Intelligence-led policing and transnational environmental crime: A process evaluation

**Carole Gibbs, Edmund F. McGarrell
and Brandon Sullivan**
Michigan State University, USA

Abstract

Transnational environmental crime (TEC) threatens human health and the natural environment. Its complexity also poses a challenge for regulation and enforcement. In the current paper, we present a process evaluation of one attempt to use innovations in policing to improve TEC enforcement. Specifically, we assess the implementation of intelligence-led policing (ILP) in the Environment Agency's Securing Compliant Waste Exports Project. We find that the team was able to fully implement the UK National Intelligence Model to address illegal exports of hazardous waste, including combining regulatory and enforcement data to generate actionable intelligence. Future research should examine the implementation of ILP in other contexts and to address other forms of TEC to evaluate the generalizability of these results.

Introduction

Global business transactions and the international nature of supply chains have increased opportunities for relatively new forms of crime, such as human trafficking and terrorism (Grabosky, 2009; Kirby and Penna, 2010; Passas, 1999, 2002; Van Erp and Huisman, 2010). Movement across national borders is the distinguishing feature of these transnational crimes. More specifically, in transnational crime 'offenders or victims are located in or operate through more than one country' (Passas, 1999: 401).

Corresponding author:
Carole Gibbs, PhD, Associate Professor, School of Criminal Justice, Department of Fisheries and Wildlife, Michigan State University, Baker Hall, 655 Auditorium Road, #508, East Lansing, MI 48824, USA.
Email: gibbsca1@msu.edu

Transnational environmental crime (TEC) is one form of cross-border crime that is unique due to the threat it poses to human health and the natural environment. TEC includes 'trading and smuggling of plants, animals, resources and pollutants in violation of . . . regimes established by multilateral environmental agreements and/or in contravention of domestic law' (Elliott, 2009: 59). TEC has become increasingly attractive owing to low risks of detection and punishment and high profitability (Cook et al., 2002; Elliott, 2009; Graycar and Felson, 2010). The impact of TEC on local environments and human health is significant, producing species endangerment, deforestation, habitat destruction, pollution (Elliott, 2009), and threats to human health from exposure to toxins (Clapp, 2001; Roche, 2010; Yakowitz, 1990).

The size and impact of TEC demands a strong legal response, but as with other forms of cross-border crime, intervention presents a number of challenges. The scale of trade and the number of actors involved in cross-border crimes create complex transactions comprised of multiple smaller crimes that are difficult to disentangle (Elliott, 2009; Hill, 2005). Transnational crimes are often committed by loosely connected informal networks, or interconnected nodes, stretching across geographic boundaries that coalesce temporarily around emerging opportunities (Wood and Shearing, 2007; Williams, 2001; Wright, 2011). Technology has also increased the speed and anonymity of illegal transactions, making them more difficult to track (Felson and Kalaitzidis, 2005; Passas, 2002; Shover and Hochstetler, 2006). Attempts at global regulation are plagued by inconsistency in legal requirements across jurisdictions (Passas, 2002).

The environmental arena also poses some unique challenges (Wright, 2011). Distinguishing legal from illegal activity is difficult because some forms of natural resource and hazardous waste trade are legal (Gibbs McGarrell and Axelrod, 2010; Graycar and Felson, 2010; Wright, 2011). In addition, traditional criminal justice agencies often fail to see the significance of TEC and are unaware of how to properly detect illegal goods (Elliott, 2009; Wright 2011). At the same time, environmental regulatory agencies typically utilize more cooperative strategies to achieve compliance rather than enforcement (Pink, 2013). Many of these issues create challenges for addressing environmental crimes in one jurisdiction, but are exacerbated in the transnational context owing to the scale and complexity of cross-border transactions.

The complexities and difficulties of TEC enforcement coupled with the significant impacts on environmental and human health demonstrate the need for innovative efforts to address the problem. In this paper, we present a process evaluation of one such effort. Drawing on recent innovations in policing, the Environment Agency in England (EA) implemented an intelligence-led policing (ILP) project (the Securing Compliant Waste Exports Project) to reduce illegal exports of hazardous waste. To the best of our knowledge, this project is the first and only one to systematically use these methods to address TEC over time. Thus, our work represents the first process evaluation of using ILP to address TEC. Consistent with other studies of this nature (Dehar et al., 1993; Oakley et al., 2006), we use a combination of quantitative and qualitative data to describe *how* the program was implemented and obstacles encountered during the process.

Examining implementation is important. Projects that lack full implementation are unlikely to achieve the desired results. Thus, process evaluation is a necessary first step to understanding the effectiveness of interventions. To that end, we begin with a review

of existing work on the nature and implementation of ILP. We highlight problems with implementation found in the prior literature to provide a basis upon which to evaluate the EA team efforts. Next, we evaluate the EA team's adherence to the National Intelligence Model (NIM) (National Center for Policing Excellence, 2005), including whether and how they addressed obstacles to implementation. We conclude with a discussion of the implications of our work, including whether ILP *can* be implemented to address TEC.

Relevant literature

Intelligence-led policing

The development of innovations in policing has dominated the literature on the topic for the last 50 years, as police agencies are forced to adapt to the emerging challenges of increasingly sophisticated criminal activity. The emergence of 'intelligence-led' policing in the first decade of the 21st century has been the latest model. Ideas of intelligence-driving policing and the term ILP originated in the United Kingdom. It has since been included in legislation in the UK through the NIM and endorsed by all leading policing associations in the United States (Carter, 2009; Global Intelligence Working Group, 2003; International Association of Chiefs of Police, 2002; National Center for Policing Excellence, 2005; Ratcliffe, 2008).

The ILP model is based on a set of ideas or principles that emphasize the police becoming more 'strategic, future oriented, and targeted' in preventing and reducing crime (Maguire and John, 2006: 69). Existing definitions vary, but essentially ILP is a business model in which agencies collect and analyze information about crime to create intelligence outputs that target investigations and tactical responses, aiming to disrupt, prevent and reduce crime by targeting serious offenders (Carter 2009; Ratcliffe, 2008). The strategic allocation of organizational resources to target specific problems is a central tenet of ILP.

ILP builds on developments that move policing from reactive to proactive and preventative approaches to crime. It also draws upon broader trends in organizational leadership and management, using data and analysis to support decision-making and the allocation of resources (Davenport and Harris, 2007). It is consistent with problem-solving strategies based on principles of situational crime prevention (Clarke, 1995, 1997) that seek to reduce crime and victimization by focusing resources and disrupting the links between repeat offenders and victims and high-risk locations and contexts (for an application to environmental crime, see Mesko et al., 2011). Similarly, ILP uses analysis of crime patterns to understand offenders, victims, and contexts, prioritizing resources on the basis of this intelligence to prevent and reduce crime (Ratcliffe, 2008).

Although evidence indicates that problem-solving approaches that target specific crimes can reduce crime and victimization (for example, Clarke, 1995; Corsaro and McGarrell, 2010; Farrell, 2005; Mazerolle et al., 2006; Weisburd et al., 2010), there is much less research available about the degree of implementation of ILP in police agencies. There are several obstacles to implementation identified in the literature worth noting when considering adopting an ILP model. Progress in the adoption of the principles and practices of ILP has been slow, uneven, and prone to organizational resistance and

constantly shifting political and organizational priorities (Maguire, 2000; Maguire and John, 2006). In a qualitative assessment of ILP implementation in two UK police forces, Cope (2004) found confusion over the proper use of intelligence products and cultural clashes from officers resistant to the increased focus on analysis, which they felt deemphasized street-level experience and expertise. Sheptycki (2004) similarly found similar issues in a study of police intelligence systems in the UK, Canada, Holland, and Sweden. He suggested that 'organizational pathologies,' including structural factors (limited availability or compatibility of technology), cultural factors (organizational and inter-organizational subcultures), and issues with intelligence technology (for example, information overload) have limited the impact of ILP (Sheptycki, 2004).

Furthermore, ILP implementation varies across and within agencies. Some UK constabularies have effectively integrated problem solving and ILP, but competing priorities in other constabularies have undermined implementation. Competing programs may not conflict with ILP in theory, but they have often vied for attention, offered alternative performance metrics, and been perceived as competing models or paradigms at an organizational level (Maguire, 2000; Maguire and John, 2006). Thus, many of the ILP strategies developed by organizations are not implemented or only partially implemented, resulting in wasted resources and opportunities, duplication of efforts, and contradictory organizational components (Gottschalk, 2010).

There may be several important reasons for the implementation problems inherent in adopting an ILP model. Ratcliffe (2008) noted the lack of conceptual clarity surrounding ILP as well as varying priorities of different enforcement organizations. This has created challenges for facilitating effective information sharing across organizations. Carter (2009) noted that, although there has been considerable activity supporting the development of ILP (for example, the emergence of intelligence fusion centers, the development of standards, policies and procedures) there is no 'manual of practice' for ILP. Additionally, Cope (2004) documented organizational variation in acceptance of analysts and intelligence products, illustrating the difficulty of changing practices in traditionally hierarchical policing organizations. New ways of gathering and analyzing intelligence may clash with the traditional procedures (Gottschalk, 2010). These issues are likely to present themselves when implementing any policing innovation that requires organizational adaptation.

Intelligence-led policing and transnational crime

A small body of literature documents the potential for ILP in the transnational arena. Cross-border partnerships have been a cornerstone of transnational ILP efforts to date, such as with the Australian National Police (Wardlaw and Boughton, 2006) and the Canadian Royal Mounted Police (Knight, 2009). Conceptual pieces on the potential utility of ILP for addressing cross-border crimes, such as terrorism (McGarrell et al., 2007), human trafficking (Schreier, 2009), and transnational organized crime (Coyne and Bell, 2011) also provide positive assessments.

Although a promising strategy, ILP is not without potential limitations in the transnational context. In some instances, the issues are identical to those identified in ILP research on other forms of crime. When used to address cross-border crime in Switzerland,

the introduction of other initiatives in conjunction with ILP consistently threatened the sustainability of the ILP efforts (Ribaux and Birrer, 2010). An ideal ILP framework was never fully implemented, owing at least in part to these tensions (Ribaux and Birrer, 2010).

Other typical ILP implementation problems may be exacerbated in the transnational context. Differing national priorities may also produce conflict rather than cooperation (Mandel, 2011), as exemplified by strained cross-border police cooperation between Taiwan and China (Yang and Lemieux, 2010). Issues of mistrust, which are often intensified by corruption, may also impede intelligence sharing (Mandel, 2011; Schreier, 2009). In addition, the complexity of transnational crime requires even greater analytic resources and may lead to an overflow of data into intelligence management systems (Ribaux and Birrer, 2010; Sheptycki, 2004). Cooperative efforts among policing agencies using ILP protocols and systems worsen this problem (O'Connor, 2006). Finally, the 'digital divide' between developed and developing nations leads to vastly different technological capacities to collect, analyze, and disseminate intelligence (Sheptycki, 2004).

Issues with varying definitions of crime may also be more problematic for cross-border crime. Transnational criminal activity is difficult to define legally (Mandel, 2011; Passas, 2002) and specific laws and regulations governing relevant markets vary drastically across borders (Gottschalk, 2010; Trebilcock and Howse, 2005). Intelligence databases are generally organized around country-specific legal codes and regulations (Ribaux and Birrer, 2010). When the structure of intelligence databases is ambiguous and subject to varying interpretations, it is difficult for multiple agencies to analyze and interpret the information (Coyne and Bell, 2011; Sheptycki, 2004). In using ILP to address transnational crime in Switzerland, the increasing complexity of databases based on criminal codes led to analytical errors (Ribaux and Birrer, 2010).

Intelligence-led policing and transnational environmental crime

Empirical research on ILP and TEC is limited, in large part owing to a lack of ILP efforts to address this form of crime. However, discussions of ILP and TEC highlight similar implementation problems, such as the need for a significant level of resources (Wright, 2011) in the face of resource constraints (Elliott, 2012). Once again, however, some implementation problems may be exacerbated in the environmental, cross-border arena.

Political challenges, for instance, may be even greater when environmental crimes are involved, because they are often not treated with the same level of concern by all national agencies (Bierne and South, 2007; Gibbs et al., 2010). Mistrust may be greater owing to the links between corruption and TEC in developing countries that are often the victims of environmental exploitation (Critharis, 1990; Graycar and Felson, 2010; Frey, 1998; Sonak, et al., 2008; Williams, 1991). Enforceable legislation and training are also often deficient. Owing to poor data collection, existing information on TEC networks may be limited in comparison with drug cartels. Environmental enforcement agencies also lack experience in working collaboratively with researchers who could support ILP analytical efforts. This is in contrast to police–researcher partnerships that have emerged to address other types of crime (Beal and Kerlikowske, 2010; Klofas et al., 2010; Rojek et al., 2012). Additionally, even with good information, in the environmental arena procedures

for information sharing or joint efforts are often nonexistent within, much less between, countries (Elliott, 2012).

Overall, the current literature identifies some unique implementation concerns related to ILP and transnational crime. However, the literature is primarily observational and few authors have empirically examined TEC. This paper fills a gap by describing the implementation of ILP for one type of TEC: international trade in hazardous waste. Specifically, it represents a process evaluation of one such program in the UK, the EA's Securing Compliant Waste Exports Project.

Methodology

There is no single established methodology for conducting a process evaluation, but most include combining quantitative and qualitative data to describe *how* a program does or does not achieve its goals (Dehar et al., 1993; Oakley et al., 2006). Consistent with this approach, we triangulated multiple sources of data to establish the validity of our findings. Originally referred to as 'multiple operationism' (Campbell and Fiske, 1959), triangulation involves using two methodologies to assess whether findings converge (Denzin, 1978). Specifically, we utilize 'between method' triangulation by examining the comparability of quantitative and qualitative data (Jick, 1979). Our primary source of information is five qualitative interviews (ranging from one to four hours) with the entire leadership of the EA team.[1] Team members also provided hands-on demonstrations of the methodology and systems used in the intelligence cycle. The observational and interview data are supplemented with an analysis of team presentations and documents.[2] We also integrate quantitative data describing the team's intelligence process.

Findings

In the current study, we assess the implementation of ILP in an Environment Agency project on the illegal export of hazardous waste in England. The project focused explicitly, but not exclusively, on the illegal export of electronic waste (E-waste), such as computers. In the European Union, it is illegal to export hazardous materials found in waste electrical equipment to countries that do not belong to the Organisation for Economic Co-operation and Development (Klenovsek and Mesko, 2011; United States Government Accountability Office, 2008). To comply with this rule, England prohibits the export of all hazardous wastes destined for disposal and limits the export of electric and electrical equipment destined for other purposes, such as reuse (Environment Agency, 2007, 2009). We begin with a qualitative description of implementation and the current process.

Implementation and the current process

The Securing Compliant Waste Exports Project began as one of several pilot projects to address emerging environmental problems. Full development of ILP practices took approximately one year. The first step was team construction. Identifying the appropriate people was a significant challenge, because ILP is not typically practiced in environmental agencies. To address this issue, the Project Manager initially hired external people with a background in ILP to fill the positions of Intelligence Manager, Intelligence
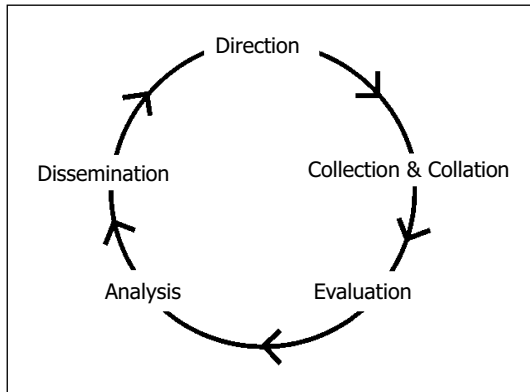
Figure 1. A graphical representation of the UK's National Intelligence Model.

Officer, Crime Analyst, two Researchers and 10 Field Intelligence Officers. Many of these new EA employees were former police officers with previous ILP experience.

The project team then implemented an intelligence cycle (see Figure 1) consistent with the NIM (National Center for Policing Excellence, 2005), resulting in a formal process for developing intelligence products. This included a strategic assessment involving an overview of crime related to the export of E-waste as well as a tactical assessment used to direct investigations. The tactical assessment focused on priority locations, subjects, crime series, and identification of preventative measures believed to hold promise for reducing or eliminating the export of E-waste. Related activities involved development of problem and target profiles. In the initial stages, the team focused on identifying sources of information related to the export of waste that could inform the strategic and tactical analyses and profiles.

To establish 'Direction' for the strategic and tactical assessment, team members targeted existing sources of data (for example, a subset of agency databases, employees with relevant expertise) to describe the current scope and nature of illegal hazardous waste exports, including the relevant participants, market trends, and the methodologies employed to export hazardous waste legally and illegally. This information allowed the team to identify and prioritize waste streams, major players, tactical responses, and points of intervention in the waste chain.

This step provided some initial direction. To reduce knowledge gaps and build a larger intelligence database, the team next identified new sources of information (described below). The team also developed standard operating procedures for issues specific to this type of crime, such as to the need to maintain health and safety standards while opening containers with potentially hazardous contents. Staff members were added to increase task specificity and productivity.

Increasing information sources allowed the team to create a process of 'Collection and Collation,' the second step of the intelligence cycle, and refine it over time. The transnational nature of the problem led the team to spend a significant amount of time establishing and developing relationships with members of the shipping sector, one of the primary sources of new information. On a monthly basis, data on exports are retrieved

from the shipping sector and collected, cleaned, and organized into a database. Other information is also gathered proactively, including data from internal EA databases (for example, on regulated waste collection or dismantling sites) and other regulatory and enforcement agencies (for example, the police, the UK Border Agency, the National Crime Agency, British Transport Police) and confidential informants in the relevant industries (for example, recycling, dismantling). Field Intelligence Officers also conduct unannounced site visits based on intelligence and submit updated intelligence logs. These are reviewed and 'actions' are assigned to field officers and researchers to fill additional intelligence gaps.

The next step, 'Evaluation,' is done using the NIM's 5x5x5 evaluation system. Team members convert information into intelligence by evaluating and coding the source and quality of the information as well as the handling/security level. Specifically, staff select from five codes to capture the reliability of each source, the reliability of the information and how the intelligence must be handled (for example, internal dissemination only, no dissemination). Senior staff members review coding decisions. Relevant data are then entered into the EA's National Intelligence System.

The fourth step in the intelligence cycle is 'Analysis.' Shipping sector data on exports are queried to describe basic patterns such as major exporters, shipment volume, and destination. In the initial period of the project, the team worked to identify typical patterns and odd entries in the data (for example, cargo descriptions are inconsistent with the operational activity undertaken at the load site) to construct potential indicators of illegal activity. In the current process, changes in typical patterns, such as shifts in the volume of exported electronics by destination country or large-volume shipments by new companies, receive additional scrutiny. Previously identified suspicious container descriptions and companies are also subject to additional analysis. When further inquiry is warranted, the shipping data queries are cross-referenced with other data sources (previously described) to fill gaps in the intelligence picture. Ideally, the movement of suspicious waste exports is tracked from cradle to grave to profile the entire network involved in a waste chain. Experiential knowledge regarding industry and market trends and participants has significantly enhanced this process over time.

The analysis is used to construct several intelligence products for step five, 'Dissemination.' A tactical assessment that identifies targets for investigation and evidence collection is produced every six weeks, including profiles and visual representations of suspected illegal waste chains and operators. Management determines the priority cases and appropriate next steps. As a regulatory agency, compliance assistance is frequently offered to lower-level issues and prosecution is reserved for larger-scale and organized illegal waste exports. A risk register of the most significant and suspicious exporters is also created each month to facilitate closer tracking. The analytic products feed back into the intelligence cycle, providing additional direction (the first step in the cycle) for the following months.

Quantifying the process

We also collected quantitative data on the intelligence cycle as a point of comparison to assess the validity of the qualitative interviews, observation, and team documents. The

data collected during peak implementation (that is, June through November 2009) converge with the qualitative assessment of implementation. During this time period, the EA team received data on containers exported in the previous month from over 25 sources in the shipping sector. These data include exports of electronics (claimed to be working) and other waste types. Shipments of electronics (approximately 5000) were extracted and reduced to roughly 2800 items that represented potential problems.

To gather further information on areas of concerns, during this same time period over 1000 actions were issued to field officers and researchers. In response, 316 site visits and 39 transport inspections were conducted and 381 pieces of research on organizations and companies involved in illegal exports were completed. As a result of these efforts, over 2000 intelligence logs (reports) were entered into the intelligence system and 239 new organizations involved in noncompliance were identified. Intelligence packages were compiled and disseminated to upper management for response.

The results

Although we did not conduct a formal outcome evaluation, we were able to collect data on agency responses to illegal exports detected through the ILP project. The EA team developed a number of 'preventative measures' during the ILP process. These included compliance letters, stop shipment notices, new investigations, and formal prosecution. Specifically, during the time period under study, 21 notices were served to either stop a shipment for inspection or return it to the exporter, 39 compliance letters (for example, letters to provide assistance and advice) were sent, and 67 investigations were initiated. At the time of the interviews, one case had been prosecuted and 17 other cases were in the queue. The initial case resulted in a £2000 (sterling) fine and £2700 fee return.

One of the goals of ILP is to target limited enforcement resources as effectively as possible and to employ a continuum of actions ranging from education to prosecution. The team reported that cases were prioritized for prosecution based on the number of organizations involved and the scale of the illegal exports to target the 'big, bad and nasty' networks. The use of multiple interventions suggests that some sort of targeting process was used, but in this instance we have no independent method to further validate case prioritization. However, the small number of responses, including court cases, does not necessarily reflect an implementation problem. We collected data relatively early in the transition to ILP; therefore, the agency had just begun to build these cases. In addition, the number of interventions represents greater activity than in the past, as the ILP project was the first systematic response to the illegal waste export problem.

Team members did express some frustration with the size of the penalty in the initial prosecution. There was some concern that penalties would be too small to create a deterrent effect. However, the team expected that future cases prosecuted in criminal court rather than magistrate's court would result in larger penalties. Additionally, in a competitive shipping market, the stop shipment orders and the fines may achieve deterrence goals. This, however, remains an open question.

This discussion reflects a problematic aspect of ILP – the challenge of measuring impacts. It is difficult to assess which interventions, prosecutions or broader, preventative measures such as compliance letters have a bigger impact on illegal exports.

Ultimately, evaluations that can measure impact over time or across jurisdictions are required to assess the impact of these preventative measures.

Overall, the qualitative and quantitative data on implementation converge to demonstrate a move from reactive to proactive, intelligence-led practices. This reflects a major shift in the EA operations and therefore displays the significance of the project. Despite the team's success at full implementation, the process was not without challenges.

Implementation challenges

Many of the implementation problems were consistent with those identified in the broader ILP literature. Time, resource, and data-processing requirements and the need for task specificity were cited as significant challenges. To avoid problems of crime analysts being drawn away from their primary analytic responsibilities (owing to an undercapacity to do investigative and administrative work) (Sheptycki, 2004), the EA project added personnel (for example, Field Intelligence Officers, Researchers) to organize data and fill intelligence gaps and also worked with other units in the EA to keep the project focused on the intelligence portion of the enforcement process. Staff frequently worked well beyond regular hours to keep pace with the workload.

Previous literature reported that resistance to new ways of thinking (Sheptycki, 2004) and friction between staff with traditional roles (for example, detective, patrol officer) and crime analysts (Cope, 2004; Sheptycki, 2004) can impede implementation. The EA team did experience some of these problems, which were context specific. For example, the Project Manager had to work diligently to establish a secure working environment, because individuals within the regulatory agency were unaccustomed to ILP and did not understand the need for information security. However, friction and resistance were not widespread, likely for several reasons. The Securing Compliant Waste Exports Project was initially implemented as a special project to tackle an emerging problem that had not previously been addressed. Initially, it did not represent an agency-wide change in practices or a shift in the method of investigating illegal waste exports. In addition, the Project Manager hired former police officers with prior ILP experience to assist with implementation as EA employees. As such, these individuals were already interested in and understood the merits of developing ILP. They seemed genuinely interested in spending their retirement (from policing) helping expand ILP practices to new areas of crime control.

Despite notable success, the EA team was later cut to approximately 20 percent of its initial size. Although this could reflect organizational resistance to change, it is more likely due to financial concerns and the regulatory context. This cut occurred during agency-wide budget reductions. In regulatory agencies, enforcement is often the first area of cutback, as enforcement is not the sole or even primary mission of administrative agencies (see, for example, Knight, 2014). In addition, the ILP program was still operating as a special project rather than a central part of EA operations. Whether ILP programs can become centralized and remain operational over time in environmental agencies remains an empirical question.

As with previous literature on ILP, EA staff did express concern with focusing on the 'wrong' problems. Previous studies report that political pressure can result in a focus on the less extensive or problematic issues (Maguire, 2000; Maguire and John, 2006). The

EA staff built in a series of checks to guard against this problem. For example, they conducted regular operational intelligence assessments to scan for and discuss other significant export problems beyond the primary project focus. A shift from the initial focus on electronic waste to include another problematic waste stream (batteries) suggests that the team's efforts were successful.

The EA team also experienced problems with constructing metrics of success for ILP. As in prior studies (Sheptycki, 2004), 'bean counting' the number of intelligence logs resulted in an increase in low-quality intelligence logs that represented noise more than valuable information. At the time of the interviews, the project leader was searching for alternative measures for staff evaluation. Implementing ILP in a regulatory agency produced other challenges as well. For example, the EA does not use highly sensitive sources (for example, covert human intelligence sources) owing to safety concerns. Other regulatory agencies may have similar restrictions because they lack mechanisms to protect sources. In addition, the Project Manager had to hire individuals with ILP expertise to initiate the project. These individuals, mostly former police officers, needed training on environmental crime.

The team was largely able to overcome these challenges to implementation on a national level. The most significant issues, however, were encountered in attempting to move from a national to an international effort. In conjunction with the INTERPOL Environmental Crime Working Group, the EA team provided leadership for a newly formed INTERPOL Global E-Waste Crime Group, created to increase information sharing and collaboration between countries that export or import illegal hazardous waste. Several obstacles proved insurmountable (to date). For example, other countries had not instituted ILP practices and did not have existing capacity to develop intelligence on illegal hazardous waste prior to the creation of the group. Thus, minimal information was available. When information was available, INTERPOL's National Central Bureaus (NCBs) provided a system to exchange it. However, some NCBs did not have preexisting relationships with the environmental agencies in their country. In some instances, NCBs explicitly refused to forward information to environmental agencies that had regulatory, but not criminal, jurisdiction. In other developing countries, environmental organizations lacked virtual communication systems. As such, information did not always reach its destination.

When information exchange was successful, the group was presented with an additional set of problems. Some developing countries did not have secure data storage infrastructure. Training and resources necessary to respond to intelligence requests were also frequently absent. When illegal imports were discovered, some countries lacked adequate legislation to prosecute. Finally, plans for a central analytic team to process information from multiple countries did not come to fruition owing to a lack of funding.

Discussion

In sum, the EA team was able to fully implement ILP. Team members overcame many of the common obstacles to achieve practices consistent with the NIM, including procedures for Direction, Collection and Collation, Evaluation, Analysis, and Dissemination of intelligence. As such, our work indicates that administrative and enforcement data can

be combined to generate actionable intelligence. Specifically, linking regulatory and enforcement information to develop risk registers that could then guide additional intelligence gathering and direct limited investigation resources demonstrates that it is *possible* to implement ILP to address TEC on a national level.

Despite these promising findings, the current study has limitations. Although we used a stronger form of this methodology (that is, 'between method'), triangulation lacks clear guidelines regarding when the overlap between various forms of data indicates convergence (Jick, 1979). In the present analysis, however, we did not uncover any areas in which validation was questionable. The quantitative data, observations, briefings, and document analysis strongly supported the interview responses regarding the degree of implementation. Sample size represents the larger limitation of this work. Namely, our analysis is limited to one ILP project in one agency.

The process evaluation also provides limited assessment of the impact of this ILP approach. The findings strike us as promising in that the EA's preventative measures appeared to be built on the insights of theory advocating a regulatory or punishment pyramid approach (Ayers and Braithwaite, 1992; Braithwaite, 2002; Gunningham and Grabosky, 1998). Specifically, the EA team used approaches ranging from compliance letters, to stop shipment orders, to criminal prosecution. However, this study does not address how potential offenders perceived and responded to these measures or the ultimate impact on levels of export of E-waste. Such assessment would require comparative data gathered over time or across jurisdictions, which is very difficult to do in the context of environmental crime. The global nature of this form of crime further contributes to the research challenge.

Additionally, several features of this context may reduce the generalizability of our results. The team was given a significant level of resources to initiate the project. As Darroch and Mazerolle (2013) found, such high-level commitment is critical for the successful implementation of ILP. Enforceable legislation with easily verifiable requirements was already in place when the EA project began. The EA also had the authority to act on the criminal provisions available under environmental law. As such, they were able to access the UK's national intelligence system and adapt it for use in the current project. In addition, given the geography of England, obtaining shipping data was manageable and provided excellent coverage of potential illegal exports. Finally, the EA team comprised a small group of highly committed individuals who collectively brought environmental regulatory, criminal enforcement, and national criminal intelligence experience to this project. This confluence of commitment and experience among the core personnel is likely critical for meaningful implementation of ILP (for ILP generally, see Darroch and Mazerolle, 2013). Yet few environmental regulatory agencies are likely to have such combinations of personal commitment and relevant experience. These circumstances likely increased their ability to overcome typical implementation problems.

Significant questions also remain regarding implementation at the international level. Although not the primary focus of our work, concerns about international efforts expressed in prior literature (for example, Elliott, 2012) seem to be warranted. Variation in legislation and training by country created a significant roadblock in attempts to expand ILP practices in collaboration with INTERPOL. In addition, the digital divide (Sheptycki, 2004) between exporting and importing countries was difficult to overcome.

The experience also highlighted some implementation problems unique to environmental agencies, such as the refusal of some police organizations to share intelligence with regulatory agencies. Finally, the group was unable to secure funding to further expand their efforts, an issue likely to be a constant struggle in the environmental arena.

Overall, this work poses a number of questions for future research before any overarching conclusions can be drawn. First, in what circumstances can ILP be successfully implemented and maintained in a regulatory agency? Although the EA team was able to achieve full implementation, future research will need to consider organizational resistance and privacy concerns about the sharing of intelligence with regulatory officials experienced in the INTERPOL project if this type of approach is to be successful in addressing environmental risks. Future efforts should also examine the allocation of resources to ILP implementation in regulatory agencies. The EA Project Manager was able to hire individuals with ILP experience, but inexperience and organizational resistance may pose a larger threat to other ILP efforts if required to draw upon existing staff. In addition, the EA team was reduced in size during budgetary cutbacks. Competition for funding may be especially fierce in environmental agencies because of competing missions and limited resources (Knight, 2014). In addition, obtaining and maintaining buy-in from upper-level management may be more difficult in environmental agencies because they are not solely focused on crime control. They rely primarily on cooperative strategies to achieve compliance (Pink, 2013). In addition, regulatory agencies may experience political pressure to avoid placing undue burdens on businesses (Knight, 2014).

Future research should also examine the implementation of ILP to address other forms of environmental crime. TEC and other forms of environmental crime have some similarities, such as the difficulty of distinguishing illegal from legal goods (for example, an illegally vs. legally taken deer) and regulatory agency emphasis on cooperative strategies for compliance. Thus, ILP programs may have the same potential for addressing environmental crimes that occur in one jurisdiction. However, TEC may also have some unique characteristics that increase the success of the ILP efforts. In England, hazardous waste was collected at permitted facilities and primarily exported via ports and shipping lines, reducing the number of points for intervention in the supply chain to a manageable number. Other actors in the supply chain (for example, shipping lines) also provided a significant amount of data to be analyzed for intelligence purposes. This may not be the case with other forms of environmental crime, even those occurring in a single jurisdiction. Illegal hunting, for example, may occur at areas dispersed across an entire country without a narrowed point for intervention, reducing opportunities to collect data for analysis. Thus, the utility of ILP for environmental crime more generally remains an empirical question.

To address these questions of generalizability, future research should examine the application of ILP to TEC in other contexts. Can ILP be implemented as fully in other regulatory agencies? What if the team has fewer resources? Will a lack of national infrastructure for these methods reduce implementation success in other countries? Will intelligence on other forms of TEC be accessible? Additional process evaluations will increase understanding of implementation challenges and solutions and therefore of the viability of ILP for addressing TEC.

The inclusion of researchers in efforts to implement ILP internationally will also be important, because cross-border collaboration will likely be needed to maximize outcomes in the TEC arena. The involvement of researchers as partners with law enforcement reflects a 'governance framework' whereby the research partnership brings knowledge and skills to assist public institutions (Rojek et al., 2012). This may be particularly valuable in the environmental arena, which historically relies on limited enforcement resources. In addition to a process evaluation of the INTERPOL Global E-waste Crime Group (if resources for implementation can be obtained), examining intelligence sharing between two or three countries would also provide important insights regarding ILP and TEC. Given the legal basis for EU coordination and cooperation (Mesko and Furman, 2014), it may be useful to attempt to establish cross-border ILP in a few European countries. Process evaluation is an important assessment tool, but understanding the impact of interventions is also essential. To fully understand the viability of this policing technique, future work should also assess whether ILP reduces TEC.

Conclusion

Crime increasingly occurs across borders, including TECs that impact human health and the natural environment. Despite these global risks to human health and the environment, TEC enforcement resources are very limited (White, 2008). As in the case with international transport of E-waste, officials face the proverbial 'needle-in-the-haystack' challenge. Innovative intervention strategies will be required to disrupt these complex transactions. The current study indicates that ILP, using data and intelligence to drive risk-based investigation and enforcement, may be one viable intervention method.

Understanding ILP implementation obstacles is an important step toward assessing this intervention strategy. In the current study, we focused on one special project designed to reduce one form of TEC. Future research should examine the ability of regulatory agencies to implement ILP in other contexts and to address other forms of environmental (including transnational) crime. Outcome evaluations are also needed. Ultimately, this additional research will shape our understanding of the viability of ILP in the transnational environmental arena.

Notes

1. Owing to the small sample size, direct quotes are not used in the following analysis to protect the anonymity of the respondents.

2.   We were able to attend briefings provided by the EA team to INTERPOL's Environmental Crime Committee at different stages of the EA ILP program. Additionally, we attended briefings for US university students visiting the UK on a study program focused on environmental crime.

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