[3]

Poorly drafted regulations are unlikely to withstand the scrutiny of courts when challenged, leading to the alleged violator going free, and prompting a review and redrafting of the regulation that can take years. In Canada, 40 per cent of federal regulations to govern toxic substances faced some enforceability problem (CESD, 2011).

A more fundamental challenge is the lack of adequate information sources needed to catch violators. The ideal system is one in which government agencies have a steady stream of reliable, timely environmental data. Unfortunately, most countries lack detailed monitoring systems, and thus have opted for a twofold approach to catching violators: sending inspectors to catch infractions, and overlaying that with mandatory self-reporting systems in which the regulated community must report their emissions on a daily, quarterly or annual basis.

This system can work for large-scale, stationary pollution sources like coal-fired electricity plants. In the United States, for example, electricity plants are required to have hourly air pollution monitors that are linked to EPA offices in Washington, so that fluxes in NOx and SO_2 are tracked. This is coupled with the requirement that the regulated companies submit a certified report each year, signed by an employee from an accredited profession like engineering, summarizing its annual emissions performance. The falsification of that report would entail the loss of professional standing, as well as other sanctions.

How Do We Know?

Self-Reporting

Self-reporting environmental monitoring systems, often linked to right-to-know legislation, revolve around obligations by industry to self-monitor and regularly report specified types of pollutants released from their facilities. Following the Toxic Release Inventory (TRI) of the U.S. EPA, other self-reporting systems have been adopted by the European Commission, Canada, Mexico and other countries and jurisdictions.

[3] In Canada, federal inspectors lacked sufficient training and laboratories needed to enforce nearly 30 per cent of regulations (CESD, 2011).

Yet for those systems to work as intended, the data reported must be reliable and comprehensive. And the regulators need to ensure that a system of self-reporting by the regulated industry accurately captures actual emissions. Otherwise there is no point in going to the expense to set up such systems in the first place. In the case of Canada's Pollutant Release Transfer Register (PRTR), some 8,500 industrial and other facilities are required to disclose information on an annual basis about 347 different kinds of pollutants, including toxic pollutants. However, for all requirements, the federal government conducted only 30 on-site inspections. More troubling, questions posed by regulators were left unanswered by many facilities about the accuracy, comprehensiveness and comparability of data reported. In addition, although changes in PRTR data could provide enforcement officers with useful information to plan targeted activities based on changing emission profiles and risk, self-reporting data systems were not being used systematically for inspections.[4]

Similarly, the U.S. General Accounting Office found mixed results when it looked at self-reporting environmental data. For example, it reported that the EPA failed to review and assess the sampling procedures used by companies under different self-reporting systems, and didn't know whether companies were submitting insufficient or fraudulent data, largely due to insufficient budgets.

If basic questions remain about pollution data required by law, it raises broader questions about environmental data reported by companies through non-regulatory drivers like ISO 14000, as well as environmental management systems and various corporate environmental reporting systems in general. And the challenge becomes even more acute when dealing with numerous, small-scale industries that together contribute to overall rates of pollution, and are generally exempt from annual reporting.[5]

Regulatory Design and Threshold Setting

Most environmental policy is designed to move beyond after-the-fact tort cases—in which injury has occurred and punitive action is taken—to measures intended to anticipate, reduce or eliminate a given risk from occurring. Regulations are about prevention. Since prevention obviously entails anticipating the future, the process of setting regulations (including demonstrating the need for a regulation based on scientific evidence and the stringency of a regulation, such as allowable parts per million of a given substance) is sharply contested. Setting stringency levels often involves modelling probable risks in the absence of complete data around long-term, low-dose exposure rates of a given substance involving infants.

The drivers behind these familiar debates can be characterized as a three-way struggle among what is technically feasible to eliminate or reduce a given risk; what economic actors are willing to bear in terms of compliance costs to industry, and the social expectations that often call for higher levels of environmental protection, including zero emissions (Gunningham, Kagan, & Thorton, 2003). While an optimal policy outcome reflects the convergence of these three factors, this rarely occurs, which is why regulation setting is often sharply contested.

[4] The report noted that regulated facilities could choose from six different methods to report pollutants. However, there were no procedures employed by the federal government to ensure comparability of the different methods. For example, a facility could change its method of reporting pollutants from one year to the next and/or change emission factor estimates, putting into question the accuracy of a baseline reference point and making comparison problematic.

[5] For example, Canada's PRTR system exempts companies with fewer than 10 employees, which would mean many start-up shale gas operators are exempt from any mandatory self-reporting requirements.

Duelling Science, Clashing Values

There is a long tradition of industries claiming that compliance costs will be ruinous. Examples include a 10-fold exaggeration of the proposed EPA regulations in 1993 to limit the use of CFCs in U.S. autos, warnings from Firestone that limiting exposure to vinyl chloride would result in an "economic disaster" not only for the company but also for the country, and more recent claims by the U.S. coal industry that the 2013 federal climate change plan would ruin the economy and cost millions of jobs.

Cost-benefit analysis is a tool intended to balance the private costs of regulatory compliance with public benefits that stem from higher levels of protection in a given area. In essence, governments weigh the economic cost to a regulated community and wider economy associated with minimizing a given risk exposure against the benefits of (for example) lower cancer rates or sound watersheds. The obvious problem is that while private costs are often explicit (such as the additional costs to install an end-of-stack scrubber) doing an apples-to-apples comparison of benefits requires that health and ecological benefits be monetized. Too often, governments fumble this effort, not through bad intentions but because the central tool intended to allow an informed trade-off—economic valuation—itself remains contested.

Many organizations, including Conservation International, the Suzuki Foundation and IISD continue to work on the valuation of ecological attributes, primarily from a conservation lens. Work is needed in valuation to help mediate what will likely be increased debates between economic costs and the environmental and human health costs of environmental regulations. If anything, the post-2007 economic downturn has sharpened the arguments by industry that regulatory stringency will cost jobs while delivering negligible benefits.

Social License and Citizen Science

Given these challenges, some have questioned if environmental regulations make any difference, or whether they are really only intended to showcase environmental concern by authorities with little expectation of results. There has been progress by some leading companies to move beyond compliance, driven by many factors including the search for the elusive "green gold" theory of Michael Porter (Esty & Porter, 1998; Esty & Winston, 2006; Markell & Rechtschaffen, 2003; Sparrow, 2000).

Despite interest in the "beyond compliance" initiatives of industry, regulations matter. Regulatory thresholds set the bar for what are considered legally acceptable practices. Most company employees, management and boards have no interest in breaking the law. While the mere existence of regulations is important, as noted above, regulatory agencies continue to face enormous problems in regulatory implementation.

The key public policy question is: how do we make regulations to reduce risks to human health and the environment? This question becomes more urgent in light of increasing controversies around social license. In recent years, the parameters of social license have moved from localized opposition to such things as pollution infractions from mines or pulp and paper mills, to global campaigns like 350.org that have made not-in-my-backyard an international issue. As one commentator has noted, environmental opposition in the form of social license represents "a growing and worrisome political phenomenon in our country with no obvious short-term fix" (McLaughlin, 2013).

Social media can be a powerful tool in monitoring environmental quality conditions, and governments may tap into it as a powerful complement to regulatory enforcement. In the past two years, the pollutant PM 2.5 has entered the vernacular in Beijing, as millions track daily levels through a choice of air quality apps on their smartphones. Similarly,

the U.S. EPA has online pollution monitoring apps allowing citizens to directly measure neighbourhood air quality levels. The power of these tools is still emergent, but different organizations—from the European Environmental Agency to World Resource Institute and Conservation International—are using new sources and data delivery tools to open new ways of tracking rates of deforestation, CO_2 loading, risks of shale gas exploration to groundwater aquifers and other uses. The opportunity provided by new environmental apps and data delivery systems of course really matters because of the huge expansion in mobile phone use in the past decade.

It is time for struggling environmental enforcement agencies to think about how they can make use of these social media outlets in a more comprehensive manner. There are many organized and structured ways of collecting data derived from citizens. A good example is the coastal migratory whale monitoring system along the coastline of British Columbia, in which some 1,500 trained volunteers submit sightings of migratory whales to the Vancouver aquarium. There are similar initiatives to check the decline of amphibians in Australia and Costa Rica: Frog-Watch Canada engages volunteers to count species of frogs. Another example is the U.S.-based Bucket Brigade, which empowers people to collect data to test air quality for harmful exposure of toxic particles and chemicals such as volatile organic compounds (VOCs).

Opportunities in citizen science are prompting government agencies to rethink and introduce new policies linking new sources of data with enforcement and compliance. In 2012, the EPA introduced a policy regarding outside data being used to help track EPA-regulated programs as well as increase the public accountability of EPA regulatory actions. This includes looking at new technologies to measure pollution emissions as well as looking at how the EPA can make better use of new technologies and link these technology opportunities with new compliance tools in enforcement.

Conclusion

Governments face the twin pressures of budgetary constraints and environmental degradation, putting into the spotlight the importance of finding cost-efficient and effective means of implementing pollution and other regulations. The emergence of social media is creating new possibilities in environmental monitoring and citizen engagement. These are areas that IISD will be focusing on at a programmatic level in the coming years.

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