Problem Analysis
for Wildlife Protection in 55 Steps

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2022

Center for
Problem-Oriented
Policing

nscr

PANTHERA

Nagaland Wildlife and Biodiversity Conservation Trust

Amur falcons dangle from fishing nets over Doyang Reservoir in Nagaland, NE India. Each year amur falcons migrating to Africa congregate at the reservoir to feed before travelling on. Hunters from local villagers trapped roosting falcons using fishing nets, to sell them as cheap meat, with over 120,000 falcons estimated killed in 2012 alone. A diverse coalition of problem solvers developed a response. Church leaders promoted messages that falcon consumption was against Christian beliefs, Nagaland Forest Department officers seized nets and posted guards around Doyang reservoir; initiatives supported hunters transitioning into tourist guides and falcon protection teams. Meanwhile, eco clubs were established, encouraging a culture of pride in the falcon as an icon of the communities. The response was extremely successful and falcon trapping dropped to zero in 2013 and subsequent years.

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Rangers prepare their vessel before setting out on a patrol in Australia's Great Barrier Reef Marine Park. Analysis of illegal fishing in no-take marine reserves found it was highly concentrated in a small number of areas, seasonal, and limited to periods of favorable sea conditions. Defining the opportunity structure for illegal fishing allowed the analysis team to develop predictive risk maps which are used by Rangers to help plan patrols and improve the effectiveness of enforcement resources.

Illegal fishing and compliance management in marine protected areas: a situational approach | Weekers, Petrossian & Thiault (2021)

About this Manual

This manual is an adaptation of Ronald Clarke and John Eck's Crime Analysis for Problem Solvers in 60 Small Steps. They first published the manual in 2003 under the title, *Become a Problem Solving Crime Analyst in 55 Small Steps*, and over the years it has become a well-known and influential piece of work in both practice and academia. Clarke and Eck wrote the manual to support analysts working in police departments, seeing these individuals as a crucial element for identifying more efficient and effective ways to use limited police resources. Most importantly, they wanted to highlight the value in breaking crime down into specific problems, to find solutions beyond arrest and incapacitation. We ourselves were trained with their manual and have used it in our own educational programs for university students, civil society organizations, and law enforcement practitioners alike. Their manual was written to fill a specific need in policing, best captured by Herman Goldstein in his foreword of the 2016 edition.

Their manual was written to fill a specific need in policing, best captured by Herman Goldstein in his foreword of the 2016 edition (see text box).

Clarke and Eck's manual was an attempt to help analysts improve their understanding of focused problem solving, but also gave them guidance on their role within police organizations. We have written this adaptation of their original manual because we feel wildlife protection agencies, and the organizations supporting them, are facing a similar challenge. Analysts are relatively rare in wildlife protection; most analytic capacity is found within the biological monitoring division of an organization, not the law enforcement units. Moreover, when analysts are present, Goldstein's description of their work is shockingly similar.

> While the POP Center has documented hundreds of successful cases in problem oriented policing, a major impediment to advancing the concept has been the absence of an analytical capacity within police agencies. Many police agencies do employ one or more crime analysts, but some of the largest and more advanced police organizations do not. When employed, the job of the crime analyst is often narrowly limited to tabulating crimes that occur. In other cases, it extends to identifying patterns of crimes with the primary objective of identifying the likely offender so that he or she can be apprehended. In its more ambitious form, the crime analyst's job may include identifying factors contributing to a crime pattern—but the job of deciding how to respond to these factors is usually deferred to operational personnel, who then tend to use traditional means for dealing with them.
>
> **- Herman Goldstein**

Our intention in writing this manual is to make the emerging field of problem analysis for wildlife protection grow more quickly. Like Clarke and Eck, we see problem analysts as a fundamental part of organizations that want to develop holistic solutions and create reliable evidence about 'what works'. We also see the need for more guidance and understanding on what analysts should do and how they fit into the structure and operations of an organization.

Our publication strategy is to make this a living document capable of capturing new examples of evidence and practice as they become available. For more information about providing content and feedback on the manual see Step 55 - Use Feedback to Improve Your Work.

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Abishek Harihar, Panthera

Ryan Scott, Panthera

It takes a team to solve a problem. A diverse team, with members from different agencies and organizations, increases the overall understanding of the problem, and provides a wider range of options for prevention.

SECTION 1 | CHOOSE TO BE A PROBLEM SOLVER

The manager of a protection team examines response options prepared by the analyst during a strategic planning workshop in Thailand. The relationship between analyst and manager is pivotal to strong problem solving, and often a weak point in decision-making cycles. The analyst aims to support her manager to make optimal decisions by clearly explaining the situation and identifying options. In return, the manager makes tactical and resourcing decisions and directs the analyst's future work by asking questions and requesting additional analyses.

Step 1
Read this first

This manual is written for anyone interested in analyzing wildlife protection problems. You might be an analyst working for the forest department, a manager tasked with developing strategy, or a donor thinking about where best to invest resources. No matter how you analyze problems, you see value in the analysis process and want to do it better.

To help you think differently about problem analysis, we ask you to put yourself in an analyst's shoes. Pretend you have been hired as an analyst and are now expected to help inform strategy and operations. For the analysts reading this…just be yourself.

The 55 steps in this manual walk you through the analysis process, giving guidance on how to think about problems, conduct research, and ultimately make recommendations for prevention strategies. They highlight how analysts fit within the structure of an organization, but also how you, the analyst, can help yourself become part of the team.

The steps are concise summaries of topics and concepts that can be used to guide focused problem solving. We recognize that our list of topics will never be complete, but we have done our best to highlight foundational concepts.

You are not expected to digest or use the entire manual. Nor is this a 'how to' manual. Rather, it is designed to trigger critical thinking regarding the content and structure of your work. Concepts will be introduced, but it will be up to you to continually consider how they apply to your context. Examples will not be exhaustive, and we challenge you to think of similar examples in your area.

WE FINALLY GOT AN ANALYST!
HOORAY!
WHAT DO THEY DO?
I DON'T KNOW…MAKE GRAPHS AND WRITE REPORTS?

Section 1
Choose to be a Problem Solver
Steps 1-5

Section 2
Make Analysis Operationally Relevant
Steps 6-12

Section 3
Think about your Problem from Multiple Angles
Steps 13-25

Section 4
Nominate, Plan and Deploy your Response
Steps 26-42

Section 5
Determine What Works, What Fails and Why
Steps 43-50

Section 6
Tell People What Happened
Steps 51-55

We hope this manual will help you learn more about the basics of analysis, how it fits into operations, and how analysts can help design holistic responses and measure their impact.

That's it for Step 1…not so bad right?

Who is this manual for…	
National wildlife authorities	Officers, analysts, and decision makers in these organizations will learn how analysis can be used to help plan and monitor prevention programs.
Other government agencies	Agencies with a wildlife protection mandate will learn how their organization can analyze problems and work with other agencies to address problems along the trade chain.
Civil society organizations	Conservation NGOs and organizations supporting wildlife protection will learn how analysts can be used to identify holistic solutions that engage civil society.
Donors	Donors will learn why analysts play a crucial role in organizations and how monitoring and evaluation can be used to build evidence about 'what works'.
General readers	Readers generally interested in wildlife protection will learn what analysts do within an organization and how law enforcement can solve problems differently.

Topics covered in this manual…	
The role and responsibilities of analysts	Analysts are a relatively new addition to many law enforcement organizations. This manual gives guidance on how analysts can be integrated to help decision makers.
Using analysis for strategic decision making	Analysts play a crucial role in developing strategy. This manual describes how decision makers can use analysts to develop proactive strategies.
Project planning and monitoring	Measuring the impact of interventions is critical for determining what works. This manual describes how analysts can break apart problems and monitor change.

Topics not covered in this manual…	
How to use analysis software.	Analysts will be expected to use a variety of software depending on their role and responsibility. This manual does not give technical advice on how to use software.
The use of analysis for investigations.	Analysts often support officers working on active investigations. This manual does not cover how analysts can help build cases against suspects or provide leads.
How to conduct specific types of analysis.	Analysts will use a variety of analysis techniques to turn raw data into a meaningful finding or recommendation. This manual does not cover how to conduct specific analysis.

Step 2
Get to know POP & SARA

As an analyst, it's important to know how to analyze data…that is pretty clear. However, as an analyst working to solve wildlife protection problems, how your skills can be used to support and improve operations is probably much less clear. You want to influence decision makers but analysis has not historically been a part of strategy development… data is for reporting… experience guide operations.

To maximize your effectiveness as an analyst, your organization should work to remove barriers between analysis and operations and embrace a structured approach towards the collection, use and dissemination of information; see Steps 6—12.

You will also need to know how analysis fits into different protection strategies. Reactive strategies tend to focus on responding to incidents, meaning analysis does not play a large role. Proactive strategies on the other hand, usually require analysis because organizations are trying to prevent crime, not respond to it.

In the absence of Minority Report precogs, crime monitoring and 'prediction' will be left to analysts like yourself. If your organization's strategy is reactive, you'll likely be managing a database and writing reports. If it is more proactive, you should be providing managers and operators with analytic products that not only help them monitor problems, but also suggest new interventions or adaptations to the ongoing strategy.

It's very likely that you are working for, or support, a local or national government agency that has the legal mandate to protect wildlife and wilderness areas. When law enforcement is an option, or seen as the only option, you should familiarize yourself with 'what works' in policing; also known as the evidence-based policing movement. While wildlife protection and public safety are two different beasts, they both can be seen as 'wicked problems' that require innovative thinking to solve.

The George Mason Center for Evidence-Based Crime Policy reviews scientific research on different crime policies, including a specific program on evidence-based policing. When it comes to crime reduction led by law enforcement agencies, the evidence is clear, strategies that work are tend to be proactive and focused on specific problems, places, and individuals.

EVIDENCE-BASED POLICING

WHAT WORKS?

For reducing crime and disorder
- Hot spots policing
- Problem-oriented policing
- Focused deterrence strategies

For reducing gun violence
- Directed patrol for gun violence

WHAT DOESN'T WORK?

For reducing crime and improving efficiency
- 'Standard model' policing tactics (random preventative patrol, rapid response to 911 calls, general increases in arrests)

WHAT'S PROMISING?

For reducing property crime
- CCTV

WHAT DO WE NEED TO KNOW MORE ABOUT?

For reducing serious crime
- Broken windows policing

For reducing crime
- Increasing department size

For clearing cases and reducing crime
- Investigations by detectives

For reducing crime and improving efficiency
- Police technology (ShotSpotter, drones, license plate readers)

Adapted from
What Works in Policing? | Center for Evidence-Based Crime Policy (n.d.)

Policing strategies that work, i.e., hot spots policing, problem-oriented policing (POP), focused deterrence strategies, and directed patrol for gun violence, all share one thing in common… they require analysis.

Policing strategies that do not work, i.e., random preventative patrol, rapid response to calls for service, and general increases in arrests also share one thing in common… analysis is not necessarily required.

This manual uses problem-oriented policing (POP), as a foundation for how analysts working in wildlife protection might structure their thinking about problems. In Section 4 of this manual, we will discuss how other effective strategies, such as targeted interventions or focused deterrence, can be used with a problem-oriented approach or vice versa (see Steps 26-42).

POP is led by the SARA process; scanning—analysis—response—assessment. SARA is a general framework for problem solving. It has been used to successfully reduce a variety of crime and disorder problems in different contexts.

As an analyst it is important that you understand how POP and SARA have been used to address crime and public safety issues in the past. While these may not be the same as the problems you deal with, do not underestimate the value of these case studies on problem solving. These are useful for thinking about how to measure impact, create control groups, and diversify information collected about a problem.

SCANNING
Identify and prioritise problems. Choose one specific problem.

ANALYSIS
Collect and analyze information to determine what drives and facilitates the problem.

ASSESSMENT
Determine the impact of your response and share lessons learned.

RESPONSE
Implement resonse that reduces drivers and facilitator of problem. Use partnerships to diverity response options.

For examples of focused problem solving and crime prevention by law enforcement agencies see:
- Herman Goldstein Awards
- Situational Crime Prevention Database

POP is a highly proactive policing strategy that requires law enforcement agencies to think differently and build partnerships. Prevention is a core theme of the strategy, which often requires law enforcement giving control or responsibility to another agency or partner better equipped deal with the root cause of a problem.

POP has been shown to achieve an average reduction of 34% when applied to specific crime and disorder problems. POP can be run alongside ongoing operations, and usually involves re-tasking staff rather than hiring new personnel.

READ MORE
Problem-Oriented Wildlife Protection | Lemieux & Pickles (2020).

This guide gives a more in-depth explanation of how to start a problem-oriented wildlife protection project. It highlights 4 case studies of focused problem solving that show how the approach can reduce wildlife crime or compliance issues.

Translations available in Bahasa Indonesia, Bahasa Malaysia, French, Thai, & Spanish

Step 3
Let SARA guide you

Problem solving is a regular part of life at home and on the job. In both cases, you identify a problem, formulate a solution, and determine if your solution effectively addressed the problem at hand. From a wildlife protection perspective, using a structured approach to problem solving will help your organization identify and prioritize problems, study them carefully, and monitor the solution.

Drawing from their experience with problem-oriented policing projects in the United States, John Eck and Bill Spelmen, used the acronym SARA to describe the problem-solving process used by various departments:

- Scanning
- Analysis
- Response
- Assessment

Each stage represents a distinct aspect of problem solving, but the four stages are interconnected and inform one another; as shown in the figure in Step 2.

Applying the SARA process helps organizations address problems through a sequential framework to avoid developing solutions before the true nature of a problem is understood. It also emphasizes the need for a properly designed assessment to monitor solutions (see Section 5).

The SARA process is not linear, recognizing the reality that after new information has been obtained, it may be necessary for organizations to return to earlier stages and readjust their strategy.

SCANNING

This phase is used to identify and prioritize problems. Here, you and the team will consider which problems are causing the most harm, and if there are specific locations you should focus on. You might do this by analyzing the data you have to determine historical trends and concentrations. If multiple problems are identified, it will be necessary to prioritize them, and eventually choose one to be analyzed.

You will also start to break larger problem categories, such as 'poaching', into more focused and specific individual problems. Ideally a problem will be crime-, time-, and place-specific: for example, 'nightly snare hunting during festive season in region A'; see Step 5—Start scanning for problems.

ANALYSIS

After choosing a problem to solve, the next step is to analyze it in as much detail as possible. Considerations include spatial/temporal patterns, offender profiles, the modus operandi of offenders, offender motivation, and current strategies being used to address the problem (see Step 8 - Make an information collection plan).

During the analysis phase, it is likely you will identify several information gaps in your understanding of the problem. Filling these gaps will require collecting additional data as part of the routine operations of your organization and/or obtaining relevant information from other organizations.

Your analysis should also include the identification of potential partners who would be useful in the design and implementation of any response.

During your analysis do not overlook the value in qualitative information such as interviews with community members and/or offenders, debriefs with patrol teams, and photo/video documentation of crime scenes. Also, do not forget to tap into the wealth of knowledge patrollers have about specific problems. The input and opinions of people from the front line will not only help you understand the problem better, it also helps you think about the feasibility of response options.

RESPONSE

During the response phase, it is time to use the output of your analysis to design a tailored intervention. Remember that problem solving should be seen as a flexible process whereby you look at a wide variety of options, including those that go beyond increasing enforcement efforts.

The purpose of this phase is to select the right tool for the job, rather than a standard response such as more patrols, more arrests, and more prosecutions. Remembering that crime is both a function of criminal motivation and opportunities for offending, you may discover that reducing opportunities for crime makes more sense than targeting offender behavior, which is often difficult to change or outside the remit of your organization.

QUICK NOTE ON SARA AND CONSERVATION STANDARDS

SARA is a type of adaptive management cycle that integrates well with other cycles such as Conservation Standards. Each has a slightly different emphasis, but all share the principle of using evidence to guide decision-making.

For a more detailed overview of Conservation Standards visit:
www.conservationstandards.org

Finally, an important part of the response phase is designing measures that will help you monitor the problem before and after you implement your response.

ASSESSMENT

The assessment phase will help you determine if your response had the desired effect. Did the problem go away? Are there signs of displacement? Is the response sustainable?

If possible, using a control area for comparison to your treatment area helps measure effectiveness (Step 47). For example, it will be nice to know that the problem went away in your treatment area but did not change in the control area. This ensures you are not claiming success when the problem may have disappeared or simply changed for another reason.

Pre- and post-intervention measurements of the right metrics are useful for the same reason. You can for example, determine how perceptions of criminal opportunity or law enforcement in the community change over time, because of a new patrolling strategy.

Step 4
Form a problem-solving team

To do focused problem-solving, you are going to need a team. This may start as a small collection of staff within your organization, but it can also include external partners depending on the problem. No matter the structure, Ratcliffe's 3is model is a clear way to see the how analysts fit into these teams.

As a wildlife protection analyst, the criminal or non-compliant environment you will be interpreting might be a protected area where wildlife is being harvested, a border crossing where contraband is smuggled, or the local market where wildlife products are traded.

The decision makers you are trying to influence might be park directors, patrol planners, and even enforcement officers themselves such as border guards or rangers.

Your goal as an analyst is to help these individuals make a positive impact on the problem at hand.

What should your problem-solving team look like? That depends on your problem. Ask yourself the questions below and try to build a team that includes some of these people.

- Who is impacted by the problem?
- Who is expected to solve the problem?
- Who is currently trying to solve the problem?
- Who collects data about the problem?
- Who wants to solve the problem?

For example, with a bushmeat hunting problem you may want to build a team that links security, education, biological monitoring, with community and livelihoods.

Building a collaborative team like the one above would not only diversify the information you are able to collect about the bushmeat problem… it will also diversify your response options. Moreover, if this is an internal team across different divisions of your organization, you avoid 'reinventing the wheel' and duplicating data collection efforts.

Team creation is not the job of an analyst, but the analyst can recommend which individuals or divisions would make good team members for a specific problem.

Teamwork will be crucial for problem-solving. As the analyst, you will need to build trust with those who provide information, but also those that use it. Consider these guidelines to help foster a collaborative environment.

Jerry Ratcliffe's Model for Intelligence-Led Policing

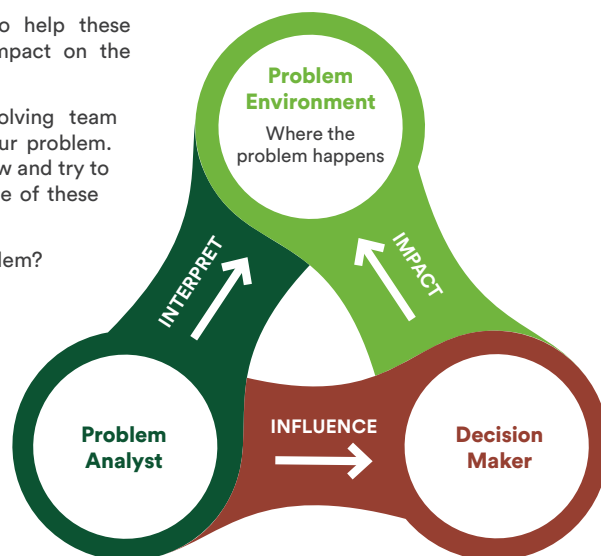- **Have a shared sense of mission.** When everyone on the team shares a mission to work towards the same goals this will overcome many difficulties. It is very easy to slide into individual projects and develop tunnel vision while you focus on the detail of your own work. When that happens, you lose sight of the bigger picture. Similarly, a shared mission is the one thing that reliably helps people come together to overcomes personal differences.

- **Have clarity of what each person does.** When there is no clarity over who does what, and what each person is responsible for, it can cause competitiveness to develop, overlap of duties, or just tunnel vision due to the assumption that it is 'someone else's' business. The worry here is that people will miss information that is crucial to their role. This can be avoided through regular chats and a written down list of duties for each person. Be aware of what information lies where, and who to speak with to access it. Make sure to talk to each other a lot.

- **Make an environment conducive to problem solving.** Make sure people on the team have the authority to make decisions on their own. An empowered team will function more effectively than one that must continually ask for permission. Rule of thumb, if an outsider needs to approve many problem-solving activities, that person should probably be on the team.

- **Create space for regular sharing of awareness.** Do you have some important information that could assist your team member to overcome a roadblock? Are you looking for information yourself? Creating time for regular, but informal catch up with team members helps overcome these barriers faster. Update each other on your work and information needs to find commonalities that would otherwise be missed.

- **Joint work.** Clear joint projects foster collaboration. Creating a weekly patrol planning meeting between the analysis team and patrol specialist ensures information sharing between these roles. It helps ensure everybody's voice is heard.

READ MORE

Intelligence-led Policing | Ratcliffe (2016)

One Mission: How leaders build a team of teams | Fussell (2017)
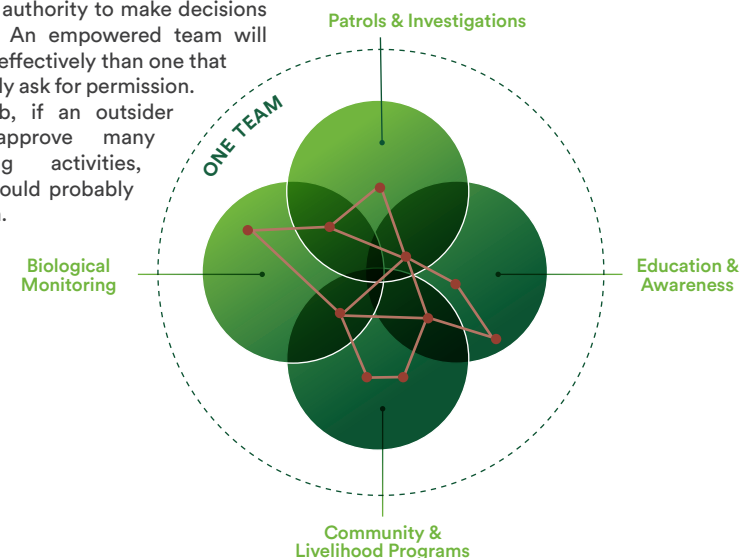
Step 5
Start by scanning for problems

The SARA process begins with scanning. This is a critical phase where you and the problem-solving team will determine what problems are out there, and which ones are the most important. It is well known that there are many different threats to wildlife and wilderness. Your job is to make of list of the most important problems and choose one to focus on (see Step 7 - Support your organization's strategic priorities).

For focused problem-solving to work, you will need to get specific. Take for example the problem of illegal hippo killing along the shores of Lake Edward in Uganda and the Democratic Republic of Congo. The umbrella term 'hippo poaching' overlooks the diverse motives driving this behavior, including:

- Killing hippos for cheap protein,
- Killing hippos to use their meat for cultural beliefs related to fertility,
- Killing hippos to sell the meat commercially to supplement income.

Moreover, these problems can be further refined by adding the different type of actors involved, such as;

- Residents living in the area,
- Non-residents travelling to the area,
- Armed groups operating in the area.

From a problem-solving perspective, you will need to start treating these as separate problems in your scanning phase. For example, even if all hunters are killing hippos to supplement income, hunting by armed groups to raise cash for their members and operations is different than local hunters doing the same thing.

Specific problems are easier to solve and measure.

For example, the solution to supplementing income for local hunters who are hunting because of poor harvests, would be very different than doing the same for armed groups looking to raise quick money throughout the year.

DEFINING PROBLEMS

> A problem description should be, when possible, behavior-, time-, and place-specific

> *Unfocused problem description*
> **Killing of hippos along the shores of Lake Edward**

> *More focused problem description*
> **Killing of hippos along the shores of Lake Edward near Communities A, B, & C**

> *Focused problem description*
> **Killing of hippos on the shores of Lake Edward, at night, by armed groups, near communities A, B & C, using guns, for commercial sale of meat**

As you start to make a list of specific problems, the next step will be to prioritize them. You will not be able to solve every problem at once, so it is important to choose the most pressing or relevant problem.

Reasons that you might prioritize one problem over another are:

- Senior management has indicated the problem is a top priority…regardless of what you think.
- A vote for the 'Top 5' most important problems amongst the team shows one problem is clearly more important than the others.

- Public outcry over a recent event has becoming a 'tipping point' to deal with a persistent problem.
- Biological monitoring data shows a dangerous collapse of a wildlife population linked to the problem.
- The problem is seen as the root cause, or a key facilitator, of many other problems in the landscape.
- The problem is a new or emerging issue and you want to take care of it early before it takes root.

The CHEERS test is a good way to double check that the problem you have selected is suitable for focused problem-solving. This checklist helps you determine if there is sufficient harm and expectation for you to focus on the problem, but also that the problem is a collection of recurring and related incidents. Remember you are trying to be proactive, which means you want to focus on problems that are still happening to prevent future incidents.

If your problem does not meet all of the CHEERS elements, you should probably pick a different one. This is especially true when there is no expectation for you to solve the problem. If people do not expect you to solve the problem, it will be even more difficult to make progress. The example below shows how a wildlife protection problem can intersect with tangible harm to a human community.

Hypothetical application of CHEERS test to hippo poaching on Lake Edward*		
CHEERS Element	**Explanation**	**Illegal Killing of Hippos**
C Community	Members of the public, civil society organizations, businesses, government agencies, and/or wildlife are harmed by the problem.	The hippo population is the non-human community harmed. The lakeshore fishermen are the human community harmed by the decline of hippos.
H Harmful	The harm directly affects people, wildlife or institutions, causing damage, injury, undue stress, or death.	Illegal killings are causing the hippo population to decline. Hippos are a key species for the fisheries ecosystem. As hippos decline, fish stocks reduce, causing financial harm to the local fishing community.
E Expectation	There is an expectation from some members of the community that the wildlife authority should help solve the problem.	Local conservationists worry the hippo population is declining too rapidly. The local fisherman collective is concerned too much hunting may negatively impact the fish stocks. Both look to your wildlife agency for solutions.
E Events	The problem is made up of specific events that can be described and documented.	Hippo carcasses have been observed and documented by patrol teams. Reports of shots fired are also recorded in the areas where carcasses are found. Hippo meat is regularly found for sale in local markets.
R Recurring	The events happen more than once. They can be chronic, recurring for years, or acute, a new, emerging problem.	Hippo killings are a chronic problem that has been happening for many years.
S Similarity	The events are linked by when and where they happen, who gets victimized, the offenders and groups involved, or the modus operandi.	Hippo killings are linked by the area where carcasses are found, the time of day when gunshots are heard, and quick transport of meat to local markets.

Note: This is a hypothetical example for instructional purposes only.

SECTION 2 | MAKE ANALYSIS OPERATIONALLY RELEVANT

A warthog carcass is smoked for bushmeat on a rack in a protected area in Zambia. Bushmeat poaching problems occur across the world and differ substantially in terms of the nature of demand. In this case, the amount of meat being processed suggests a commercial venture. Smoking sites like this require poachers to be fixed in one location for multiple days, offering targets for patrol teams to increase the certainty of detection and arrest. Asking questions about where the bushmeat markets are, and why consumers buy it, will inform your options for reducing it. Is the bushmeat just the cheapest protein offered and could be replaced by an alternative? Or is it a luxury product consumed by elites and thus requires a different approach? Are there distinct places of sale that can be controlled, and can health authorities be engaged to assist in reducing availability as a disease-prevention measure?

The team leader briefs his team on the day's patrol plan. Using the latest results from the analyst to inform his decision, the leader decides which area they will patrol to counter a priority poaching problem, and what tactics to use. The analyst works closely with the patrol leader and follows the team on certain patrols to ensure his work is directly relevant to the patrol leader's requirement.

Step 6
Embrace the analysis process

The first A in SARA, analysis, is a critical component of problem solving and the focus of this manual. Analysis is not simply about developing reports for managers. It should be viewed as a process that aims to increase knowledge about wildlife crime problems to help inform, and hopefully improve, decision making at all levels.

Think of analysis as an iterative process, or a series of steps needed to complete your problem-solving tasks:

1. Find projects that support your organizations priorities
2. Design an information collection plan
3. Develop a data management framework
4. Analyze your information
5. Communicate your results

Embracing the analysis process will provide structure to your wildlife crime projects and ensure that these align with the priorities and needs set out by your organization. It will help you be responsive to questions that matter most to your organization's strategic decisions.

Use the analysis process to guide your research agenda and the collection of relevant data and information. How these data and information are brought together and integrated will directly impact the types of analysis that can be undertaken and ultimately the influence of your work on management decisions.

The diagram on the next page provides an example of the analysis process and how it might align with a management decision cycle in a protected area setting. Derived from the Intelligence Cycle, the same process can also be applied to non-protected area settings such as airports, national road networks, and urban areas; these too are governed by laws and protected by agencies with their own mandate and strategy.

> *Your analysis arms decision-makers with the understanding they need to manage wildlife crime problems more effectively.*

To be a successful wildlife crime analyst, you will need to align your work program with the needs of your organization. Remember that the analysis process exists for one purpose only – **to answer the questions asked by managers so that they can make better informed decisions.**

WHO ARE DECISION MAKERS?

Every person in your organization needs to make decisions which means everyone is a decision-maker. As a wildlife protection analyst, you need to identify who your relevant decision-makers are – these are the people and groups that you are seeking to influence with your analysis work. They could be rangers, patrol leaders or senior managers. Each decision-maker will have unique needs. Identifying and addressing these needs is a key part of your role.
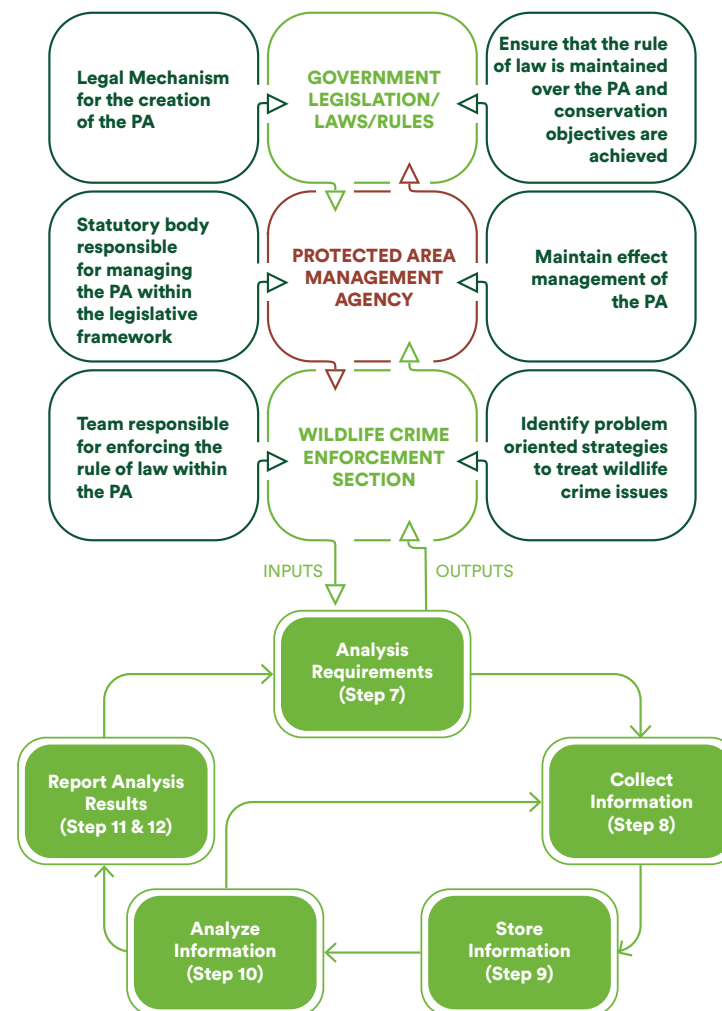
READ MORE

Law Enforcement Intelligence: A Guide for State, Local, and Tribal Law Enforcement Agencies | Carter (2009)

OSCE Guidebook: Intelligence-Led Policing | Organization for Security and Co-operation in Europe (2017)

Integrating the National Intelligence Model with a 'Problem Solving' Approach | Kirby (2004)

Step 7
Support your organization's strategic priorities

As an analyst, it is important that your work program aligns with your organization's priorities. These priorities should filter down from the strategic goals of the organization to individual work programs and the day-to-day functioning of operational units.

Logically, the specific wildlife crime problems that you are tasked to solve should support the legal responsibilities or conservation objectives of the organization you work for. Priorities will come from strategic and tactical planning cycles led by decision makers. Whether you are part of this planning process or not, the questions managers want answered should guide your analysis projects.

Remember however, that decision-makers are both the recipients of your analysis products as well as the ones who set your analysis priorities. Remaining independent and objective throughout the analysis cycle, and sometimes challenging dominate perspectives, will increase the integrity of your analysis, and critically, will help to avoid 'group think' (see Step 10).

Use the strategic priorities of your organization to build a solid foundation for the analysis of wildlife crime problems.

Organizational priorities can be used to frame your work program by identifying the wildlife crime problems that require analysis. For example, in a protected area setting, ask the following questions:

- Why was your protected area created?
- What was the conservation purpose?
- What are the conservation objectives of your organization?
- Are certain species or habitats a key priority?
- What tools and resources does your organization have to deal with the problem?
- How do you currently solve conservation problems currently?
- What are the wildlife crime problems undermining conservation priorities?

These questions could be adapted to other contexts where wildlife problems occur such as markets and transportation hubs. In those settings, the lead agency may not be conservation focused, but has a legal mandate to reduce the problem.

In some cases, the identification of priorities will be clearly set out through a systematic threat assessment process that addresses each of these questions and provides a ranked list of priority activities. Where this process does not exist, take the initiative. Use these questions and work with others in your organization to do your own assessment. Identify priority analysis projects and begin to structure your work program around them.

Your organization's strategic priorities give your analysis direction and keep your work relevant.

Keep sight of your organization's strategic and operational priorities. This will provide the necessary direction for your analysis work. It will prevent you from drifting towards self-directed projects that fall outside of the scope of your organization's conservation objectives.

Adhere to agency priorities to ensure that your analysis remains relevant by addressing the needs of decision-makers. Tailor analysis products to these needs to increase the impact of your work.

Being relevant will increase the trust that decision-makers have in your analysis and will build support for problem-oriented work in your organization.

A NOTE ON THE USE OF 'INTELLIGENCE' DISCOURSE IN WILDLIFE CRIME LAW ENFORCEMENT

Unfortunately, the notion of 'intelligence' is not well defined and generally misunderstood outside (and often within) its traditional security and policing settings. As a result, interpretations of 'intelligence' tend to be loaded toward secretive processes of acquiring information that can be used to directly guide law enforcement practice.

'Intelligence' can be an attractive term used by organizations in their mission statements to project an advanced program – Our conservation program is risk-based and intelligence-led. Often, such claims denote simplistic processes whereby single pieces of information directly inform law enforcement actions. Rarely, do they refer to programs where analysis is central to decision-making and even rarer, programs built around the analysis process as required in genuine intelligence-led practice. The inappropriate use of the term 'intelligence' can lead to an emphasis on reactive enforcement practices that often lack focus and an appropriate understanding of wildlife crime problems.

If implemented correctly however, the use of the 'intelligence cycle' (or analysis process as in this manual) within conservation management practice, represents an effective framework for prevention-focused wildlife crime analysis practice.

READ MORE

Intelligence Analysis for Problem Solvers | Eck, Clarke & Petrossian (2013)

Step 8
Make an information collection plan

A critical component of the analysis process is the collection of information and data. A structured collection process allows for both the collection of information about specific wildlife crime problems and the identification of knowledge gaps.

A good way to manage the collection process is through the development of information collection plans. When designing these plans, you should carefully consider the wildlife crime problem that you are analyzing.

Develop collection plans that focus on specific wildlife crime problems to ensure that your analysis remains problem oriented.

Standard vs Problem-Oriented Information Collection Strategies	
Standard	**Problem-Oriented**
Data focused	Analysis focused
Exploratory	Crime specific
Understands crime through individuals	Identifies suspects from crime analysis
General approach	Targeted approach
Explores databases to identify crimes	Focused on management requirements
Descriptive end-product reporting	Analysis products produced to support decisions

It may be useful to work within your problem-solving team (see Step 4) to develop hypotheses about specific problems. Use these hypotheses to think outside the box and direct your information collection efforts.

Remember that wildlife crime problems are complex and often masked by other legitimate activities. One way to avoid misleading outcomes can be to map all relevant stakeholders to the problem and use this to set a broad information collection strategy.

DEVELOP AN INFORMATION COLLECTION PLAN

The steps below provide an example of the process that you as a wildlife crime analyst can apply to develop a focused information collection plan. Here we outline a simple plan for bushmeat hunting in a PA for local sale.

Step 1 – Define the problem:
● Be crime specific - in this case, we will be developing a plan for the problem of bushmeat hunting in a PA for local sale.

Step 2 – Identify your analysis goal:
● What management decisions are you supporting – to reduce bushmeat hunting in the PA (your analysis should include SCP measures)
● Generate hypotheses – what scenarios do you want to test?
● What information do you need to support your analysis objectives?

Step 3 – Design an analysis strategy:
● Which analysis techniques should be applied? For example, spatial/temporal trend and pattern analysis of the hunting activity.

Step 4 – Identify data/information sources:
● Conduct an analysis of stakeholders (information sources)
● Identify internal and external data sources (data).

Step 5 – Implement the information collection plan:
● Action the plan (apply steps 1-4).

PROBLEM

Bushmeat hunting in PA for sale to local city markets

Information Summary
Hunting wildlife for bushmeat has been a chronic long-term problem in the PA. With low numbers of target species observed PA managers want to implement prevention strategies.

Management Question
What prevention strategies can the organization apply to reduced bushmeat hunting in the PA?

The table below provides an example of an information collection plan for bushmeat hunting and may be developed as part of crime script analysis. (See Step 17 – Develop a crime script)

	Sources							Comments
Analysis Questions	Analysis of Patrol Data	Local Police - Interviews	Ranger – Interviews	Community Leaders	Community Groups	Market Place Observations	Investigation Case Files	
Who are the hunters and where are they coming from?			▇	▇	▇		▇	
How are hunters entering the PA?			▇	▇	▇		▇	
Are there spatial and temporal patterns associated with the activity?	▇		▇				▇	Snares are reportedly set close to roads and waterholes.
How is the hunting being conducted (weapons/snares)?	▇	▇	▇	▇	▇		▇	Hunters are highly skilled.
How is the meat being transported?		▇		▇	▇	▇		
Where is the meat being sold?		▇		▇	▇	▇		
Who is selling the meat?		▇		▇	▇	▇		Possible link with organised crime.
Who are the customers?					▇	▇	▇	Product is being sold to high income urban groups seeking luxury meat.

Step 9
Develop an information management framework

Consider information and data as a valuable asset like any other in your protection strategy; do not forget social media companies make billions of dollars from data!

Effective data management is a critical element of the analysis process. Advances in technology, broad access to computing hardware, and the availability of structured database systems have driven a revolution in modern policing that has filtered through to wildlife protection.

The ability to store information and data from multiple sources, and in some cases link entities (people, places and activities etc.), provides a strong foundation for problem analysis.

BREAK DOWN INFORMATION SILOS
Bring information together

Part of information management is about identifying potential sources of data. Often these sources are isolated and held in information 'silos'.

All organizations tend to develop information 'silos' over time. Not being aware or not being able to access these sources of information can limit your analysis of wildlife crime problems. When you pool this information together, it gives a very powerful level of awareness, and improves your ability to triangulate trends and plan the most appropriate response. The importance of information integration cannot be overemphasized.

Keep information silos at the forefront of your mind and try to spot these within your organization or between different organizations. Identify unknown silos by thinking about what each team does and what sort of information they might have.

The tendency to withhold information and data often stems from a lack of trust between individuals, teams and organizations. Forming relationships and being open with your own information and analysis products can help break down barriers to information.

An information management framework will help connect information 'silos' and speed up your analysis.

DEVELOP AN INFORMATION MANAGEMENT FRAMEWORK

Implement a clear information management framework to ensure that the information you collect and store has integrity, is secure, and can be accessed by those who need it.

A management framework is simply a set of agreed policies and procedures that provide guidance for the storage and use of data within your team or organization. Having a documented information management framework in place will provide a foundation for your strategic plan and compliance with local regulations. Remember that your information is a critical resource and managing it effectively will strengthen your analysis outputs.

When developing a framework for information management and database design, consider the short and long-term goals for analysis capacity in your organization. Use these goals to develop a strategic plan (1-5 years) or roadmap for information technology (IT) that lays out a path to implementation. Having a clear vision of future information system requirements will help build an efficient IT infrastructure. In short, think big, but start small.

The design of your organization's information management system should be appropriately structured to store the information being collected, allow for the integration of multiple data sources and then provide access to the data in formats suitable for your analysis project.

If your database is networked within your organization's information system, you will need to collaborate with your IT support team to design a management framework. Otherwise, work within your teams to develop a set of procedures for how you manage your data.

The following is an example of a simple data management framework – consider how this could be applied to the specific requirements of your team or organization.

Governance – Refers to the overarching governance of data and databases including, but not limited to, statements about its purpose, strategic vision, responsible entities, security requirements, and timeframes for review.

Data Flow Model – Refers to a description of current and future inputs, outputs, and system requirements (storage, processing etc.). Provides a blueprint of how data flows within your section and organization. Data flow models are often illustrated as diagrams. (Hint – Google 'data flow model')

Metadata – Refers to details about your data and provides a system of categorizing and organizing information. Metadata helps make sense of your information and may include features like activity, sources, dates, and locations.

Quality – Refers to ensuring that the entry of source data is consistent and is of a minimum standard for analysis. This can be achieved by developing data entry operating procedures, developing metadata standards, providing training on data collection, and making some categories of metadata mandatory.

Privacy – Collecting law enforcement data often involves recording the personal details of individuals. Your organization will have a legal requirement to protect personal privacy. Understand what these are in your jurisdiction and ensure that they are identified and built into your data management framework.

Sharing – As with data privacy, there may be limits on how you can use your data and who you can share it with. Use this section to clearly articulate both data sharing limitations and opportunities to prevent silos.
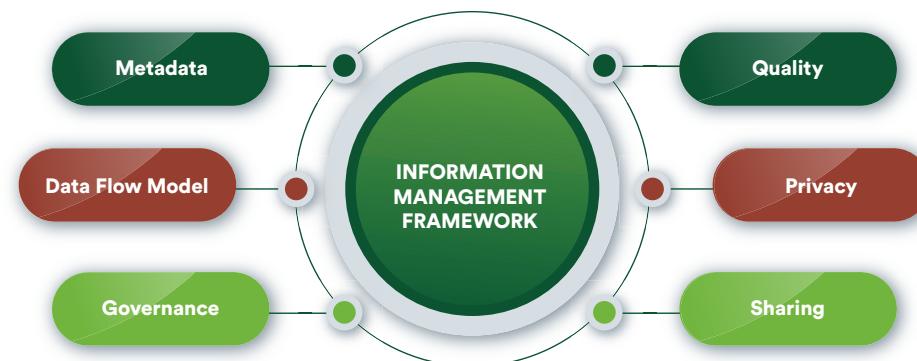
Step 10
Understand your role as a wildlife crime analyst

Your primary goal as an analyst will be to influence operations by providing decision-makers with accurate information about relevant problems. This will largely focus on the who, what, when, where, why, and how of a problem (Step 15), but will also include tailored response options.

Remember to be crime specific and consider each of your analysis tasks as individual projects. For example:

a) Identify the specific wildlife crime problem for analysis

b) What are the questions that decision-makers want to answer?

c) What analysis techniques can be used to address these questions?

d) Assess your information and identify knowledge gaps for collection plans.

e) Conduct analysis

f) Communicate your results and recommendations.

WHAT IS YOUR ROLE AS A PROBLEM-SOLVING ANALYST?

The analysis process outlined in this manual (Step 6) highlights the many functions and responsibilities of an analyst. In traditional intelligence/crime analysis areas these responsibilities are often allocated across several people. In a protected area setting however, it is possible that you are the only analyst in the team, and as such, in charge of bringing together all the aspects of the analysis process.

This 'management' role gives you power to set the analysis agenda – i.e., towards focused problem-solving! Do not underestimate the influence that you can have on the management of your wildlife crime problem. Applying a structured approach to the analysis function will help underpin this influence.

Remain focused on prevention and avoid the temptation of simply supporting law enforcement monitoring. Your role as analyst will be intrinsically involved in empowering decision-makers by guiding and assessing security work in the park, designing interventions, assessing their impact, learning from them, and moving forwards. You are a key part of the machine and with your role comes a great deal of responsibility. But as part of a problem-solving team, you are not alone, and working together you are strong.

AVOID GROUPTHINK

Groupthink refers to a common tendency for groups of people to conform to similar ideas in order to avoid confrontation. Groupthink leads to irrational and poor decision-making. As an analyst, you will face varying levels of groupthink within your organization. Be aware of organizational biases and avoid reinforcing them through your analysis.

Your job as an analyst is to objectively unpack wildlife crime problems, identify knowledge gaps, and where necessary challenge prevailing perspectives. This requires a tactful approach to delivering analysis outcomes. Influencing ingrained agency perspectives through objective analysis is likely to be a long-term project. Do not get discouraged by a skeptical audience, remain objective and stay the course.

> *Wildlife crime analysis is a new field, and you are at the cutting edge. Take pride in the work that you do.*

Where new or unfamiliar concepts and analysis techniques are being introduced, decision-makers should be engaged with early and often to build trust and avoid 'surprises'. Indeed, socializing your approaches to analyzing wildlife crime problems will help decision-makers to be more comfortable with your analysis results and ultimately maximize the influence of your work.

TEN GUIDING PRINCIPLES FOR PROBLEM ANALYSTS

1. **BE BOLD** – take risks and have confidence in your professional judgment.

2. **BECOME A SITE EXPERT** – understand all activities that occur in your site, both legal and illegal.

3. **BECOME A STUDENT OF ANALYSIS TECHNIQUES** – there is a substantial amount of publicly available literature on crime analysis (i.e., POP Center). Learn from these resources and use them to become a better analyst.

4. **BUILD RELATIONSHIPS** – there are many people involved with the analysis process from community members to decision-makers. Building and maintaining strong relationships will increase your access to information and improve your analysis.

5. **FIND CHAMPIONS** – champions are individuals who place a high value on the role of analysis in delivering positive conservation outcomes. Having people 'champion' your work will help support each stage of the analysis process.

6. **PREPARE TO HAVE YOUR ANALYSIS CHALLENGED** – if you are doing your job correctly, some of your analysis will inevitably be challenged. Be prepared for these challenges. Having confidence in your analysis will provide a strong foundation for respectful and open discussions. Push back against groupthink!

7. **GO ON PATROLS** – there is no substitute for time spent in the field alongside rangers who share the lived experience of the wildlife crime problems that you are analyzing.

8. **COMMUNICATE YOUR ANALYSIS IN SIMPLE TERMS** – using complex analysis and language will only create barriers to your work.

9. **BE CONSISTENT** – being consistent with your analysis and the style and language in end-product reports will help build a supportive consumer base.

10. **UNDERSTAND YOUR AUDIENCE** – you can produce amazing analysis but if it doesn't fulfil the specific needs of end users it will not influence their decision making.

READ MORE

Psychology of Intelligence Analysis | Heuer (1999)

Step 11
Develop a communication strategy

As an analyst, you are an important custodian of the knowledge held by your organization. Remember that the information you are responsible for collecting, storing, and analyzing is a valuable resource. You should maximize this value by having in place a communication strategy that actively targets the information needs of end-users.

The primary objective of a communication strategy should be to maximize the value of your analysis in the decision-making processes of your organization. How much influence you have will be determined by its relevance to end-user requirements, and how well you communicate your analysis to decision-makers. Communication is a critical step in the Analysis Cycle and one that requires purpose and planning.

You can maximize the impact of your analysis by developing a targeted communication strategy that identifies:

a) the end-users of your analysis (the audience or stakeholders),

b) the specific decision points in their work program that require support,

c) the information and analysis needed to support these decisions and,

d) the best way to present your analysis, such as briefings, reports etc.

CONDUCT A STAKEHOLDER ANALYSIS

A stakeholder analysis is a simple technique for visualizing all potential end-users for each of your analysis end-products. These end-users may also include people or teams outside your organization. Thinking strategically about your target audience and understanding their specific information and/or analysis needs will help you deliver better analysis products and prevent overwhelming people with information they don't require to do their job.

You can also work with your end-user groups to step through specific decisions that they need to make in their job. This includes asking; what are the questions they need to answer, what information they need to do this, who else is involved in the decision process, the frequency of decisions, and what are they trying to achieve.

> *Understanding your audience's need helps you refine how you communicate your findings. That will maximize its impact.*

UNDERSTAND YOUR AUDIENCE

Your audience's needs will differ depending on peoples' roles. For example, a field officer planning a patrol may want a briefing on the latest activity observed for an area, recent reporting and a map of know high risk locations. A patrol team leader deciding on how to allocate patrol resources more broadly may need you to provide them with spatial and temporal analysis for an illegal activity to help them better direct field patrols towards the right places at the right times. Finally, a site manager developing a strategic plan to prevent a type of illegal activity from

occurring may require alternative analysis and recommendations not limited to enforcement actions (see Section 4 – Develop Response).

These examples highlight the scope of reporting responsibility that you will have as an analyst.

DESIGN A FRAMEWORK FOR STRUCTURED REPORTING

With your target audience in mind, put in place a set of report types, along with templates, to help structure your work program and ensure that your information collection, storage, and analysis tasks are being undertaken for a specific reporting purpose. At a basic level, analysis reports can be categorized as being either, strategic, tactical, or operational.

The audience for your analysis products will be different at each of these levels as will be their specific information requirements.

In general, strategic reports are written with 1-5 year outlooks and will be used by higher levels of management to make longer-term organizational decisions.

Tactical reports provide shorter-term analysis assessments between 3 and 12 months. These types of reports may provide a more refined level of detail such as recent patterns and trends and changes over time. The audience for tactical reports may be middle managers who have responsibility for identifying priorities and the allocation of resources.

Finally, **operational reports** should be designed to provide field staff with contemporary information and analysis to assist in the day-to-day planning of field operations.

Type of Report	Analysis Horizon	Purpose	Audience
Strategic	1-5 years	Provide decision makers with long-term assessments of wildlife crime problems to assist with strategic organizational planning (e.g. Annual/5 Year Strategic Plans).	Senior and middle level management
Tactical	3-12 months	Provide decision makers with medium term assessments to assist with prioritizing operational resources and implementing prevention strategies (e.g. increasing patrol resources to high risk areas).	Middle management and senior field operations staff
Operational	0-3 months (Contemporary)	Provide decision makers with day-to-day support to assist with planning field operations (e.g. provide contemporary information on locations and targets of interest).	Senior field operations staff and rangers/officers

READ MORE

Managing Intelligence: The Art of Influence | Quarmby (2010)

Step 12
Communicate with purpose

While the substance of your analysis is important, how well you communicate your work to decision-makers is the ultimate test of any analysis project. You may be great at analysis, but it is effective communication that will make you a great analyst.

Clearly define the purpose of each of your analysis products. This will help guide your analysis process and critically provides your target audience (stakeholders) with a conceptual framework for how they should consume and apply the analysis that you deliver. Hint – develop an opening statement for each type of end-product to provide guidance for your readers.

Understanding the purpose of various analysis products will ensure that you are providing suitable levels of information to appropriate audiences.

Remember that just as not sharing can cause problems, such as information silos, oversharing analysis products will result in some end-users receiving information that is not relevant to their activities and responsibilities.

In Step 11 (Develop a communication strategy) we looked at the various types of analysis reports – Tactical, Operational and Strategic. In general these reports will fall into two categories, Situational Awareness and Problem Analysis.

Situational Awareness communication products can be used to share contemporary information that has been received on a specific target or activity and as such tend to be operational in nature. These are information rather than analysis products and can be used to support the day-to-day operations of field staff through patrol briefs, but can also serve as a good way to share information with other sections in your organization or your partners.

For example, a situational awareness product could contain a map of known poaching locations and a list of recent reports about illegal activity in a specific area. The primary audience for these types of products are generally field officers. Examples of situational awareness products include:

- Patrol Briefs
- Weekly "Intelligence Highlights"
- Other reports developed to provide situational awareness across your organization or with partners.

Sharing situational awareness products such as "Intelligence Highlights" with internal and external end-users is a great way of breaking down structural barriers that can inhibit access to information.

> *Make sure your briefings and reports follow the ABC's: Accurate, Brief, Clear.*

Problem Analysis communication products on the other hand, will be the outputs of your wildlife crime analysis projects. As you will learn in this manual, crime science applies various techniques to uncover the opportunity structure of illegal activity, with the focus of this knowledge being to reduce and even prevent wildlife crime from occurring. These products tend to be more tactical and strategic in their focus; their primary audience are senior officers and managers who make decisions about organizational priorities and resource allocation. Examples of problem analysis products include:

- Problem Profiles – Analysis of patterns and trends for a specific problem activity at your site.
- Subject Profiles – Analysis of offender groups or individuals associated with a specific problem activity at your site.

KNOW THE ABCS OF EFFECTIVE COMMUNICATION.

In general, the rules for effective communication are the same for the delivery of both written analysis products or verbal briefings and presentations. These rules can be summarized simply as **ABC**:

- **A for accuracy** – your analysis should be accurate and factual. Errors will undermine your reputation and the trust (influence) that decision-makers will have in your work.

- **B for brevity** – your analysis should be brief and to the point.

- **C for clarity** – your audience should be able to understand the analysis being presented. This includes how the analysis links back to the management requirements. Make sure your analysis has clearly addressed the 'so what?' test.

LEARN HOW TO CONVEY UNCERTAINTY CLEARLY.

Read most crime/intelligence reports and you will observe a unique style, structure and use of language. Communicating outcomes in a clear and consistent way will help your consumers gauge the degree of certainty that you have about your analysis.

To better convey uncertainty, analysis practitioners have over time developed words of estimative probability, which assign common wording to specific ranges of probability. For example, adding words like highly unlikely, unlikely, likely or almost certain to your assessments will help to provide clear guidance for managers making decisions based on your analysis.

> **READ MORE**
>
> Intelligence management: Delivering effective analysis | College of Policing (2020)
>
> Words of estimative probability | Kent (1993)

Maswabi Lishandu, Panthera

Hollie Booth

SECTION 3 | THINK ABOUT YOUR PROBLEM FROM MULTIPLE ANGLES

Community members inspect a synthetic serval skin that forms part of Heritage Fur attire. They share insights regarding how ceremonial leopard and serval skins are acquired, and beliefs surrounding their cultural importance. Interviews provide important insights into the nature of the problem and why people are involved. Understanding the problem in the context of the local culture is important for developing the right kind of response. In Zambia, the Barotse Royal Establishment endorsed the use of heritage furs in all Lozi traditional ceremonies, to both preserve the Lozi's culture, and protect dwindling felid populations.

An oceanic manta ray heads to a cleaning station in eastern Indonesia. Manta ray gills rose in popularity as a traditional Chinese medicine in the early 2000's, leading to a rise in commercial manta fishing by specialists from Lamakera village. Analysis by Booth et al. (2021) found that hunting was highly concentrated in space and time, as mantas congregated at the sea surface over cleaning stations between March and October, peaking each month around the new moon. Access to the market for manta gills was managed through four gill traders, but around 50% of all households in the village were involved in and derived income from manta hunting, either working as a hunter or processing the gills. This informed a carefully orchestrated response in a coalition of partners including the East Flores Fisheries Agency, Misool Foundation, and the marine police. Multiple interventions took place simultaneously with targeted patrolling on manta aggregation areas during peak times in the month, targeted arrests and prosecution of the traders, and a range of livelihood-based interventions targeting hunters, meat processors, and the wider community. The project resulted in landings of manta rays reducing by ~86% in 2017 compared to the 2013 baseline.

An integrated approach to tackling wildlife crime: Impact and lessons learned from the world's largest targeted manta ray fishery | Booth et al. (2021)

Step 13
Know the 10 principles of crime opportunity theory

This section will help you think about different ways to analyze your problem to find drivers and facilitators. You will want to consider the role of criminal opportunities as well as what motivates individuals to get involved. In Opportunity Makes the Thief, Marcus Felson and Ron Clarke lay out 10 principles of crime opportunity theory. Use these to think about and unpack your problem.

#1 Opportunities play a role in causing all crime.

If criminal opportunities do not exist, crime does not exist. This means even highly motivated offenders will not be successful. On the other hand, when lots of opportunities exist, people with low levels of motivation may even be tempted to offend.

#2 Crime opportunities are highly specific.

Do not forget, the differences between types of wildlife crime matter. Opportunities depend on the species, harvesting method, and market. These opportunities will likely change from one location to the next, even within a protected area. This is why it helps to be problem specific.

#3 Crime opportunities are concentrated in time and space.

Some places have more opportunities for crime than others (i.e. higher rhino density; more cargo shipments). Certain time periods are better suited for crime than others (i.e. rhino poaching at night; late night arrivals of air traffic).

#4 Crime opportunities depend on everyday movements of activity.

The routine activities of people and wildlife will determine how crime opportunities are distributed. This is why harvesters target animal trails, watering holes, and seasonal migrations.

#5 One crime produces opportunities for another.

When wildlife products are harvested, this is the first in a series of crimes committed by different people. Most national legislation prohibits the harvesting, possession, and consumption of protected species. Moreover, remember the proceeds of illegal wildlife trade may be used for other illegal activities such as drug use or gambling.

#6 Some products offer more tempting crime opportunities.

Wildlife products differ in their attractiveness for harvest, sale, and consumption. Some products may take a lot of effort to obtain, but the reward is huge. Others may not be worth much, but they are easy to harvest and sell, making it a worthwhile way to generate income. This helps explain why certain species are targeted more than others.

#7 Social and technological changes produce new crime opportunities.

The internet and social media have transformed the way wildlife products are traded. Technologies such as thermal imaging and night vision create new opportunities for hunters. Geotagged photos of rhinos on social media are one example of an unintentional crime opportunity created by technology.

#8 Crime can be prevented by reducing opportunities.

Research shows that attempts to reduce crime by removing opportunities that promote or facilitate crime have been successful, even when they do nothing to address offender motivation. This approach is referred to as Situational Crime Prevention (see Step 29).

#9 Reducing opportunities does not usually displace crime.

A common criticism of strategies that use opportunity reduction is that the problem will just move somewhere else; known as displacement (see Step 36). While possible, research shows this does not always happen, especially when other suitable crime locations are not available nearby.

#10 Focused opportunity reduction can produce wider declines in crime.

A 'diffusion of benefits' has been observed for some opportunity reduction efforts, often when offenders overestimate the scale of implementation. It is also possible that other related problems also decrease, as areas because less attractive to offenders.

Examples of Opportunity Theory - Suicide in England and Wales

Example	Problem	Change	Result
Suicide in England and Wales	In the 1950s, nearly half of all suicides were committed using domestic gas. Individuals put their head in the oven, turned on the gas, and waited to die from carbon monoxide (CO) poisoning.	In the 1960s and 70s, domestic gas production methods changed, resulting in new gas mixtures with less, and eventually no carbon monoxide.	The % of suicides by domestic gas nationally decreased dramatically from a high of 49.8% in 1958, to 21.6% in 1968, to 0.4% in 1976.

Interpretation

Suicide, an act considered to require extreme motivation, was shown to be highly susceptible to changes in the opportunity structure. When an easy, readily accessible, and 'clean' suicide method was no longer available, suicides declined nationally by 38% between 1958 – 1976. This means opportunity reduction can work, even for unwanted events driven by extremely motivated individuals.

Examples of Opportunity Theory - Redwood burl harvesting in the United States

Example	Problem	Change	Result
Redwood burl harvesting in the United States	Some redwood trees produce 'burls'; highly unique and valuable pieces of wood that can be used to make carvings and furniture.	Infrastructure development in the Redwood Forest National Park, for tourism and logging purposes, increased the abundance of roads over the years, as well as shops selling burls.	Most burl harvesting is concentrated around roads and burl shops

Interpretation

Despite widespread distribution of redwood trees and burls throughout the park, burl harvesting concentrates along roads, especially those near a shop selling burls. Because shops do not need to prove burls have been legally harvested, this creates market opportunities for harvesters. Roads make it easier to access the forest with vehicles, which in turn make it easier for harvesters to search for burls, as well as move their equipment and burls around, both of which are heavy.

Examples of Opportunity Theory - Illegal fishing in no-take zones in the Great Barrier Reef Marine Park

Example	Problem	Change	Result
Illegal fishing in no-take zones in the Great Barrier Reef Marine Park	No-take zones contain significantly more and larger target fish species, such as Coral Trout, than in areas open to fishing.	A 're-zoning' of the GBR in 2004 increased the area of no-take reserves from 4.5% to 33%. A rapid increase in the number of recreational fishing vessels since 2004 has significantly increased fishing activity.	Most illegal fishing occurs in no-take zones adjacent to high use boat ramps (access points) in wind condition less than 10kts.

Interpretation

Despite an increase in both the number of no-take zones and registered fishing vessels, most illegal fishing remains concentrated in a small number of zones, adjacent to high use boat ramps and is also characterized by temporal patterns around weekends and holidays. The locations of these zones make them highly attractive and accessible to fishers operating small vessels during their leisure time. The opportunity structure of this activity is further defined by prevailing sea conditions which places limits on the safe access to the environment, in this case wind speeds less than 10kts and sea swell less than 1m. Understanding the opportunity structure of illegal fishing can be used to develop targeted prevention strategies.

READ MORE

Opportunity Makes the Thief | Felson & Clarke (1998)

The spatial pattern of redwood burl poaching and implications for prevention | Kurland et al. (2018)

Illegal fishing and compliance management in marine protected areas: a situational approach | Weekers et al. (2021)
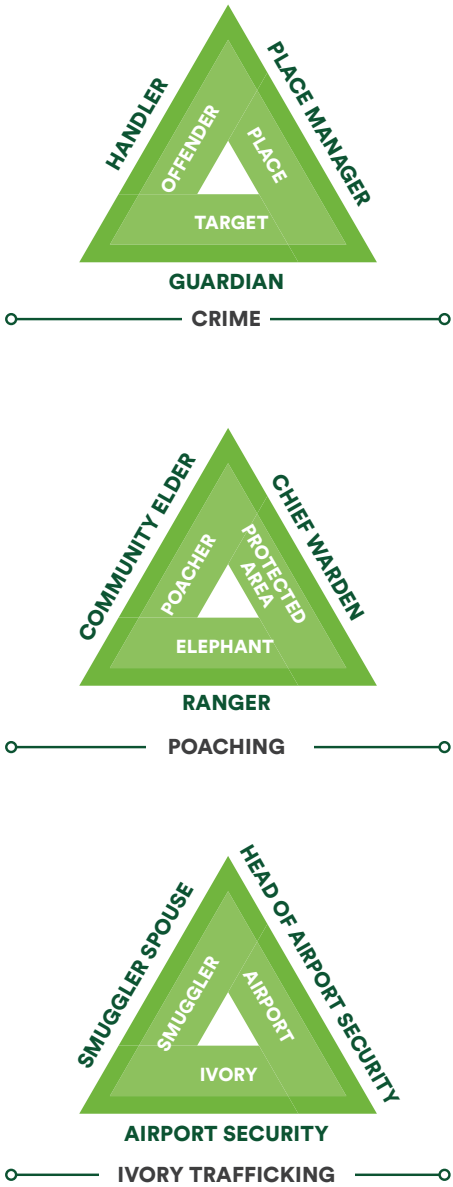
Step 14
Use the problem analysis triangle

The problem analysis triangle is a good starting point to help you think about the people and places involved with your wildlife crime problem. The inner triangle, also known as the crime triangle, includes the offender, target, and place; the basic elements of any criminal event.

The outer triangle represents the guardian, handler, and place manager; these elements have the potential to prevent crime. The relationship between the two triangles is simple. Guardians protect targets, place managers control places, and handlers control offenders.

As part of your analysis, use the problem analysis triangle to start identifying who is involved with crime and where it is happening. Then add the second layer indicating what individuals or structures could be involved in crime prevention. This will help you build a strong information collection plan to study the problem in more detail (Step 8).

You can start using general terms, like the examples shown, on this page, or focus on very specific events when you know more about the people and places involved. The example on the next page shows how different groups filled different roles to protect the Amur falcon.

HANDLER — OFFENDER — PLACE MANAGER — PLACE — TARGET — GUARDIAN

CRIME

COMMUNITY ELDER — POACHER — CHIEF WARDEN — PROTECTED AREA — ELEPHANT — RANGER

POACHING

SMUGGLER SPOUSE — SMUGGLER — HEAD OF AIRPORT SECURITY — AIRPORT — IVORY — AIRPORT SECURITY

IVORY TRAFFICKING

Problem Analysis Triangle Actors	
Target	This represents the victim of crime such as a person or their property. For wildlife crime, the target is usually a plant or animal at the harvesting stage, and a product during trafficking events.
Offender	This is the individual who commits the crime. In protected areas, they are typically referred to as hunters, firewood cutters, fishermen, and cattle grazers. For trafficking problems, they might be traders, smugglers, or consumers.
Place	This is the location where a crime occurs. Places can be thought of at different levels such as a GPS coordinate, known landmark, patrol sector, or protected area. For trafficking problems these might be shopping centers, roads, or airports.
Guardian	This represents the person or security device that protects a target. The most common guardians in wildlife protection are rangers, community scouts, and police, but private citizens can also be guardians. Guardians along trafficking routes usually include police, customs officials, and baggage handlers. Formal guardians are those who that hold official powers to enforce the law. Informal guardians are people who through their work or daily routines, see problems and can intervene.
Handler	This is an individual who can influence an offender and encourage them to stop offending. Examples of handlers include family members, wives, religious leaders, community elders, employers, and friends.
Place Manager	This individual is responsible for controlling what happens at a specific place. Examples include wardens, private landowners, lodge owners, and gate guards. For trafficking, this includes individuals managing locations along trade routes such as traffic police, seaport/airport management, and those who manage markets/shops.

READ MORE

A Naga village's journey from hunting ground to safe haven for the Amur falcon | Ghosh (2018).

How three Indian villages saved the Amur falcon: A new grassroots conservation model takes root | Rao (2013)

THINK ABOUT YOUR PROBLEM FROM MULTIPLE ANGLES

MASS TRAPPING OF AMUR FALCONS AT DOYANG RESERVOIR FOR CHEAP MEAT BY LOCAL VILLAGES DURING ANNUAL MIGRATION.
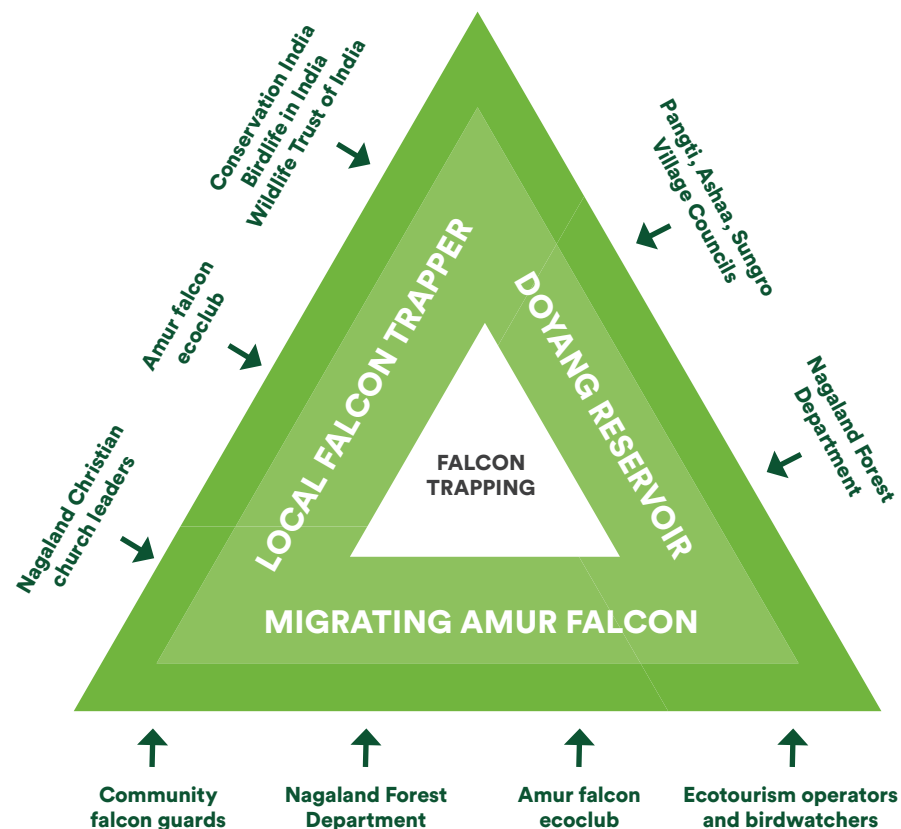
This problem analysis triangle above shows how a falcon protection project in India tried to reduce illegal hunting by incorporating several handlers, guardians, and place managers. Every October, amur falcons migrate to Africa from Central Asia and congregate in large flocks over a period of ten days above Doyang Reservoir in Nagaland, Northeast India. A trade arose in which hunters trapped falcons in old fishing nets around evening roosts to sell as cheap meat. At its peak in 2012, 120,000 falcons were estimated to be hunted each year. A response was developed by a coalition of different organizations which involved directly protecting roosting falcons, developing a tourist industry around falcon watching, and fostering cultural pride in a village icon.

In terms of falcon guardianship, the formal guardians of the falcons, Nagaland Forest Department officers, seized nets and posted guards around Doyang reservoir. These were supported by informal guardians; amur falcon eco club members and ecotour operators who spotted and reported nets, and later community falcon guards. Among the handlers of the falcon trappers, Church leaders promoted messages that falcon consumption was against Christian beliefs while the eco club and NGOs developed messaging of the amur as a cultural icon and supported transition of falcon trappers into bird guides. This was so successful that falcon trapping fell from 120,000 to zero in 2013 and in subsequent years.

Step 15
Answer the 5Ws and 1H

Building from your problem analysis triangle, try to answer the 5Ws and 1H of your problem. This adds context to your triangle, by including elements of time, motivation, and modus operandi. The 5Ws and 1H are:

- **What** is the problem you are dealing with?
- **Who** is causing or facilitating the problem?
- **Where** does the problem happen?
- **When** does the problem happen?
- **Why** do people choose to engage in the unwanted behavior?
- **How** do they do it?

These simple questions are a great way to start unpacking a specific wildlife crime problem. As you try to answer the questions, you will begin to think about sources of data you would need and who might have this information. You may also realize your problem is driven by different motivations, an important consideration when developing your response strategy (see Section 4).

Identify knowledge gaps early by trying to answer the 5Ws and 1H at the beginning of your problem analysis. This will help you tailor information collection plans to your needs sooner. It also helps set a baseline for what you know about the problem.

The table below provides some guiding questions to help you think about the 5Ws and 1H of your problem.

In Sections 3, 4, and 5 of this manual we use four hypothetical examples to help unpack the problem-solving process. The four examples show how this approach could be adapted to different problems within wilderness areas, but also to a trafficking problem.

The examples are not based on actual case studies but should be realistic enough for illustrating the core ideas of problem analysis and measuring effectiveness. The table below answers the 5Ws and 1H of the hypotheticals used in this manual.

THE 5WS AND 1H OF HYPOTHETICAL PROBLEMS

	Turtle Egg Harvesting	High value smuggling through transit airport	Illegal gold mining inside park boundaries	Bushmeat hunting to support drug habits
Who	Farm workers that sell to local buyers	International smuggler	Local artisanal miners	Local hunters
What	Collect turtle eggs	Move rhino horn through airport	Mine for gold	Kill deer using snares
When	Two months a year (May/June); a chronic problem	Year-round; an emerging problem	Year round; an emerging problem	Year round; an emerging problem
Where	Along Rivers A & B	International cargo terminal	NE sector of the protected area	In sector A, neighboring community with hunters
Why	For quick and substantial, opportunistic income	Substantial income as 'top up' income to legitimate business	For sustained income as a regular miner	For quick income to support drug use
How	Snatch and grab	Forged paperwork	High power water jets	Wire snares

Questions to Help Unpack the 5Ws and 1H	
Who	Do individuals involved act alone or in groups? How do these groups form and how are contacts established? How are actors distributed along the wildlife crime continuum? (see Step 16)
What	How is this problem unique from other problems in the area? Does it overlap with other problems?
When	At what time of the day, year and season does the problem occur? Is there any relation to specific holidays or events? How long does it take to commit the crime? Is this a new problem, or a chronic problem that has been happening for many years?
Where	Do you have exact locations or general areas? Does the problem concentrate at specific locations or types of place? Where do other steps along the wildlife crime continuum take place?
Why	What motivates individuals that cause the problem or facilitate it? Are their actions opportunistic or driven by other specific needs? Is the behavior considered unacceptable by the community?
How	How does the problem happen? What steps are taken to ensure success? What tools, weapons, skills, contacts and information are needed? How do individuals avoid detection?

Step 16
Think along the wildlife crime continuum

When unpacking wildlife crime problems, it is important to remember one of the key principles of opportunity theory…successful crimes produce opportunity for other crimes (see Step 13). For illegal wildlife trade problems, the wildlife crime continuum provides a framework for helping you link the original offense of illegal harvesting, to the offenses that follow including the possession and trade of products.

When thinking about your wildlife crime problem, try to be specific about the stages and actors involved. For example, ivory on a wild elephant will go through several stages to become a product someone buys. The wildlife crime continuum divides these into harvest, process, transport, trade, and consume. The stages do not always occur in this order, so think carefully about how your problem unfolds. For example, a product, such as a long-lasting ivory ornament, may be purchased, and then sold and purchased again, over long periods of time.

As an analyst, you will want to determine who is involved at each stage. Depending on your problem, you might find that some individuals are only involved with one stage, while others are involved with many, perhaps all of them! The wildlife crime continuum uses three categories to describe actors: harvesters, intermediaries, and consumers.
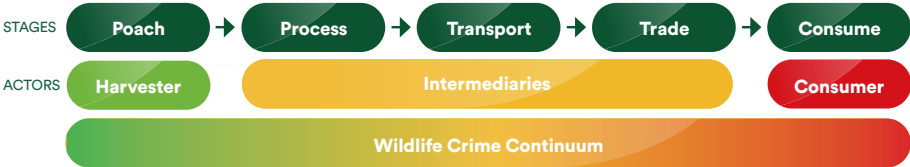
Drawing a wildlife crime continuum for your specific problem will help you start to see the link between actors across stages and determine which ones may be easier to influence. As you sketch your continuum, start thinking about which organizations or individuals would have information about the different stages and actors. For example, your patrol and arrest data might tell you a lot about harvesters, but nothing about intermediaries and consumers. Who would you ask for this information? Would they be interested in helping reduce the problem?
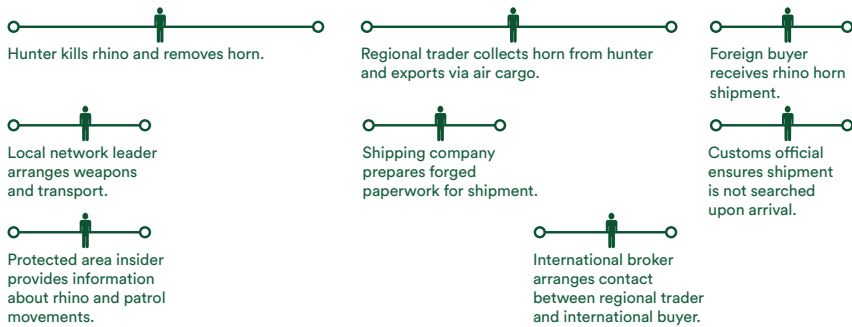
STAGES AND ACTORS OF THE WILDLIFE CRIME CONTINUUM

Stages are different types of activities that create and sustain markets for wildlife products.	
Stage	**Explanation**
Harvest	Taking wildlife from nature.
Process	Turning wildlife into a useable product for trade.
Transport	Moving a wildlife product.
Trade	Selling a wildlife product.
Consume	Using a wildlife product.

Actors are individuals responsible for different parts of the trade chain for wildlife products.	
Actor	**Explanation**
Harvester	An individual that takes wildlife from nature.
Intermediary	An individual that makes, transports, and/or trades wildlife products.
Consumer	An individual that buys and uses wildlife products for the intended purpose such as food, medicine, display, or as a pet.

STAGES: Poach → Process → Transport → Trade → Consume
ACTORS: Harvester | Intermediaries | Consumer
Wildlife Crime Continuum

HOW DOES THE PRODUCT GET FROM HARVESTERS TO CONSUMERS?

Hunter kills rhino and removes horn.

Regional trader collects horn from hunter and exports via air cargo.

Foreign buyer receives rhino horn shipment.

Local network leader arranges weapons and transport.

Shipping company prepares forged paperwork for shipment.

Customs official ensures shipment is not searched upon arrival.

Protected area insider provides information about rhino and patrol movements.

International broker arranges contact between regional trader and international buyer.

WHERE COULD YOU FIND INFORMATION ABOUT THE DIFFERENT INDIVIDUALS INVOLVED, WHERE THEY OPERATE, AND THEIR METHODS?

Patrol and arrest data.

Seizure data and police investigations.

International law enforcement agency.

Police investigations.

Customes investigations and airport security.

Foreign customs agency.

Wardens and lodge owners.

International policing networks.

The Importance of Roles
Some people are more replaceable than others

What people do along the wildlife crime continuum matters. Personal networks link harvesters to the final consumer, even if they are not directly connected, and different people in these networks add different value. Some add value because they are trusted and well connected; like the international broker above. Others add value because of what they do; such as the employee at the shipping company providing forged documents. If the broker or forger decided to leave the network, or were unable to complete their task, it would be a major blow to the operation. Consider targeting your interventions at roles that are hard to fill because they require special skills, are a unique position of authority, or require high levels of trust built over time.

Step 17
Develop a crime script

As an analyst, it is important to remind yourself that crime incidents do not occur insolation. In reality, individuals go through a number of steps to prepare for their crime, execute it successfully, and avoid detection after the crime has been committed. When you map out these steps, it will be easier to identify weak points in this chain of events.

Crime scripting is a useful tool for structuring your thinking on crimes from beginning to end. This method helps you create a detailed list of steps required to successfully commit a specific crime in a specific setting.

While the stages of a crime script have been broken down in various ways, a basic crime script will include preparation, pre-activity, activity, and post-activity. Each of these stages contains actions that are taken to complete the stage.

You should draw from various sources to develop a crime script. Primary sources are the observations and accounts of people that witness or experience the event, such as law enforcement, victims, and offenders. Secondary sources are other sources of information that describe the events such as media reports or open-source information on the internet.

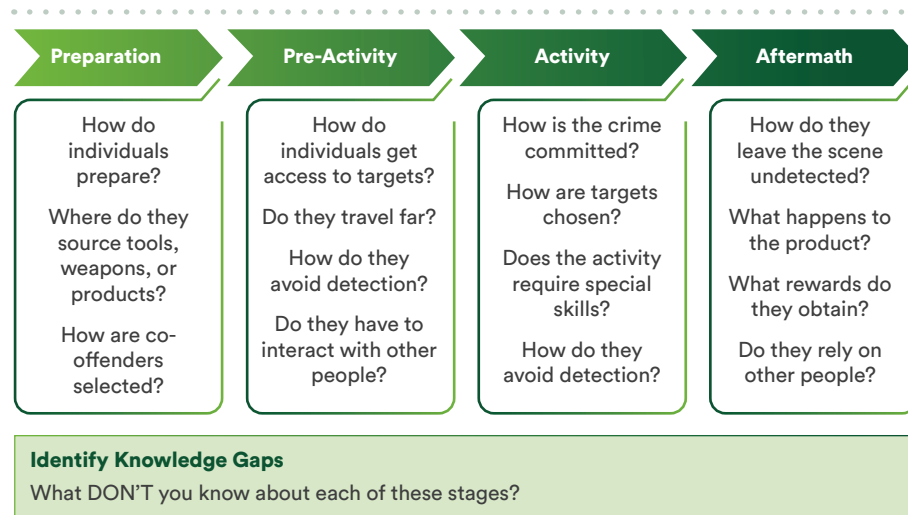Interviews can help you understand:
- How the crime scene was chosen
- How the target/victim was selected
- Tools/equipment/finances required
- The skills and effort required
- Perceived criminal opportunity
- Perceived barriers
- Typical offender characteristics

People you might interview include:
- Game wardens
- Tourist guides
- Prisoners
- Active offenders
- Law enforcement personnel
- Researchers
- Local community members
- Product consumers

Secondary sources of useful information include:
- Police reports and court records
- Court records
- Internal crime analyses
- Camera trap imagery
- Biological monitoring data
- Academic literature
- Grey literature
- News report
- Social media
- Open-source information

Preparation	Pre-Activity	Activity	Aftermath
How do individuals prepare? Where do they source tools, weapons, or products? How are co-offenders selected?	How do individuals get access to targets? Do they travel far? How do they avoid detection? Do they have to interact with other people?	How is the crime committed? How are targets chosen? Does the activity require special skills? How do they avoid detection?	How do they leave the scene undetected? What happens to the product? What rewards do they obtain? Do they rely on other people?

Identify Knowledge Gaps
What DON'T you know about each of these stages?

Describing a criminal event from beginning to end helps identify what agencies or organizations are responsible to act. Rangers can arrest people in the park, but who should be contacted during the aftermath of a poaching event? Much like trying to answer the 5Ws and 1H, this process will also help you identify knowledge gaps.

Consider writing a product-based crime script. Product-based scripts follow wildlife products from harvest to consumption. Rather than looking at the actions of individuals, these scripts help unravel the sourcing, processing, trading, and consumption of a product. This helps identify the places and actors involved along the wildlife crime continuum.

Understand the limits of your crime script. A crime script will only be as good as the data that was used to build it. A crime script developed using the experience of one person is much less rigorous than one developed using multiple sources of information. Do not get led astray by incomplete information. Use workshops and multiple information sources to build a strong script.

Do not over generalize. Remember that you will be looking at specific problems in specific places. The crime script you develop may not apply elsewhere, even if it is a similar problem. Try to develop crime scripts for local problems and then compare them to one another to identify commonalities and highlight differences regionally.

Start thinking about responses immediately. When building your crime script, start to consider how each step in the chain of events could be disrupted. You should think about what your teams and other organizations currently do to disrupt the script, but also more broadly about other options.

Update your script regularly. This helps integrate new information as it becomes available, but also helps you adapt if the problem changes over time. For example, you might find that a new fence is pushing border crossings further down the fence line, but once hunters enter, they migrate back to routes they know well (see example, Step 22).

The table below shows what the preparation phase of an illegal gold mining event might look like. For more detailed examples of crime scripts see:
The Poaching Diaries: Crime Scripting for Wilderness Problems

This collection contains crime scripts for 12 different wilderness problems and a 'how-to' guide in the appendix.

For more information about linking product- and actor-based crime scripts see:
The production of jaguar paste in Suriname: A product-based crime script | Lemieux & Bruschi (2019)

Crime Scripting Example: The first step in actor-based crime script of illegal gold mining

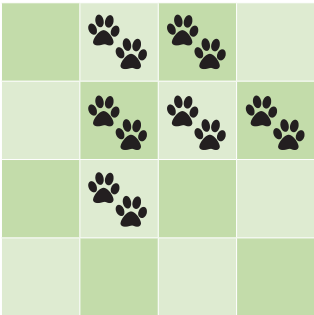| Stage	Details and Options	Spatial	Temporal	People	Interventions to consider
Preparation Engage Guide	Team leader of mining group engages local guide, a fisherman who lives nearby the park and makes regular fishing and hunting trips inside the boundary. The guide has been personally recommended or has worked with the team leader before.	Village near boundary of park	Up to one month before operation.	Team Leader Local Guide	**Focused outreach and deterrence.** Explore mix of measures to encourage compliance amongst guides known to work with miners. **Engage community leaders.** Explore options to increase social stigma related to mining because it poisons the community water sources.

Steve Winter. Panthera

Step 18
Watch out for bias in your data cased by triple foraging and silent victims

Part of your job as an analyst will be understanding the limitations of data you use. The silent victim problem refers to the fact that wildlife cannot 'call the police'. This means official reports of crime will depend on how much effort law enforcement units put into searching for crime, as well as how good they are at finding it.
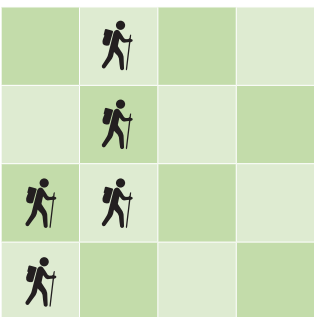
In a protected area setting, this can be thought of as a triple foraging process that plays out in the landscape. Wildlife, harvesters, and rangers all have different areas where they forage, creating different opportunities for crime…or protection. This impacts the reliability of data collected by ranger teams, because ranger and harvester foraging does perfectly overlap.

WILDLIFE FORAGE FOR FOOD
Wildlife looks for suitable habitat and nutrition in the landscape

RANGERS FORAGE FOR HARVESTERS
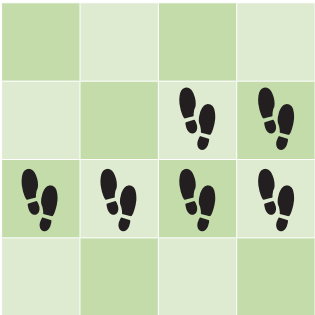Rangers look for harvesters and signs of harvesters in the landscape

HARVESTERS FORAGE FOR WILDLIFE
Harvesters look for opportunities to take wildlife in the landscape

TRIPLE FORAGING
The overlap of wildlife, harvesters and rangers in the landscape

		Risk	Patrol Data Bias
	Rangers Forage Alone They do not detect any wildlife or harvesting activity.	**Risk to Wildlife** Low	**Patrol Data Bias** None. Rangers have been to the area.
	Wildlife Forage Alone Rangers and harvsters do not visit this area.	**Risk to Wildlife** Low	**Patrol Data Bias** Wildlife in this area is not included in patrol data. Wildlife distribution is underestimated.
	Harvesters Forage Alone Harvesters are unsuccessful because there are no opportunities.	**Risk to Wildlife** Low	**Patrol Data Bias** Harvesting in this area is not included in patrol data; distribution is underestimated.
	Wildlife and Harvesters Forage Harvesters are more successful and go undetected by patrols.	**Risk to Wildlife** High	**Patrol Data Bias** Successful harvesting in this area is not included in patrol data; harvesting is low risk and underestimated.
	Rangers and Wildlife Forage Rangers record wildlife sightings.	**Risk to Wildlife** Low	**Patrol Data Bias** None. Rangers have been to the area and recorded wildlife sightings.
	Rangers and Harvesters Forage Harvesters are unsuccessful and their activities are detected by rangers.	**Risk to Wildlife** Low	**Patrol Data Bias** None. Rangers have been to the area and recorded harvesting activities observed.
	Wildlife, Harvesters and Rangers Forage Harvesters are more likely to be successful and detected.	**Risk to Wildlife** Medium	**Patrol Data Bias** None. Ranger data includes observations of wildlife and harvester activity.

SECTION 3
THINK ABOUT YOUR PROBLEM FROM MULTIPLE ANGLES

CONSIDER PATROL DATA BIAS

The figure on the previous page shows how triple foraging unfolds, and how this relates to wildlife protection and data reliability. This simplified approach focuses on where wildlife, harvesters, and rangers go, but you need to also consider when they visit these places. For example, if a ranger team visits an area when a harvester is there, this may result in an arrest. However, if they go to the area at a different time, they may see nothing, or only find evidence a harvester was there, such as a snare or cut tree.

When you look at patrol data, try to classify places in one of these three categories:

- A patrol team has visited the area and found nothing (no problem).
- A patrol team has visited the area and found harvesting (problem exists).
- A patrol team has not visited the area (unknown).

A good analyst will try to understand why unknown areas go unpatrolled. Is the area too far away? Is it too hard to patrol? Is there no wildlife? Is the area purposely overlooked?

SILENT VICTIMS ARE EVERYWHERE

The silent victim problem does not only apply to protected areas. Once wildlife has been turned into a product, a similar process unfolds. In other words, 'wildlife products can't call the police'. This means the amount of product found is related to effort.
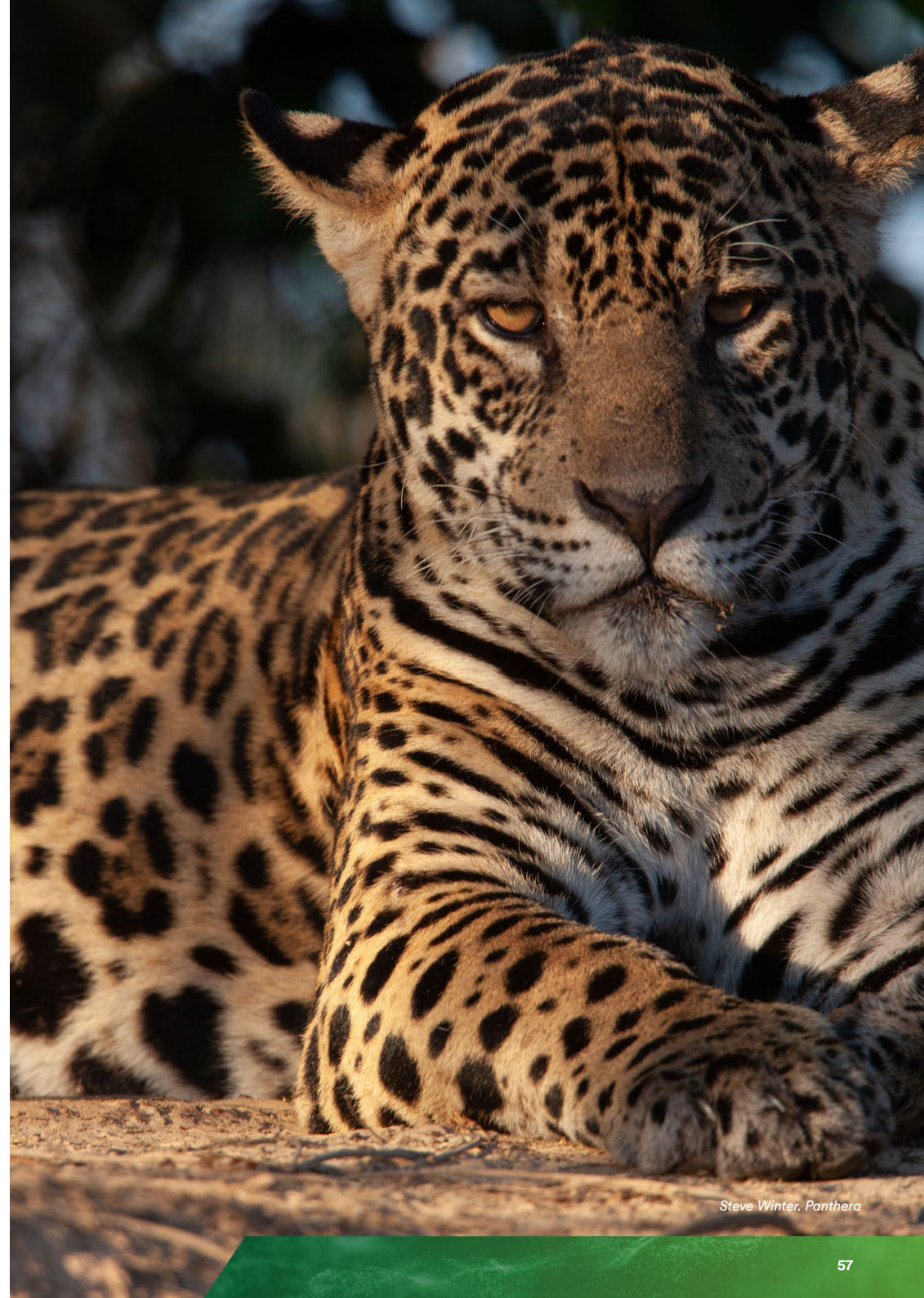
Useful ratios might include:

# of bags with product / # of bags searched / total # of bags

# of buses with product / # of buses stopped / total # of busses

# of butchers with product / # of butchers checked / total # of butchers

READ MORE

Situational prevention of poaching | Lemieux (2014)

Steve Winter. Panthera

Step 19
Determine if the 80:20 rule applies

As an analyst, it is important to remember that crime is not randomly distributed. It tends to be concentrated in time and space, and in relation to when and where opportunities exist. You will want to identify these concentrations and pay special attention when the problem is highly concentrated.

One common rule of thumb is the 80:20 rule, also known as the Pareto principle, which is used in many fields, not just crime reduction. It says that 80% of the effects observed come from 20% of the causes.

In business for example, that means roughly 80% of sales come from 20% of clients. For crime problems, you might find that 80% of crime is caused by just 20% of offenders. Or that 80% of crime is found in just 20% percent of a protected area. This is a useful principle for setting priorities and maximizing the impact of interventions.

The 80:20 rule is not a strict measure, but a good rule of thumb for guiding analysis. The idea is that crime will concentrate by time, place, victim, offender, or product. It is your job to determine how crime is distributed over these factors, and to triage problems related to the causes. The table below gives examples of factors to consider.

Calculating the 80:20 rule is easy. Take for example rhino poaching in South Africa in 2010.

Calculating the Distribution of Rhino Poaching Events in 2010 across South Africa by Province
Does the 80:20 rule apply?

Prov.	Rhino kills	% of all rhino kills	Cuml. % of rhino kills	%of prov.
KNP*	146	44	44	8
NW	57	17	61	17
LIM	52	16	77	25
Note Kruger National Park, the Northwest and Limpopo provinces account for 77% of all kills but just 25% of the 'province' categories.				
KZN	38	11	88	33
MP	17	5	93	42
GP	15	5	98	50
EC	4	1	99	58
FS	3	1	100	75
NC	1	0	100	75
MNP*	0	0	100	83
MAP*	0	0	100	92
WC	0	0	100	100

Data available here

https://www.poachingfacts.com/poaching-statistics/rhino-poaching-statistics/

Examples of Factors Related to Crime Concentration	
Repeat Offenders	A small number of offenders account for a large proportion of the problem.
Repeat Victimization	A small number of victims suffer a large proportion of problem (i.e. the same species is targeted, the same national park is targeted, the same area within the national park is targeted).
Hot Spots	A small amount of geographic space sees a large proportion of the problem.
Hot Products	A small number of product/resource types makes up a large proportion of products/resources illegally harvested and traded
Hot Times	Crime is concentrated at certain times of the day, week, month or year.
Risky Facilities	A small number of facilities, such as markets, airports or border crossings, account for a large proportion of the problem

THINK ABOUT YOUR PROBLEM FROM MULTIPLE ANGLES

MONITORING THE 80:20 DISTRIBUTION OVER TIME : Rhino Poaching in South Africa

Prov.	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2019
KNP (SANParks)	44	56	64	60	68	70	63	49	55	55	60
NW	17	5	12	9	5	4	5	9	8	5	7
LIM	16	17	9	11	9	8	9	8	5	8	9
KZN	11	8	10	8	8	10	15	22	18	22	13
MP	5	7	4	9	7	6	3	5	7	6	6
GP	5	2	0	1	0	0	1	0	0	1	1
EC	1	2	0	1	0	0	1	0	0	1	1
FS	1	1	0	0	0	1	2	4	2	2	1
NC	0	0	0	0	0	0	1	2	2	1	1
MNP (SANParks)	0	1	0	0	0	0	0	0	0	0	0
MAP (SANParks)	0	0	0	0	0	0	0	0	0	0	0
WC	0	1	0	0	0	0	0	0	0	0	0

% of Rhinos killed nationally by province

These data show rhino poaching was heavily concentrated in Kruger National Park (KNP) over 10 years, accounting for 60% of all deaths between 2010-2019. The data also show that during this time period, 96% of the rhino poaching was found in just 6 of the 12 'provinces'; KNP and the North West, Limpopo, KZN and Mpumbalamba provinces. Kruger was a clear and sustained outlier, while the others took various proportions of the remining rhinos killed each year. Of particular interest is KZN, which averaged roughly 10% of the national rhino loss for the first 6 years, but then jumped to 20% in the last 4 years. This shows there was a clear shift in which areas poachers targeted, possibly because of displacement (see Step 36).

As an analyst, this technique helps you quickly identify how your problem is distributed. When you identify high concentrations of your problem, you will want to pay careful attention to these…but also don't forget to compare these to similar areas where the problem does not exist. What explains this difference? Is it target availability? Distance to motivated offenders? Better management? Are there gaps (spatial or temporal) in patrol effort that need to be addressed?

READ MORE

Understanding Risky Facilities | Clark and Eck (2007)
Understanding and Responding to Crime and Disorder Hot Spots | Telep & Hibdon (2019)
Analyzing and Responding to Repeat Offending | Tilley (2016)
Understanding the Theft of 'Hot Products' | Bowers & Johnson (2016)
Analyzing Repeat Victimization | Weisel (2005)

Steve Winter. Panthera

Step 20
Remember that different places do different things

Just as individuals play different roles within a network, places provide different opportunities to different people. As you think along a crime script, you will begin to see how places are linked to success. Some places are useful for planning and hiding, while others provide a low risk offending environment.

Four distinct types of crime place exist.

- Crime sites
- Convergent settings
- Comfort spaces
- Corrupting spots

Mapping how each place relates to another can help you identify places which play a particularly important role in facilitating the problem.

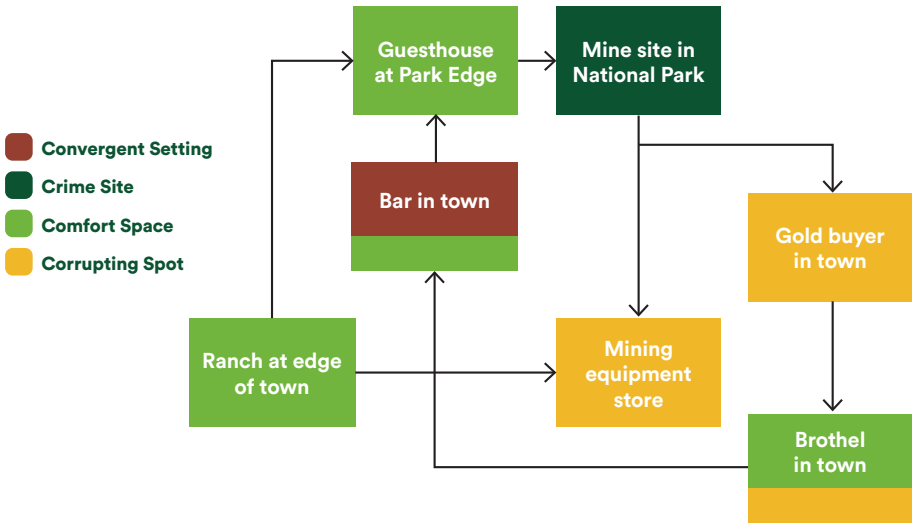| Four Types of Crime Place	
Crime Site	Place where the crime event itself occurs
Convergent Setting	Place where potential co-offenders meet before the crime event
Comfort Space	Place where offenders feel safe and comfortable. Staging, supplying or meeting locations for offenders.
Corrupting Spot	Place that is a transaction point for offenders to exchange items obtained for cash or other rewards that encourage re-offending

Look for crime generators. Some places 'generate' crime by bringing many potential targets together. This is often for reasons unrelated to crime such as shopping or sporting events. Look out for places and events, such as migrations or crop blooming, that increase unwanted interactions between wildlife and people.

Try to identify crime attractors. Some features of the environment 'attract' criminals because they know their chances of success are higher. In cities for example, bar districts or prostitution areas are attractive to robbers. In protected areas, water holes and known migration routes are examples.

Find crime enablers. These are places where control has been lost over time. For example, an abandoned building is good for hiding people and drugs. For wildlife protection, look for unregulated markets that make it easy to sell product, unpatrolled areas with good road access, and lodges that 'look the other way' when suspicious activity happens.

Work with partners to control crime places. Controlling crime places can involve a spectrum of options from positively engaging a neutral or willing landlord as a partner to help prevent the facility being used for criminal purposes, to coercing the landlord to taking over the place altogether.

Gold Mining Hypothetical: Mapping out important places
The problem-solving team used information from post-arrest interviews and investigative work by police officers to identify six key places. These enabled illegal miners to repeatedly prepare for a mining expedition in the national park and enjoy rewards afterwards. The team worked with a diverse set of partners including local police, the municipal authority, and health inspectors to find the most effective ways to regain control of each place.

The figure and table on the next page summarize the findings of their work. |

- **Convergent Setting**
- **Crime Site**
- **Comfort Space**
- **Corrupting Spot**

Gold Mining Hypothetical: Controlling places to reduce the problem		
Types	**Place**	**Place Control Interventions**
Crime Site	Isolated forest patch along narrow creeks where water can easily be pumped.	Increase frequency to high-risk creeks by wildlife officers.
Convergent Setting	Bar in town where miners recruit new team members and plan expedition.	Investigate infractions the bar is committing and work with municipal authority to close bar.
Comfort Space	Ranch at the edge of town is used as a storage facility for mining equipment.	Build case against Ranch owner as knowing accomplice in commission of illegal mining. Apply focused deterrence to dissuade owner from continuing to store miners' gear.
	Guesthouse close to the park edge is where mining teams overnight before entering park.	Provide advice to guesthouse and encourage reporting when miners stay, follow up with warning if necessary. Increase spot checks by health inspectors.
Corrupting Spot	Gold Buyer converts miner's gold into cash.	Unpredictable frequent visitations by officers make this an uncomfortable place for miners to use.
	Brothel converts miners' cash into sexual services.	Investigate drug dealing at brothel and force closure.

| READ MORE |
|---|
| PIVOT. Place-based Investigations of Violent Offender Territories | Isaac et al. (2017) |

Step 21
Know how an awareness space develops

As an analyst, it will be important for you to think about how offenders find criminal opportunities. For example, you might ask yourself, how do harvesters know where to find wildlife? How do traders know where it is safe to sell their product? The concept of awareness space is useful for unpacking these questions.

Awareness space refers to how much an individual knows about the distribution of opportunities in an area. This can refer to criminal opportunities, but also for things a person does in everyday life such as buying bread or adding petrol to a vehicle.

For example, if you needed to buy bread right now, you would access your awareness space for your current location. Where is the nearest store or bakery? Is there more than one? Do you prefer one over the others because it is cheaper or better quality?

When offenders look for criminal opportunities, the same type of questions will guide their decision making. What is the closest source of wildlife? Is there more than one? Is one preferred because the concentration of wildlife is higher or the risk of detection by patrol teams is lower?
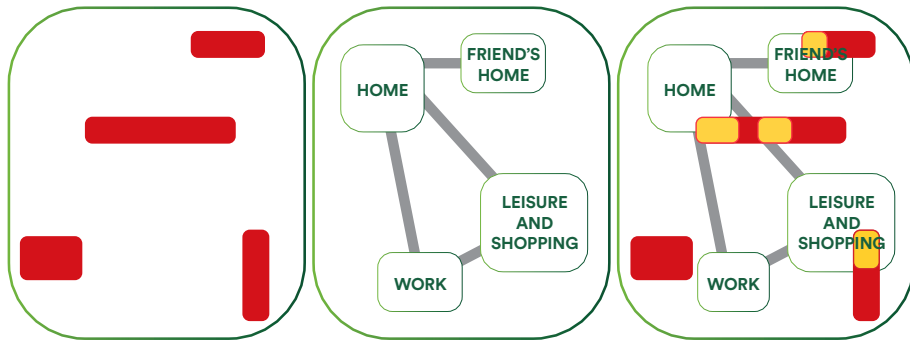

Criminal opportunities (red) have distinct distribution within any given area.

One's awareness space across this area is developed through routine activities such as work, leisure and visiting friends; home and travel between these places (grey lines) add to the awareness space.

Knowledge of criminal opportunities, or the chance of finding them, is highest where the awareness space overlaps opportunities (yellow).

When unpacking your wildlife crime problem, try to understand the role an individual's awareness space plays in determining where they offend. Inside protected areas, it will be important to consider how these awareness spaces develop, when technically these areas should not be used for 'routine activities'; see text box on next page for more on this topic.
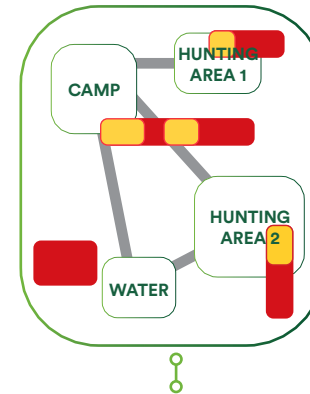
The awareness space of harvesters will develop over time. Their 'routine' activities may include water sources, hunting areas, and camps where they rest and process product.

Awareness spaces are not only important for harvesters that take wildlife. All actors along the wildlife crime continuum, including intermediaries and consumers, will rely on their awareness space when making decisions about where to offend. For example, your problem analysis might consider…

- Which occupations are most useful for creating an awareness space in the area where your problem occurs?
  - o At airports, these might be cargo handlers and security guards because they move around secure areas more freely than cleaners, ticketing staff, or restaurant workers.
- How are trading opportunities linked to leisure/shopping activities?
  - o Busy public places, such as shopping malls, provide good cover for small transactions and make it easier for individuals to perform reconnaissance and counter-surveillance unnoticed.
  - o Consumers may learn about opportunities to buy wildlife products while sitting at a bar or shopping in markets.

OPTIONS FOR BUILDING AN AWARENESS SPACE INSIDE A PROTECTED AREA

Protected areas are unique because they regulate when and how people may access the area. Moreover, they tend to be remote with limited infrastructure, making both access and movement more difficult. The four options below suggest how awareness spaces can be developed under these conditions to improve the efficiency of harvesters.

Option 1—true foraging—harvesters enter the protected area and roam around looking for targets, unaware of where wildlife and patrols are. Success or failure here will largely depend on luck and the skill of the harvester to find targets with no prior information.

Option 2—repeat foraging—harvesters enter the protected area numerous times over a specific period, building up knowledge of where the best hunting grounds are, how to navigate through the terrain, and where it is easiest to avoid patrols.

Option 3—extended foraging—harvesters plan extended trips into the protected area, i.e., days/weeks, to provide extra time to find targets. These trips provide additional time to adapt one's hunting strategy.

Option 4—linking awareness spaces—harvesters rely on the awareness space of others to find targets and avoid patrols. A classic example would be corrupt rangers sharing information about the location of high-value species or patrol movements with poachers, to increase their chances of success.

Step 22
Consider the journey to and from crime

In Step 17, crime scripting was described as a way to think about a criminal event from beginning to end. As an analyst, you will also want to think carefully about the spatial components of a crime script, especially the journey to and from crime. This is not only useful for thinking about prevention measures, but for thinking about reactive measures during the aftermath of a crime event.

Know that offenders typically offend close to home. Countless studies of offending show the further you go from an individual's home, the less likely they are to offend. This often referred to as distance decay; see figure below. Offending near home, or another key node in an awareness space (see Step 21), is logical because it requires less effort. Moreover, individuals are likely to have better information about target availability and security schemes in areas where they spend a lot of time.

Do not neglect the journey AFTER crime. Most crime journey research has focused on how individuals get to their crime site. Fewer have focused on how they get away. The journey after crime is important to understand as it provides additional options for interventions… even if they are reactive. For example, knowing how rhino poachers exit the landscape after a successful hunt, will help you think about where to deploy response teams along a fence line when a gunshot is heard. While you may have missed the incursion, if you know common exit points, you might be able to intervene as hunters leave the protected area. Moreover,

DISTANCE DECAY
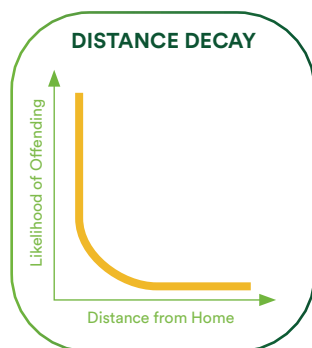
if you know which public roads leading away from the reserve are commonly used, you may be able to inform checkpoints to be on the lookout for a suspicious vehicle.

Consider how people move in the landscape. When analyzing journeys for your problem, think hard about how people move from settlements to the protected area, but also within it. Do they use a vehicle at any point? If so, can that vehicle only travel on certain roads? If they are on foot, are certain types of trails preferred over others? For example, hunters might avoid roads because they are more likely to leave behind footprints that can be detected by patrol teams. In mountainous landscapes, ridgelines might be the preferred route to use because they require less effort than going up and down slopes.

Use tracking data to establish the journey to crime. In some instances, patrol teams will follow the tracks of someone who has entered the area. When possible, have teams collect information that tells you when they are 'on track', as this will help you better understand the crime journeys. GPS collars worn by tracking dogs are an excellent opportunity to build a realistic model of how people move in the landscape.

Use interviews to better understand crime journeys. Qualitative research and post-arrest interviews are useful options for learning more about how people travel to and from crime sites. Here you can learn more about modes of transport used, but also how decisions are made when navigating the landscape. Are manmade features such as powerlines used as points of reference? Are natural features also important? If so, which ones? When triangulated with tracking data, these interviews can help build useful models of movement that can be used to guide operations.

Crime journey before new fence installed begins.

Crime journey when fence is 1/3 complete.

Crime journey when fence is 2/3 complete.

WATCH OUT FOR CRIME JOURNEYS THAT ADAPT TO INTERVENTIONS

As levels of rhino poaching in South Africa increased, greater emphasis was placed on securing the borders of protected areas, both public and private. One option for this was replacing standard electrical fences, that had been installed to keep wildlife inside the area, with more advanced 'smart' fences, that would send a signal to the operations room when the fence had been cut or tampered with by individuals trying to get in. The alerts were specific to a section of the fence, making it easier for response teams to be directed to the incursion immediately, and with better precision.

During a training session with the manager from one of these reserves, it became clear that during the construction of the fence, incursions continued, but targeted the older, non-smart sections of the fence. When the tracks of hunters were recorded by patrol teams, despite the change in entry locations, it appeared hunters would quickly return to their known routes to find and shoot rhinos (see figure above). Thus, hunters did their best to maintain a low risk profile along the fence line, but ultimately relied on known routes to areas with high rhino density. This highlights the importance of thinking about how interventions might disrupt crime journeys, but also how adaptations may be more predictable than expected when the actors and distribution of potential targets remain unchanged.

Distance Decay and Illegal Fishing - An Example from the Great Barrier Reef

An analysis of the travel patterns of illegal fishers from their home to no-take zones where they were detected poaching by authorities in the Great Barrier Reef Marine Park in Australia, found that the journey to crime, both on land and at sea, was consistent with the concept of distance decay. The study showed that poaching was highly localized, with offenders generally driving to the nearest boat ramp from their home and then offending in the nearest no-take zone to that boat ramp.

READ MORE

Conservation Criminology: Modelling Offender Target Selection for Illegal Fishing in Marine Protected Areas | Weekers et al. (2019)

Step 23
Look out for 'hot' wildlife products

When looking at harvesting and seizure trends, you may notice that some species are targeted at much higher volumes than others. In other words, there might seem to be 'hot products' that are preferred by harvesters, intermediaries, and consumers. As an analyst, it will be important for you to think carefully about why some products are harvested and traded more than others.

Understand why 'hot products' are different. Analyses of shoplifting show certain products, such as alcohol, cigarettes, and baby formula are stolen at much higher rates than other items available in a shop. It is not uncommon to find a small number of products are responsible for most of the theft, possibly an 80:20 distribution (Step 19). But why? What makes these products so attractive for theft? A shoplifter could have taken anything, so why do they consistently target these items?

Know that products are CRAVED or CRAAVED. One of the earliest hot product frameworks explained items that are concealable, removable, available, valuable, enjoyable, and disposable (CRAVED) will be stolen more often. In their application of this framework to live parrot trade, Pires and Clarke split available into accessible and abundant to better capture opportunities available to harvesters.

Size matters. Wildlife products come in all shapes and sizes. Smaller items will be easier to hide (concealable) and lighter items will be easier to move around (removable). For example, the claws and teeth of a lion are easier to move than the skin. Try to determine how size and weight impacts the risks and rewards of harvesting and trading. Comparing the value of an item to its size/weight can

be useful for understanding which products are the most valuable 'kilo for kilo'. Size and weight will also help you think about how many people need to be involved and the types of transport or concealment required.

Component	Explanation
Concealable	Products that are easy to hide are more attractive; the theft is less noticeable.
Removable	Products that are easily removed are more attractive; the theft requires less effort.
Available	Products that are commonly available are more attractive; finding targets requires less effort.
Valuable	Valuable products are more attractive; the financial rewards are higher.
Enjoyable	Products that create enjoyment when used are more attractive; the non-financial rewards are higher.
Disposable	Products that are easy to sell are more attractive; obtaining rewards requires less effort.
CRAAVED	
Abundant	Products that are more abundant are more attractive; finding targets requires less effort.
Accessible	Products that are easy to access are more attractive; harvesting targets requires less effort

Pires and Clarke split available into abundant and accessible to better capture how parrot nests differ in their target attractiveness. For example, parrots' nests found on cliffs were classified as 'less accessible' and parrot range was used to determine how abundant nests were for different species.

Consider how fast products go bad. Wildlife products differ in their perishability. Bushmeat rots, live pangolins die, and lion skins become unusable if they are not cared for properly. On the other hand, ivory and rhino horn do not spoil. Wildlife products that require a lot of effort to keep them valuable after the harvesting event may be less attractive than those that that do not. Non-perishable products may even be seen as an investment or savings account that can be relied upon when the money is not needed immediately.

Remember that a single animal can become many products. Tigers are perhaps the best example of this. Almost every single piece of a tiger has cultural or medicinal value meaning when they are killed for trade, very little is left behind. This is quite different than an elephant or rhino, where very little, if any, of the animal is taken besides the ivory/horn. Watch out for species that have a triple bottom line; they are valuable in the live trade, meat trade, and non-perishable trade (i.e., turtles and pangolins).

Cultural and financial values are important. Unlike products stolen from shops, wildlife products often have significant cultural value in addition to an economic value. For example, animal skins are often used in traditional or ceremonial dress, highlighting their cultural importance. When determining the value of different wildlife products in your area, keep in mind how much someone will pay for it, but also how this financial value (or lack thereof) is related to cultural value, which may supersede all.

Watch emerging markets carefully. What's hot today might not be hot tomorrow. Be on the lookout for changes in the types of products you find on the market. For example, the market for lion products has diversified in recent years. While skins have long been traded, the trade in bones (legal and illegal) has grown immensely over the last decade, and a more recent shifts show teeth, paws, and fat coming into the market. Understanding these shifts is important. Reducing an emerging problem is often more realistic than reducing one that has been common for years.

Know the Market

In 2013, a great deal of media attention was given to the link between terrorism and wildlife crime, based on claims that Al Shabab was earning a significant amount of income from the ivory trade. Research published by the Royal United Services Institute in 2015, showed that while Al Shabab had been involved in the ivory trade, it was likely to have been ad hoc and opportunistic. They made much more income by taxing charcoal and sugar, as these were products being sold daily, and in large quantities across the community. This is a good reminder that products with large, local markets may be more attractive even if their value per item is relatively low (disposability).

An Illusion of Complicity: Terrorism and the Illegal Ivory Trade in East Africa | Macguire & Haenlein (2015)

READ MORE

Are Parrots CRAVED? An Analysis of Parrot Poaching in Mexico | Pires & Clarke (2011)

Explaining and Controlling Illegal Commercial Fishing: An Application of the CRAVED Theft Model | Petrossian and Clarke (2014)

Opportunistic or Non-Random Wildlife Crime? Attractiveness Rather than Abundance in the Wild Leads to Selective Parrot Poaching | Romero-Vidal et al. (2020)

From CRAVED to CAPTURED: Introducing a Product-Based Framework to Examine Illegal Wildlife Markets | Moreto & Lemieux (2014)

The Convergence of CAPTURED Fish and People: Examining the Symbiotic Process of Labor Traffcking, and Illegal, Unreported, and Unregulated Fishing | Moreto et al. (2019)

Step 24
Study offender motivation

Why individuals offend is an important question for analysts to consider (Step 15). While criminal opportunity structures facilitate crime, motivation ultimately determines who will or will not take these opportunities. Thus, understanding why individuals choose or feel a need to break the law will help you unravel the link between opportunities and motivation.

For example, are individuals only committing crimes because it is easy, and the risk of arrest is low? Or is the perceived reward so large, that individuals will search for opportunities and take risks because they believe it is worth it? Do they perceive such a high need for a natural resource, that this overrides everything, or do they believe it is their right to collect these resources anyway?

Try to put yourself in the other person's shoes. Imagine what is going through their mind as they consider the risks and rewards of committing a crime. Rather than focus on the distant drivers of offending, such as a troubled upbringing or social inequality, think about the decisions they will make to plan and execute a crime, as well as what they will gain.

Try to identify justifications for behavior. At the end of the day, offenders believe their behavior is justifiable in one way or another. Try to determine what the justifications for your problem are. You may find that some of the justifications such as hunger or lack of opportunity can be addressed with focused protein and livelihood programs. Others, such as traditional rights and perceived injustice, will require a different approach likely involving mediation.

Remember that motivation varies from one person to the next and over time. For instance, firewood collectors could be motivated by (a) the need for cooking fuel at home, (b) financial gain because of demand from local markets, or (c) a combination of both. These motivations can change over time. For example, a person that normally collects for cooking fuel, may need additional income to pay school fees or unexpected medical costs at certain times of the year.

Link motivation to modus operandi. Remember that different motivations may require different tools or levels of planning. For example, if firewood is for personal use, the individual may simply enter with a small axe and carry the wood out by hand. For commercial purposes, different cutting and hauling equipment may be required. Thus, the same threat, perpetrated by individuals for different reasons, would rely on very different opportunity structures.

Identify rewards. Never forget people take risks because it is beneficial. These benefits may be financial, but they could also be related to satisfying hunger, adhering to social norms, thrill seeking, or exacting revenge, which is often the case with retaliatory killings that follow human-wildlife conflict. By understanding what offenders want to gain from their actions, you will be in a better position to consider alternative benefits that would encourage law-abiding behavior.

Try to measure commitment. As you learn about the people causing your problem, see if you can determine how committed they are to rule breaking. People that are quick to join in on these activities may also be quick to leave; or less likely to adapt. Others, who have been involved for a while, or have a history of causing other problems, may be the opposite. Your response will want to account for this level of commitment.

Determine why people DO NOT offend. Knowing that offending is not widespread in most communities, it is important to understand non-offending behavior. Do people find it morally wrong? Do they support the behavior but do not have the skills themselves to participate? Are they too busy with other activities? Are their needs different? Understanding why people do not participate in the problem may help you design a more effective response that encourages this compliance.

There are several ways to learn about offender motivation such as:

Prison interviews
- Offenders in prison are a good source of information. These individuals are typically willing to share their stories because (a) they have already been convicted for the offense and (b) the interaction with outsiders is refreshing.
- When interviewing convicted offenders, do not forget that crime is constantly evolving, and what happened years ago may not be relevant today.

Interviews with active offenders
- Although it is more difficult to find willing participants, interviews with active offenders are an excellent way to learn about the how and why of crime. This group can shed light on why they choose crime over law-abiding behavior, and how they avoid detection/risks.
- Asking this group about crime events they planned but did not execute, i.e., an aborted crime event, may help you understand what deters them.

Informant networks
- If you are unable to access offenders, informant networks are a useful way to collect secondary information. These people are likely to be the friends and family of offenders, or ex-offenders themselves.

Post-arrest interviews
- After a suspect has been arrested, there is an opportunity to learn more about their motivation with interviews. Sometimes these will be formal interrogations, but other times it may be informal conversations that will not be used as evidence.
- Depending on your organization's policy, you may also be able to issue warnings to suspects in exchange for information.

Law enforcement interviews
- Rangers interact with offenders regularly and therefore have developed their own ideas about offender motivation. This group is easy to access and has proven to be a valuable source of information as much of what they know does not end up in official reports.

Courtroom statements
- Reviewing statements made by suspects in court is a good way to utilize historical information. This may require working with local prosecutors to access their documents.

Community focus groups and surveys
- Learning about the community and their perceptions of the park, wildlife, law enforcement as well as the pressures they face can teach you many things. Why do people commit crime, but also why do people not commit crime? And why one type of crime but not the other? This contrast is very important to help you understand the people causing your problem and think of interventions to address them.

READ MORE

Conservation enforcement: Insights from people incarcerated for wildlife crimes in Nepal | Paudel et al. (2019)

The people behind the poaching: Interviews with convicted offenders in South Africa | Moneron et al. (2020)
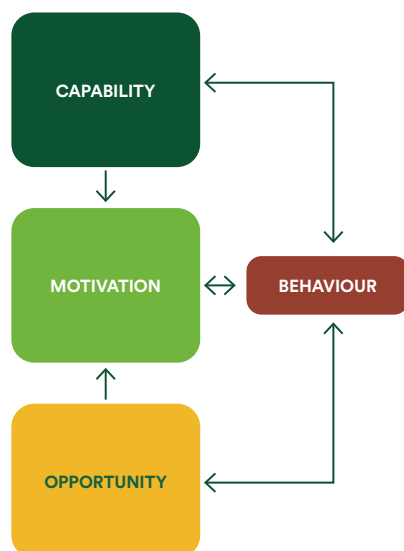
Step 25
Consider criminal capabilities

A person's behavior is the outcome of three things interacting: capability, opportunity and motivation. Although crime science focuses mainly on crime opportunity reduction, understanding criminal capability and motivation and how the three interact can help you refine your response.

Capability, motivation, and opportunity interact to produce a specific behavior.

The COM-B Framework

A capability is a person's knowledge, skills, or physical abilities. Skills and knowledge can be shared or learned through trial and error. Access to a specific piece of equipment such as a firearm, GPS device or night vision goggles can also provide a capability. A person's capability can determine how well they can exploit crime opportunities, and explains why some crime opportunities are only available to certain offenders.

Offenders vary in capability. People vary in their capabilities, in their physical ability, skills and knowledge. That variation helps explain why offenders are not equally responsible for crime, and often a small number of repeat offenders are responsible for most offenses.

Some capabilities are hard to develop. This means certain people will be more valuable to a crime events and networks than others. Experienced hunters who know the land and how to set traps are harder to replace than young men recruited to carry meat.

The graphic below shows how opportunity, motivation, and capability impacted the decision making of bushmeat hunters in Sumatra, Indonesia around Ramadan's end.
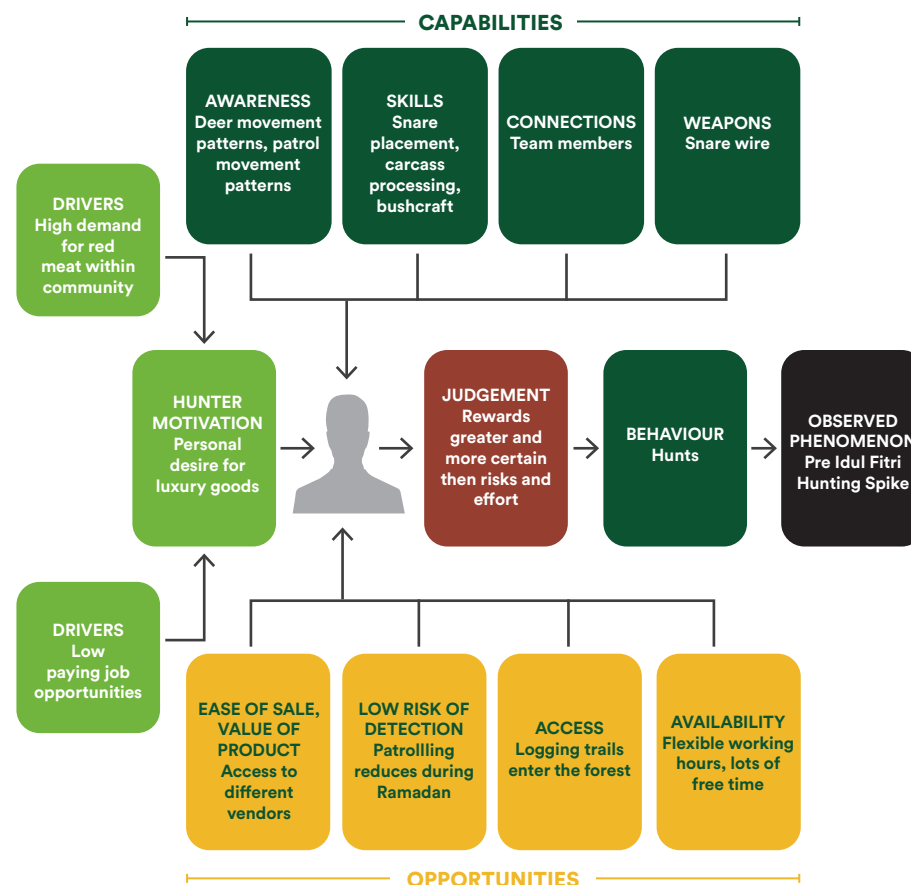
READ MORE

The behaviour change wheel: A new method for characterising and designing behaviour change interventions | Michie et al. (2011)

Examining the shifting patterns of poaching from a long-term law enforcement intervention in Sumatra | Risgianto et al. (2016)

OFFENDER CAPABILITIES AND NETWORK RESILIENCY: A CAUTIONARY NOTE

Certain wildlife crime problems are the work of well-organized networks. Actions to disrupt these networks often focus on removing individuals with special capabilities that are critical to obtaining or moving goods. The assumption is that the individuals' capabilities are hard to replace, and when they are removed, the network dissolves or weakens, resulting in the wildlife crime problem reducing. While this can be effective in some circumstances, several studies show that perceptions of irreplaceability are often flawed. The arrested individuals are replaced, and the network adapts; in some cases, the network is more efficient and resilient.

In the Bangladesh Sundarbans, pirate groups specialized in kidnapping and extorting forest users also dominated tiger poaching throughout the 2000s. A successful government campaign, including a surrender amnesty and targeted enforcement actions, resulted in complete removal of all pirate groups from the Sundarbans by 2018. However, tiger poaching continued and expanded. Interviews with tiger poachers and traders in 2021 revealed local traders who had previously bought tiger products from the pirates reacted to the supply shortage by setting up their own tiger specialist poaching teams. This resulted in shorter supply chains and more efficient networks. The research showed local traders already possessed many of the same capabilities as the pirates to poach tigers, and the local traders continued to interact with pirate members after surrender, gaining knowledge of corruption systems to operate securely.

Pirate Era 2000-2018
Tiger-focused Pirate trade model
Restricted Access
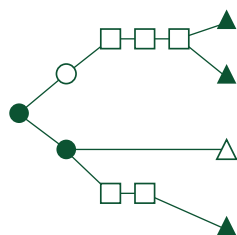
Post Pirate Era 2018-2021
Specialist trade model
Short supply chains
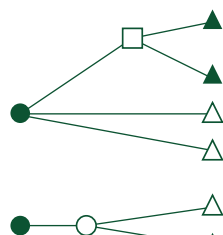
LEGEND

● **Poacher**

○ **Local Trader**

□ **International Trader**

△ **Elite Local Consumer**

▲ **International Consumer**

Try to determine how capabilities are acquired. There may be distinct ways in which an individual gains knowledge or skills. Pinpointing these can provide targets to reduce transmission. For instance, in the Indonesian example, deer poachers gain knowledge of deer movement and patrols from working in the forest as bird trappers and discussing with farmers on the forest edge.

Try to determine if capabilities are acquired at specific places. A local coffee-shop might be the place to acquire knowledge of patrol movements, a blacksmith's shop might be where homemade rifles are obtained. Controlling these places can prevent the development of certain capabilities.

Target capabilities with your response. Look for ways to reduce the development of capabilities or disrupt networks by focusing on specific capabilities, especially rare ones. These may be harder to replace or substitute, increasing the impact of your response and the time it takes for networks to adapt.

READ MORE

Learning from perpetrator replacement to remove crime opportunities and prevent poaching of the Sundarbans tiger| Uddin et al. (2022)

Examining the shifting patterns of poaching from a long-term law enforcement intervention in Sumatra | Risdianto et al. (2016)

Gareth Whittington-Jones, Panthera

Manuel Mairena/Daniel Corrales, (UACFel-SINAC/Panthera)

SECTION 4 | NOMINATE, PLAN AND DEPLOY YOUR RESPONSE

Wearing traditional ceremonial attire, Lozi paddlers move the King's Royal Barge over the floodplains in Barotseland, Zambia. This important cultural event led to high demand for leopard and serval skins each year for ceremonial attire by potential paddlers. A partnership between the Barotse Royal Establishment and Panthera, took a problem-oriented approach to address the issue, and ultimately developed a response that involved setting rules and providing an alternative. Following the King's decree that only artificial skins would be allowed on the barge, custom-made realistic 'heritage attire' was created and shared with paddlers. Interviews found paddlers had an overall positive opinion of the heritage furs, and 70% subsequently had no intention to acquire a real skin. This appears to have been a causal factor in the decline of targeted leopard poaching in protected areas. However, the team also identified a minority preferring real skins, indicating further refinement of the response is needed.

Conflict between people and wildlife creates frustration and can lead to retaliatory killing. Losing a cow to a predator can be a financial blow which farmers may try to offset by selling on body parts to willing buyers. This chain of events can be broken early on by anti-predation measures, but the measures have to work with the capacity of the farm. In other words, problem-solving on a farm-by-farm basis. In Costa Rica, the Wild Cat Conflict Response Unit, a team of the National System of Conservation Areas supported by Panthera, found light and sound emitting collars substantially reduced the likelihood of cattle being predated by jaguars and pumas, with minimal changes to husbandry practices. This and other measures such as electric fences and maternity paddocks, have proven to be close to 100% effective to prevent further attacks by wild cats.

Panthera Costa Rica's Felid-Livestock Coexistence Program

Step 26
Create a conceptual map of how your problem works

This section helps you think about ways to develop a response strategy. After analyzing your problem in depth, you will have probably found different factors enabling the problem are connected to one another. Understanding how the factors are interrelated and where there are reinforcing feedback loops will help you in forming responses. Creating a conceptual map of the problem will help structure your thinking.

> *A conceptual map helps you disentangle a complex problem and get different partners on the same page.*

Create a narrative that explains the problem. Why does your problem exist and how it is sustained? This requires you to ask 'why, why, why, and why?' For example, why do people conduct illegal logging? Because they periodically need access to large amounts of cash. Why? To pay for expensive anti-malarial treatment as malaria is rising. Why is malaria rising? Because illegal logging and farming practices are creating conditions favorable to mosquito breeding. Writing a narrative enables you articulate how one aspect of the problem influences another and helps generate testable hypotheses. This map is a very effective communication tool to draw different partners' attention to where the problem overlaps their area of interest.

Turn your narrative into a map. As you challenge and refine your narrative, you can develop a conceptual map to share with partners and decision-makers. There are no hard and fast rules about how to create conceptual maps, but a few suggestions will increase their impact.

Conceptual maps should always be drawn left to right. This helps guide the reader through a chain of logic. Avoid large leaps of logic where the reader must fill in the blanks. Bear in mind that decision-makers may not question your logic and take the map at face value, so make sure you are communicating where you are confident in the map's assertions, and where you are presenting a hypothesis.

> *Carefully choose how complex your map will be... if it looks overwhelming, chances are it won't be read or understood.*

BUSHMEAT HUNTING HYPOTHETICAL

Drawing a conceptual map

In this step, and some that follow, we use a hypothetical bushmeat problem to describe how a problem-solving team might analyze and respond to a problem.

As they began their analysis, the problem-solving team conducted interviews with hunters after arrest to understand more about the nature of the problem. The team found a high percentage of hunters were young males addicted to methamphetamine, motivated to poach to supply their habit as well as provide essentials to their families. The team worked with a researcher from a local university conducting a socio-economic questionnaire survey in the villages. This confirmed methamphetamine addiction and bushmeat poaching was widespread and rising, exacerbated by low employment options and antagonism towards the park.

The team identified a trap of poverty and drug addiction which led to increased motivation for stimulation and fast cash, while reducing rational decision making. The analysts found that the trap involved two feedback loops. Initially unemployment led to excessive free time among young men who sought stimulation to escape the boredom, poaching for thrill seeking and taking methamphetamine. As addiction rates rose, more income was spent on fueling drug habits, reducing the men's ability to provide family essentials. This created a two-fold need for cash, resulting in the men hunting more. At the same time, several outsider meth dealers perceived the community as a target and started supplying low-cost meth to generate demand. Demand for meth rose, dealers spent more time in the community, and openings arose for new dealers.

The team presented their map and the supporting evidence in a multi-agency meeting and discussed ways to reduce the bushmeat poaching problem. The meeting included police, wildlife department, NGOs, the rural public health department, and the local municipal authority.

Describe importance. A conceptual map can illustrate multiple chains of causation of factors underlying your problem, but not all of them might be equally as important. Varying arrow thickness or annotating your map can help to draw readers' attention to the most important areas. It can be helpful to write a narrative describing your understanding of the problem. Articulating it in this way and inviting your peers to challenge your assumptions will help you strengthen your understanding.

Find the traps and feedback loops. Feedback loops reinforce the problem, trapping it and making it highly resistant to interventions. The malaria-logging case described earlier was one example of a trap.

Identify convergence points to other crimes and problems. One crime can produce opportunities for another. Understanding how the opportunity that enables your focal problem to exist connects to other problems will help you to engage other interested partners.

Desire for bushmeat as a luxury food among elite in local city increasing

HIGH IMPORTANCE

Traders increasingly contact community members offering quick cash for bushmeat

Speed and certainty of cash reward increases

Convergence Point

Dealers increasingly selling meth within communities

HIGH IMPORTANCE

Methamphetamine addiction increases

Motivation for fast cash increases, increased risk taking

Feedback Loop

Increase in poaching for bushmeat

Motivation for stimulation increases

Low job opportunities

High levels of unemployment within the communities

Free time increases

Boredom and depression rise

Unemployment Drug Addiction Trap

Ability to provide food and essentials to family decreases

Risks of detection and sanctioning are low

Sentiments of lack of benefits from park to communities

Widespread antagonism towards park by community members

Motivation for retaliation against authorities strengthens

Park gueards take bribes from poachers, facilitating hunting and masking scale of problems

KEY

| Casual Factor | Specific motivation or crime opportunity | Impact |

Step 27
Consider the different regulatory models available

As your analysis develops, and your understanding of the problem becomes clearer, you will eventually start to ask yourself and others, 'What can we do to make this problem go away?'. If you're working within a law enforcement agency, or supporting one, it is likely that responses rooted in deterrence will be suggested. It is important to remember that deterrence and incapacitation are just some of the regulatory approaches you may consider.

Choose a response that targets the type of individuals driving your problem. Braithwaite's Responsive Regulatory Pyramid is a great way to organize your thinking about what responses might work. Are you dealing with members of the public that are unaware of the harm they cause…or even the laws outlawing the behavior? Or do you have hardened offenders that do not consider the costs of punishment?

Braithwaite's Responsive Regulatory Pyramid

INCAPACITATION
*Incompetent or irrational actor

DETERRENCE
Rational Actor

RESTORATIVE
Virtuous Citizen

CAPACITY BUILDING
Learning Citizen

Assumptions about actor(s) driving the problem

Choose the right tools for the job. Malcolm Sparrow promotes the use of regulatory craftsmanship. The concept is simple, a carpenter cannot build a chair with a single tool; why would reducing unwanted behavior be any different? Do not be afraid to target your problem with different approaches. You might find a combination of capacity building with focused deterrence may be more effective.

Mix and match mandates. Mandates govern what an organization or agency can legally do. For example, NGOs typically lack the mandate to make arrests, whereas law enforcement agencies are unlikely to have a mandate or budget for capacity building in the community. Combine mandates to address the problem from different angles.

Use incapacitation selectively. Prisons and jails are used to incapacitate people; removing them from society so they can do no harm. Incapacitation, which also includes the death penalty in some countries, is the most serious form of punishment available in criminal justice systems; it should be used carefully. For some problems, the harm may be disproportionately caused by a few high-rate offenders. If these are not rational actors and are unresponsive to deterrence or capacity building efforts, you might consider using incapacitation. Incapacitation should be seen as a last resort after alternatives have failed.

Consider the collateral consequences of incapacitation. When people spend time in jail, there are many consequences. Some are felt by the offender, others by their close contacts. Families often lose a key income earner and parental figure, which negatively impacts family structures and adds financial stress. Upon release, offenders often find it hard to get work when they leave prison, especially if they are seen as 'criminals'.

Remember, as you go up the pyramid, costs increase. From an economic perspective, incapacitation is one of the costliest ways to deal with a problem. It requires paying for law enforcement agents, prosecutors, judges, and eventually prison services. When long sentences are given, governments become financially responsible for individuals for years.
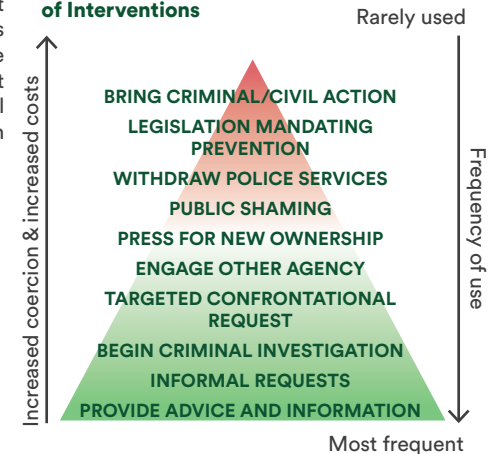
Know about the crime funnel. As individuals move through the criminal justice system, the certainty of punishment changes. This is important for regulatory approaches reliant on deterrence and incapacitation. Court cases can be dismissed, not guilty verdicts are possible, and even sentences handed down by magistrates may not result in punishment (i.e., fines are never paid, or prison sentences are not served). If only a small percentage of individuals are detected or punished, it is unlikely these regulatory approaches will work. The next step gives more information about how deterrence works.

THE CRIME FUNNEL

% DETECTED

% ARRESTED

% TRIED

% CONVICTED

% PUNISHED
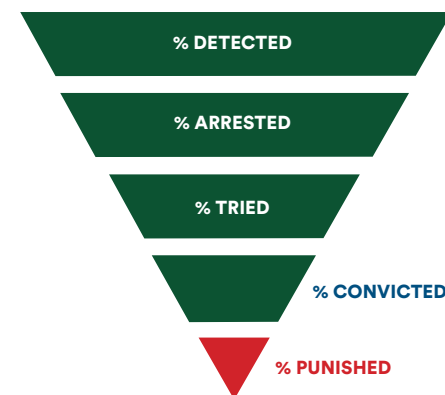
Consider getting others to take responsibility for the places where your problem occurs. Sometimes you may find that members of the community, such as business owners, may be better suited to deal with the problem than you are. This is especially true when specific places are part of the problem. Goldstein's hierarchy of interventions, see figure below, shows the different approaches you might use to shift the responsibility of problems on to place managers; reproduced from Herold and Madensen (2017). Much like Braithwaite's pyramid, it emphasizes that formal police actions are highly coercive and costly; they should be a last resort rather than a starting point.

Goldstein's Hierarchy of Interventions

Rarely used

Increased coercion & increased costs

Frequency of use

BRING CRIMINAL/CIVIL ACTION
LEGISLATION MANDATING PREVENTION
WITHDRAW POLICE SERVICES
PUBLIC SHAMING
PRESS FOR NEW OWNERSHIP
ENGAGE OTHER AGENCY
TARGETED CONFRONTATIONAL REQUEST
BEGIN CRIMINAL INVESTIGATION
INFORMAL REQUESTS
PROVIDE ADVICE AND INFORMATION

Most frequent

READ MORE

Methods for Shifting and Sharing Responsibility for Public Safety Problems | Scott & Goldstein (2011)

Understanding Crime-Place Networks | Herold & Madensen (2017)

Responsive Regulation | Braithwaite (n.d.)

Fundamentals of Regulatory Design | Sparrow (2020)

Step 28
Get focused to make deterrence work

Knowing that deterrence will be a commonly used regulatory model by law enforcement agencies, it is important to consider strengths and weakness of this approach. In some cases, you will be bound by mandate to use enforcement to achieve a deterrent effect. By thinking carefully about how deterrence might fail, or work better, you can use this approach more effectively.

Deterrence is rooted in punishment and rational choice. As noted in the previous step, deterrence assumes you are dealing with individuals who will calculate the risks of offending. The threat of punishments such as fines, community service, or incarceration are seen as too costly for the rewards of offending. Deterrence also assumes that when people are punished, others will see this, reinforcing the risks of offending to society at large.

Deterrence is related to the certainty, celerity, and severity of punishment. Rational actors will base their risk assessment on the likelihood of being caught, the severity of the punishment, and how quickly all of that will happen. A hot stove is a perfect model of deterrence. People learn quickly not to touch hot stoves because every time you do you get burned, it happens immediately, and it is painful. Criminal justice systems are rarely as efficient as hot stoves.

Type of Deterrence	Description
General (populations)	General deterrence refers to the effect of punishment on society at large. By witnessing the effects of punishment on others, individuals within a society change their perception of the 'costs of crime'.
Specific (individuals)	Specific deterrence refers to the effect of punishment on those who are punished. After punishment, these individuals will change their perception of the 'costs of crime'.

Component	Explanation	Example Indicators
Certainty	How likely is it that you will be punished?	Crime detection rate | All crimes : Detected crimes Arrest rate | Arrests : Total detections Conviction rate | Arrests : Convictions
Celerity (Swiftness)	How quickly will you be punished?	Time | hours between offense and detection Time | days between arrest and sentencing Time | days between offense and punishment
Severity	How bad will the punishment be?	Fine ratio | Fine : Annual income (from crime) Incarceration ratio | Months in prison : Months offending Incarceration ratio | Months in prison : Estimated lifespan
Rationality	Are individuals able to make rational choices?	Legal awareness | % of (arrested) population aware of laws Intoxication | % arrestees intoxicated at time of offense

THE 'GEARS OF JUSTICE'
A simplified version of criminal justice systems

Detection & Arrest — Bail & Pre-Trial — Trial & Sentencing — Punishment & Rehabilitation

Unwanted behavior — Desired behavior

The 'Gears of Justice' have multiple failure points. One of the most important reasons criminal justice systems fail to provide a consistent deterrent effect, is because they require coordination across multiple agencies. Moreover, the system is a consecutive process, meaning the failure of one 'gear' causes a failure in the entire system. For example, if rangers make arrests but do not collect evidence according to standards, the case may be dismissed. Or, a person may sentenced to jail, but corruption in the prison services makes it easy for them to avoid serving their sentence. In either case, the system fails, and deterrence is undermined.

When the certainty of punishment is low, so is the deterrent effect. Research shows certainty is the most important component of deterrence. If individuals do not think they will be detected or arrested, the severity and swiftness of punishment matter less. Issues such as corruption, limited resources, and a lack of training, can cause breakdowns in the criminal justice system.

Awareness is crucial. For deterrence to work, people need to know the rules. People unaware of harvesting regulations or the protected status of species will not see their behavior as a problem. Find ways to increase awareness to encourage compliance and communicate potential risks.

Harsh punishments can have unintended consequences. People often argue law enforcement is not working because the penalties are not severe enough…'we need to get tough on crime!'. It is important to know that research on severe penalties shows they are often ineffective and can even be counterproductive. Moreover, if certainty is low, would-be offenders will not see the severe punishment as a risk. Also consider that when punishments are seen as too harsh, communities may see them as illegitimate and be less likely to help with detection.

Focused deterrence is a proven way to reduce crime and disorder. Focused deterrence is a strategy that overcomes some of the problems with a deterrence model by strengthening cooperation between different parts of the criminal justice system. The logic is simple, when chronic, high-volume offenders are identified, law enforcement and their partners can find different ways to increase the certainty these offenders will be punished. This often involves building strong cases against these offenders and then contacting them to share the evidence. A simple message is given, 'stop now, or you are going to be punished.'

Focused deterrence is a 'carrot and stick' model that 'pulls levers' to achieve change. Individuals targeted need options to abandon their criminal ways. This often involves law enforcement working with social service agencies to provide offenders with access to jobs, addiction services, or other forms of assistance. The goal is to pull levers in the person's life; some will make punishment more certain; others will make leaving a criminal lifestyle easier.

READ MORE

Conservation, wildlife crime, and tough-on-crime policies: Lessons learned from the criminological literature | Wilson & Boratto (2020)

Focused Deterrence of High-Risk Offenders | Scott (2017)

Focused Deterrence Strategies | Center for Evidence-Based Crime Policy (n.d.)

Pulling levers: Chronic offenders, high crime settings, and a theory of prevention | Kennedy (1997)

Step 29
Think about removing opportunities

When thinking about ways to tackle or solve your wildlife crime problem you have identified, it is important to use the results of your analysis. By now you should have answered the 5 W's and 1 H of the crime problem and thus will know a great deal more about the motivation of offenders and the criminal opportunity structures enabling their behavior.

When designing solutions, you need to think outside the box and look for ways to address the problem other than adding 'more boots on the ground' as this is probably not possible financially and more importantly, does not draw on what you have learned about the crime problem. Moreover, if the criminal justice system is not working properly, using it to change behavior is probably unrealistic.

The 25 techniques of situational crime prevention (SCP) are an excellent tool for brainstorming. Each technique refers to a different way for helping discourage offenders, empower citizens, and protect victims.

CASE STUDIES SITUATIONAL CRIME PREVENTION (SCP)

The POP Center hosts the Situational Crime Prevention Evaluation Database. These case studies are great examples of how SCP projects were designed, implemented, and evaluated, providing evidence about 'what works'.

The 25 Techniques of Situational Crime Prevention	
Increase the effort	1. Target harden
	2. Control access to facilities
	3. Screen exits
	4. Deflect offenders
	5. Control tools/weapons
Increase the risks	6. Extend guardianship
	7. Assist natural surveillance
	8. Reduce anonymity
	9. Use place managers
	10. Strengthen formal surveillance
Reduce the rewards	11. Conceal targets
	12. Remove targets
	13. Identify property
	14. Disrupt markets
	15. Deny benefits
Reduce provocations	16. Reduce frustrations and stress
	17. Avoid disputes
	18. Reduce temptation and arousal
	19. Neutralize peer pressure
	20. Discourage imitation
Remove excuses	21. Set rules
	22. Post instructions
	23. Alert conscience
	24. Assist compliance
	25. Control drugs and alcohol

Steps 30-34 are dedicated to the 25 techniques of SCP and will help guide you through the utility of each one. Examples for the manual's hypothetical problems are provided to show how theory turns into practice. See Step 15 for a refresher of the 5W's and 1 H of the hypothetical problems; a list of the problems is provided on the next page.

As an analyst, it is important to know these techniques. They are useful for thinking more broadly about prevention, especially beyond deterrence and incapacitation models reliant on the criminal justice system.

5 Do's and Don'ts of Situational Crime Prevention

DO use situational crime prevention as part of a broader law enforcement strategy.

SCP does not require an agency to stop all other law enforcement activities. Instead, it should be seen a novel way to target criminal opportunities with directed operations and partnerships and go beyond trying to be 'in the right place, at the right time, all the time'. Responses should complement ongoing operations...not compete with them.

DO NOT use situational crime prevention to address wildlife crime in general.

SCP works best on specific problems. The broad category of 'wildlife crime' would include are too many actors, targets, places, and unwanted behaviors. Get specific if you want to use SCP properly.

DO NOT use situational crime prevention to address a problem before it has been thoroughly analyzed.

Until the drivers and facilitators of a specific problem have been verified with a thorough analysis, it will be difficult to choose the right response or set of responses. SCP is very context specific, be sure you have not made assumptions that will undermine your work. You will not know what prevention tools you need until your analysis is complete.

DO use situational crime prevention to create a 'menu' of responses that can be discussed with management and operations.

Implementing interventions requires a great deal of coordination and support to get it right. Create a list of potential interventions and present them objectively to those involved with implementation. This makes it easier to prioritize responses based on budgets, skill sets, timelines, and willingness to participate.

DO NOT try and fit every situational technique to your problem.

These techniques provide a structure for thinking about crime prevention. This helps create a broader list of responses. If one of the techniques does not fit your problem that is OK. Simply mark this as not applicable. The examples below show when this applies to the hypothetical problems used in this manual.

Step 30
Increase the effort required to be successful

Knowing that offenders can be opportunistic or highly motivated, increasing the effort required to offend successfully targets both groups. In general, the main idea of the SCP techniques described below is to make it more difficult to access and/or take advantage of criminal opportunities.

It is important to remember that some of these techniques may be very easy to implement while others might require considerable time and money. As an analyst, it is your job to think carefully about the pros and cons of each measure, and present these to decision-makers. By giving a well-researched plan of action, with multiple options for interventions, you are emphasizing the reality that there is no silver bullet for crime reduction.

Harden targets. Target hardening is one of the oldest and widespread crime prevention measures. For example, locks keep burglars out of homes, bullet proof glass makes robbing banks more difficult, and cement barriers keep cars from driving onto sidewalks. In essence, the purpose of target hardening is to make crime more challenging by building barriers between offenders and targets. Using target hardening to solve wildlife crime problems is a bit difficult given the need to leave nature undisturbed. That said, one way target hardening may be useful is when wildlife crime problems involve confiscated items such as skins, traps, and trophies, which are vulnerable to theft.

Control access to facilities. As noted in Step 14, crime is the result of offenders and targets being in the same place at the same time. By controlling access to facilities, it is possible to keep these groups separate. In cities, doormen or electronic access cards are a standard way to monitor who is coming in and out of buildings, making it more difficult for thieves to enter the building. In protected areas, fences make it more difficult gain access especially when manned gates are used to monitor the coming and going of individuals and vehicles.

Screen exits. Thinking about the stages of crimes from beginning to end (see Step 17), targeting offenders as they leave the scene of a crime may be beneficial. Alarms at the exit of stores to detect items that have not been paid for are commonly used to prevent shoplifting. Vehicle searches when people leave protected areas may help identify illegal products as would screening of baggage at airports.

Deflect offenders. Road closures are a classic example of ways to deflect offenders by forcing them onto other roads, further away from their targets. This may be a good option for preventing certain wildlife crime problems, such as illegal logging, whereby closing roads would reduce access to prime areas. Checkpoints along roads running through protected areas is another option, making it harder to move large quantities of bushmeat quickly from hunting areas using certain routes that may be better suited for large vehicles.

Control tools and weapons. When offenders need tools and weapons to commit their crimes, finding ways to reduce access to these can be important. For example, limiting the sale of spray paint to minors can help reduce graffiti and vandalism. Strong legislation on gun ownership and storage makes it more difficult for these to be used in crime or accessed by children which often results in unintentional shootings. Controlling the sale of traps and poisons used by hunters is one example of this. When tools or weapons are commonly available, such as snare wire, this technique may not be applicable to your crime problem. In that case, use the other SCP techniques to disrupt the unwanted behavior.

SCP Technique	Turtle egg harvesting	High value smuggling through transit airport	Illegal gold mining inside park boundaries	Bushmeat hunting to support drug habits
Target harden Make the target physically harder to remove or damage.	Not applicable. Altering the eggs or nests would be too disruptive.	Not applicable. The high value items are already in transit.	Not applicable. You cannot alter the earth without disturbing nature.	Not applicable. You cannot alter the deer without disturbing nature.
Control access to facilities Limit entrance to areas with physical barriers and/or screenings.	Prohibit boat access to river segments where eggs are harvested.	Extra screening for high-risk cargo when it is unloaded from arriving aircraft.	Require pre-approved permit for travel on park roads.	Require pre-approved permit for travel on park roads.
Screen exits Make it harder the leave the crime scene unnoticed.	Use checkpoints along river to monitor boat traffic coming out of harvesting sites.	Use detection dogs to screen high risk cargo before it is loaded onto airplanes.	Vehicle checks for all traffic leaving the park to look for evidence of mining activity including tools or products.	Checkpoints with detection dogs along roads monitoring vehicle traffic coming out of the park in the early morning.
Deflect offenders Push offenders away from their targets.	Re-route boat traffic during breeding season.	Not applicable. The product is already in transit via legal cargo routes.	Close or destroy (in)formal roads used to access mining sites.	Close park roads at night when they are commonly used to access hunting areas.
Control tools/ weapons Limit access to key items needed for success.	Not applicable. All of the tools needed are too common to control.	Not applicable. No tools or weapons are used in this problem.	Prohibit the purchase and use of mining equipment by unlicensed individuals.	Close down blacksmiths selling materials used to make homemade guns.

Step 31
Increase the risks associated with each attempt

Offenders often commit crime because they feel the risk of getting caught is very low. Finding ways to increase the risk of getting caught, or making offenders think there is a higher chance of being identified, is a useful set of SCP techniques. The most important thing to remember when considering these options is to think about how individuals other than law enforcement, such as private citizens and business owners, can help with crime detection and reporting.

Do not forget that when the criminal justice system is not working, increasing the risk of being caught may not serve as a deterrent. However, 'getting caught' can have numerous outcomes, including loss of social standing or enrollment in diversion programs that give positive opportunities (see Step 33). Your job is to think about how increasing risk applies to your local context and culture.

Extend guardianship. Guardians are people that protect targets from offenders, sometimes by simply being present. Extending guardianship increases the amount of time targets spend with guardians who can intervene or observe when offenders attack a target. Sometimes the perception that someone is watching is enough to make one target seem less attractive than another. Walking in groups at night and leaving a light on at home when you are away are classic examples of making robberies and burglaries seem riskier. In protected areas, community scouts and 'farm watch' programs are good examples of attempts to extend guardianship.

Assist natural surveillance. Natural surveillance typically refers to 'eyes on the street' in cities where citizens watch over neighborhoods and report crime to police. Interventions such a better street lighting and designing buildings

to make natural surveillance easier are two examples of assisting natural surveillance. For wildlife crime prevention, setting up hotlines for citizens to report suspicious activity or creating chat groups with landowners are examples of assisting natural surveillance.

Reduce anonymity. Being anonymous gives offenders an advantage because it is less likely that victims and witnesses will be able to identify them. Finding ways to reduce anonymity is one option for increasing the risk of offending. To reduce reckless driving, many companies place 'how's my driving?' decals on vehicles making it easier for citizens to report the actions of specific drivers. Better record keeping at the entrance to protected areas and giving verbal warnings to known hunters are two ways to reduce anonymity.

Use place managers. The problem analysis triangle emphasizes the importance of place managers in crime prevention (see Step 14). By training employees how to prevent crime in the places they work, it is possible to shift some of the responsibility of law enforcement agencies to members of the public. Crime is rarely good for business meaning place managers will benefit from participating in crime prevention programs. In protected areas, getting landowners, tourism operators, and lodge staff to identify and report suspicious activity or become involved with job programs might be options.

Strengthen formal surveillance. Formal surveillance refers to the work of police and private security companies responsible for detecting and deterring crime. Finding ways to strengthen these agencies is one way to increase risk. The use of CCTV and other monitoring technologies has given police departments an increased ability to monitor areas and investigate crimes after the fact. For wildlife crime, building better collaborations between agencies will help with information sharing, while remote sensing technology can help monitor areas continuously. Adding more rangers or ranger posts are also examples of attempts to strengthen formal surveillance.

SCP Technique	Turtle egg harvesting	High value smuggling through transit airport	Illegal gold mining inside park boundaries	Bushmeat hunting to support drug habits
Extend guardianship Increase the actual or perceived presence of guardians.	Internship program for local biology students to monitor beaches.	Internship program for criminal justice students to examine x-ray imagery of cargo as it is offloaded.	Internship program for geography students to regularly monitor satellite imagery of the area to find new mines.	Internship program for biology students to conduct biodiversity surveys in hunting areas.
Assist natural surveillance Make it easier for citizens to recognize and report suspicious activity.	Work with local youth groups hiking in the area to establish reporting mechanism for suspicious behavior.	Teach baggage and cargo handlers how to identify/report suspicious cargo and paperwork.	Awareness courses and hotline for community members to identify and report mining.	Community hotline to report the sale of bushmeat.
Reduce anonymity Make offenders easier to identify.	Keep records of shoeprints found on the beach.	Report all personal and company details of seized shipments to international police organizations.	Leave notices at mining sites informing miners that their site has been recorded and will be monitored regularly.	Verbal warnings to known hunters or middlemen.
Use place managers Get help from individuals and businesses responsible for the locations where crime happens.	Encourage hotel owners in the area to report suspicious activity or guests during the harvesting season.	Give rewards to cargo service companies, and their employees, for information about suspicious cargo.	Work with building owners to evict businesses selling illegal mining equipment.	Encourage plantation owners whose bordering land is used to access the park to report suspicious activity.
Strengthen formal surveillance Increase the capacity and capabilities of security organizations.	Permanently stationed eco-guards at beaches during harvest season.	Training in species identification for customs and airport police.	Targeted patrolling in mining areas during hours when the mines are active.	Targeted patrolling and observations at forest entry/exit points.

Step 32
Reduce the rewards associated with success

Rational choice theory explains criminal behavior as a calculation of risks and rewards. When the rewards of crime are thought to outweigh the risks, criminals will take a chance. Finding ways to reduce the rewards of criminal behavior is one avenue for prevention.

As an analyst, it will be your job to think about the rewards offenders receive. Is the behavior driven by a need for money? Protein? Status? Or perhaps even revenge? Look for ways to reduce those rewards using these techniques.

Conceal targets. Hiding targets from criminals is one way to make crime less attractive. When offenders cannot see opportunities, they are unlikely to pursue them. Parking cars in a garage, removing jewelry from display cases at night, and putting valuables in the trunk of a car while shopping are all examples of concealing targets from thieves. Translocating animals away from the boundaries of protected areas, driving them away from fence lines, and not publishing detailed species distribution information are all examples of concealment.

Remove targets. Like concealing targets, one way to reduce the rewards of crime is to remove targets altogether. Emptying cash registers at night, storing valuables in a safety deposit box rather than at home, and removing electronics such as GPS devices from parked cars are examples. For wildlife protection, translocating animals to different reserves and rhino dehorning are examples of target removal. Note that removing and concealing targets may not be possible for many wildlife crime problems because they are too disruptive.

Identify property. Markets for stolen goods work best when the products being sold cannot be traced. When stolen items have unique identifiers, it is easier to link them back to crime scenes and arrest those who are in possession of these items. Cattle branding, micro-chipping of expensive horses and micro-dots on personal electronics are all way property can be identified. In protected areas, DNA databases for rare individuals, micro-chipping in rhino horns, and photographic databases of tiger stripes are ways to link seized products back to a specific reserve.

Disrupt markets. People steal for many reasons, but a major driver of this activity is the ability to resell stolen items for a profit. By focusing on what happens to stolen products after the initial theft, much can be learned about the individuals and markets involved. By targeting these markets, you target the rewards associated with theft. Examples of this include monitoring of pawn shops and regular checking of street vendors to ensure they are licensed. Markets for wildlife products are no different, so regular spot checks on places known to sell bush meat, demand reduction campaigns, and prohibiting/regulating trade in specific products may be useful.

Deny benefits. If crime does not produce the desired benefit an individual is looking for, it becomes less attractive. Denying the benefits of crime will depend on the type of problem and motivation of the offender. Quickly removing graffiti denies artists the benefit of people seeing their work, using ink tags on clothing makes stolen items unfashionable, and disabling stolen cell phones makes them less attractive to buyers. For wildlife crime, preventing hunters from smoking meat in the bush means it will spoil faster, putting trackers in rhino horn will make it easier to find, and having leaders stop the use of real furs in ceremonies help deny the benefits of illegal hunting.

SCP Technique	Turtle egg harvesting	High value smuggling through transit airport	Illegal gold mining inside park boundaries	Bushmeat hunting to support drug habits
Conceal targets Make it harder for offenders to see targets.	Not applicable. Moving or hiding the eggs would be too disruptive.	Not applicable. The product is already in transit.	Not applicable. The gold is already hidden in the ground.	Not applicable. Moving or hiding the deer would be too disruptive.
Remove targets Physically remove targets from the places where offending occurs.	Create hatchery program for a certain proportion of the eggs each year.	Not applicable. The product is already in transit.	Not applicable. Removing the gold would do the same damage as mining it.	Not applicable. Moving or hiding the deer would be too disruptive.
Identify property Give items a unique identifier so they become traceable.	Spray eggs with DNA water to identify which beach it came from should it be seized.	Consultation (virtual) by experts to determine species and legal status of goods.	Not applicable. Once gold is melted down it becomes untraceable.	Rapid DNA tests to determine if meat sold is domestic or bushmeat.
Disrupt markets Alter the availability or size of markets where illegal products are traded.	Identify and warn/arrest key traders that buy eggs from the harvesters to reduce market access.	Impose fines on cargo agencies responsible for checking and loading contraband.	Prohibit sale of gold without proof of origin or permit for mining.	Introduce legally obtained deer meat into the market at the same or lower price than illegally hunted meat.
Deny benefits Make it harder for the offender to benefit from the crime, even if they were successful.	Awareness campaign to reduce demand/price for turtle eggs.	Ban individual and companies associated with seizure from using delivery service.	Target individuals buying illegal gold with focused outreach and deterrence.	Use demand reduction campaign to reduce price of bushmeat.

Step 33
Reduce provocations that encourage the problem

Crime is the product of various situations, personal histories, and opportunities coming together at once. This means it is important to think about the 'tipping points' that provoke people into a specific crime. This could be a sudden need for income due to crop failure, the fear of further loss after wildlife damaged property, or social pressure to hunt to maintain or increase status. You will probably realize your law enforcement mandate is not well equipped to deal with these provocations. That is ok. Instead think how you could partner with others to get the resources and services needed to reduce these provocations.

Reduce frustrations and stress. Many times, frustration and stress build up until reaching a tipping point is reached. Crowded public transportation, delayed flights, and overcrowded bars all have the potential to induce violence problems. Limiting the number of people into a club, providing regular updates about delays, and offering more frequent transport service, can all reduce stress. With wildlife protection, revenge killings are often the outcome of crop raiding animals, attacks on humans or livestock, and poor lines of communication between protected areas and the surrounding community. Addressing wildlife damage rapidly, providing better communication between communities and park management, and involving communities in decisions that impact their daily lives, are all ways to reduce frustrations and stress.

Avoid disputes. If not properly managed, arguments or disputes have the potential to turn criminal. By understanding how disputes arise, it becomes clearer how they can be avoided. Separating rival fans at football matches, agreeing on prices before offering services, and removing excessively intoxicated people from bars are all examples of avoiding disputes. Building barriers to keep wildlife out of communities, reimbursement programs for lost cattle/crops, and community driven management are ways to avoid disputes in wildlife protection.

Reduce arousal and temptation. Certain criminal behavior is the result of offenders being tempted into it. While there is no excuse for breaking the law, as a problem-solving analyst you should keep arousal and temptation in mind. Prohibiting sex offenders from working with children and having observers present during medical exams are examples of reducing temptation. Controlling access to information regarding the distribution of high value species and banning private weapons inside reserves are ways to reduce the temptation to get involved with wildlife crime.

Neutralize peer pressure. Peer pressure can have a positive or negative effect on the criminal behavior of individuals. On the one hand, peers may encourage crime, on the other, they can be very effective at discouraging it. Separating troublemakers at school and public awareness campaigns such as 'friends don't let friends drive drunk' are good examples of this. Role model programs centered around conservation principles, sharing information about the safety risks of hunting, and gaining the support of community leaders are ways to apply this technique to wildlife crime.

Discourage imitation. Imitation is the sincerest form of flattery…or so the saying goes. It is also a way criminal behavior spreads within a community or population. Finding ways to discourage imitation of unwanted behavior is an option for solving a crime problem. Firewalls on internet browsers prevent children from viewing sensitive content, rapid repair of vandalism discourages further damage, and keeping certain details about serious crime out of the newspaper avoids copycat behavior. With wildlife crime, limiting profit sharing with communities involved with poaching, educational programs about the effects of wildlife on communities, and seizing the tools/weapons of individuals found in the protected area are ways to discourage imitation.

SCP Technique	Turtle egg harvesting	High value smuggling through transit airport	Illegal gold mining inside park boundaries	Bushmeat hunting to support drug habits
Reduce frustrations and stress Find ways to remove stressors that lead to offending.	Provide seasonal alternative livelihood opportunities for harvesters.	Not applicable. The problem is not caused by frustrations and stress in the transit nation.	Alternative livelihood programs for miners or job programs with legitimate mines.	Alternative livelihood programs for hunters.
Avoid disputes Find ways to reduce the likelihood of disputes or ways to resolve them quickly.	Not applicable. The problem is not caused by disputes.	Not applicable. The problem is not caused by disputes.	Work with local leaders to ensure park benefits are shared with communities.	Work with local leaders to inform community of park regulations and harvesting agreements.
Reduce temptation and arousal Eliminate situations that expose motivated offenders to easy crime opportunities.	Create incentive scheme that rewards communities based on proportion of eggs hatched.	Reliable and reasonable pay for cargo and baggage handlers.	Micro-loan schemes to provide relief when quick cash is needed.	Substance abuse programs to help hunters reduce drug dependency.
Neutralize peer pressure Find ways to encourage social norms that are against offending.	Social media campaign to show the destructive nature of egg harvesting on the local ecosystem.	Reward and promote baggage handlers that identify illicit cargo.	Awareness campaign to show the personal dangers of mining as well as the environmental impact.	Employ reformed hunters to coordinate wildlife club activities that promote conservation.
Discourage imitation Find ways to reduce opportunities to learn criminal behavior as well as the benefits of imitating it.	Work with village leaders to denounce the collection and trade of eggs.	Ban people and companies associated with seized shipments from business in the transit nation.	Seize all equipment and gold from miners found at an active site.	Enact community-based rewards systems that are related to the proportion of community members involved with illegal hunting.

Step 34
Remove excuses for non-compliance

Justifying behavior is a common tactic used by offenders to side-step responsibility for their actions. Statements such as, "I didn't know it was illegal" or "everyone else is doing it" or "my actions are not hurting anyone", are examples of these justifications. The final category of situational crime prevention looks to remove excuses for offending.

As an analyst, you will need to consider if unclear laws, ignorance of laws, or cultural norms explain the unwanted behavior. Culture norms might drive repeat offending while opportunistic offenders may simply not know the regulations. You need to consider when removing excuses is relevant based on your problem analysis.

Set rules. Setting rules is a very simple way of removing excuses for crime. Making clear rules, and enforcing them, removes the wiggle-room often exploited by offenders. Rental agreements at apartment complexes make expectations clear and non-refundable deposits for reservations reduce no shows. For wildlife crime prevention, memorandums of understanding with communities that regulate hunting make quotas clear while curfews on driving at night stop unwanted movement in protected areas.

Post instructions. Posting instructions in areas targeted by offenders removes excuses for unwanted behavior. Classic examples of such signs are "private property" and "shoplifters will be prosecuted". In protected areas, signs might read, "no hunting allowed", "cattle will be seized", and "no trespassing". These signs might change seasonally to reflect current regulations.

Alert conscience. Sometimes, a simple reminder helps offenders remember that they are being watched or breaking the law. Two well-known examples of this are signs that read, "smile, you're on camera" and roadside display boards that show the posted speed limit and the speed of a vehicle. For protected areas, clearly marked boundaries, with fencing or signs, helps show where the reserve begins, while requiring visitors to sign a statement saying they know and understand the park rules which are punishable by law, reminds them that they will be held responsible.

Assist compliance. A great way to remove excuses for offending is to actively help would-be offenders not break the law. Providing bags for dog droppings at the entrance of parks can reduce the reluctance of owners to clean up after their pets, public urinals on the streets of Amsterdam help reduce people urinating on the streets, and using simple barriers at airports to control cues prevents cutting in line. For protected areas, allowing regulated hunting and firewood gathering and profit sharing with communities can assist compliance with regulations.

Control drugs and alcohol. Many times, crime is the result of people being drunk or high which lowers their inhibitions and causes them to do things they normally would not do. At the same time, addiction can fuel a recurring need for fast cash. Controlling drugs and alcohol helps remove excuses used by offenders who do not take responsibility for their actions. Hosting alcohol free events and training bar staff how to monitor the alcohol consumption of customers helps avoid unwanted situations. In protected areas, providing substance abuse programs for individuals who use wildlife crime to fund their habits, and regulating the use of alcohol by legal hunting camps, are two ways this technique may help reduce crime.

SCP Technique	Turtle egg harvesting	High value smuggling through transit airport	Illegal gold mining inside park boundaries	Bushmeat hunting to support drug habits
Set rules Define a clear set of regulations and make them known.	Define formal harvesting guidelines.	Establish national legislation to govern wildlife trade.	Establish process for approval of mining operations.	Establish clear hunting regulations.
Post instructions Use signs and display boards to clearly communicate rules at a location.	Post signs at entrances or at harvesting areas indicating which species can be harvested and when.	Post signs at packing or delivery locations with pictures of prohibited species.	Post signs in communities at along forest entrances that make it clear mining is not allowed.	Post signs at park border indicating what species can be hunted at that moment in time.
Alert conscience Find ways to remind offenders their behavior is not allowed and punishment may be possible.	Place small signs at turtle nests reminding harvesters it is illegal and the beaches are monitored.	Add note to waybill signed by sender reminding them that items seized in transit nation come with immediate arrest warrant.	Leave signs at new mining sites, for example during the land clearing phase, telling miners this is illegal.	Motion sensitive speakers along hunting trails that play a recorded message about hunting regulations.
Assist compliance Find ways to make it easier for people to follow the agreed upon rules.	Create legal and sustainable offtake scheme.	Amnesty boxes at packing centers if senders want to turn over illicit goods.	Provide job scheme for mining industry or establish well defined areas for artisanal mining.	Licensed hunting program with assistance to help local hunters enroll.
Control drugs and alcohol Find ways to limit the availability and use of substances driving offender behavior	Not applicable. This problem is not related to or facilitated by drugs and alcohol.	Not applicable. This problem is not related to or facilitated by drugs and alcohol.	Not applicable. This problem is not related to or facilitated by drugs and alcohol.	Substance abuse programs for addicted hunters.

Step 35
Control places that facilitate the problem

Step 20 highlighted the importance of researching locations during your problem analysis. Different places do different things, and your analysis may show that when it comes to deploying a response, focusing on places may be a better option than focusing on people. This is especially true when you have limited information about offenders. If you do not know who is causing the problem, it may be better to focus efforts on where the problem occurs.

Start with your crime script. If you have written a script for your problem (Step 17), you will know which locations are important. Think of ways to make these locations less attractive or functional. For example, you might look for ways to improve weak security at a facility being exploited to stockpile products or concentrate on wildlife markets where products are sold.

Identify and empower place managers. The problem analysis triangle (Step 14) highlights the importance of getting property owners and managers involved with crime prevention. When important locations have been identified, figure out who owns, rents, and manages them. Think about ways the wildlife crime problem impacts these people. Are they benefiting? Is it causing problems? Do they even know about the problem? When you find willing managers, make them part of your solution by providing advice or assistance to reduce the use of their property.

Put names and faces to places. When you understand how your problem connects to different places, get to know the people who go there...not just the owner or manager. You may realize there are many additional options for controlling the problem with help from citizens in the area. These may be staff working at a location, or community members that regularly use it. These people may be interested in helping report unwanted behavior, or they may have good ideas for how to make it stop. Either way, making personal connections with people in these locations will help you build relationships useful for solving the problem.

Identify what makes a place vulnerable to disruptions. As you think about ways to intervene, consider why certain places are weaknesses in the chain of events. Is a location one of the few places where the entire group of offenders comes together? Is it a place where high value products or tools are stored? Does the offender stay in this one place for long periods of time? Is the place unique, rare, or hard to replace?

Build a network of partners to help put pressure on multiple locations. The locations facilitating your problem will be controlled by a variety of individuals and groups. As you start building a response, determine who you will need, and how they might become part of a larger network. Also try to think about networks that already exist. For example, you may find there is an association of market stall vendors that would like to stop the sale of illegal products. Or a farmers' association associated with the agricultural land along your boundary. Both could support the development and deployment of solutions.
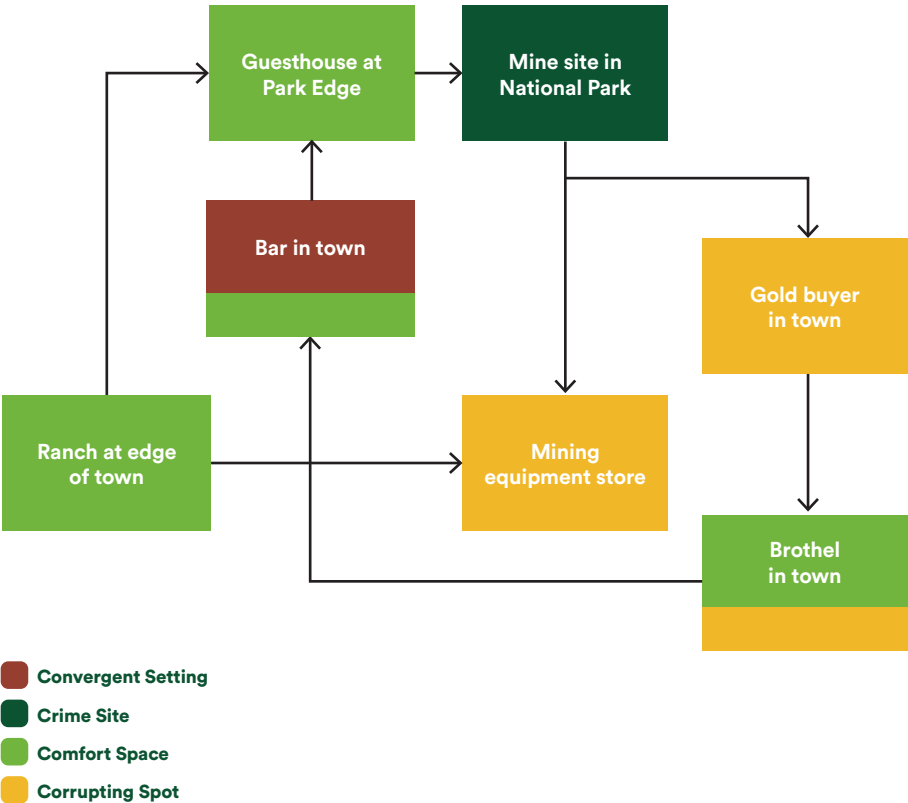
Do not forget about transit routes. Transit routes connecting places may be good targets for an intervention. If there are clear bottlenecks or 'choke points' along a transit route, or crime journey (Step 22), consider how you could use this to your advantage. Also consider how place managers along transit routes, like bus drivers and luggage handlers, could help with prevention.

Make sure you control places at the right time. Your problem is unlikely to happen at important locations 24 hours a day, 7 days a week. Look for patterns in when the place is used to ensure you do not waste resources on an intervention at the wrong time.

The table on the next page gives examples of place-based disruptions that could be used to target the hypothetical mining problem introduced in Steps 15 & 20.

Convergent Setting
Crime Site
Comfort Space
Corrupting Spot

| Illegal Mining Hypothetical: Controlling places that facilitate the problem		
Place	Vulnerability	Option for Disruption
Crime Site **Isolated forest patch along narrow creeks where water can easily be pumped**	Miners spend extended periods of time in very specific parts of the landscape	Monitor water downstream to look for signs of mining. Deploy patrol teams based on this to increase the probability of arrest. Combine with focused patrolling along creeks to identify mining locations. When mining areas are discovered, leave warning letters to alert miners their activity has been detected and they will be arrested if found inside the park. These measures will increase the perceived risk of mining along these creeks.
Comfort Space **Ranch at the edge of town is used as a storage facility for mining equipment**	Expensive mining equipment is kept in one place	Build case with local police to prove gear is being used to mine in the protected area. Execute search warrant when gear is in storage. Even if no arrests are made, the loss of equipment will be a significant disruption to the operation. Miners will need to replace expensive equipment and find another trusted storage location.
Corrupting Spot **Gold Buyer converts miner's gold into cash**	Miners only have one trusted option for selling gold locally	In coordination with local police and tax authorities, monitor the location to determine how much illegal gold is bought and sold. Use a focused deterrence strategy to target the shop owner. Make clear that underreporting income and buying gold obtained from the park will result in serious legal consequences and loss of the owner's gold trading license. Remind the owner that only a small proportion of the shop's income is coming from illegal gold, and this could jeopardize the legitimate part of the business.

Step 36
Know about displacement

As an analyst, you will be asked to recommend prevention strategies that are tailored to the actors and places involved. When making these recommendations, you will also want to consider how the problem, and those involved, might change as you implement your response. The table below gives a brief description of the types of displacement to watch out for.

Displacement occurs when offenders change their behavior to avoid enforcement and prevention measures; research shows it occurs in approximately 25% of crime prevention projects.

Types of Displacement	
Spatial	Actors change where they offend. They may change their hunting grounds, trafficking routes, or selling points.
Temporal	Actors change when they offend. They may offend at different times of the day/week/year to avoid detection by law enforcement.
Target	Offenders change what they target. Harvesters may target different species because of increased risk or reduced demand; traders and consumers may also change their preferences for specific wildlife products.
Crime type	Offenders change the type of crime they commit. Guns used for hunting might be used for robberies or trafficking routes might be used for to smuggle other types of smugglingproducts.
Tactical	Offenders change how they commit crime. If snare-combing efforts are successful, people may start hunting actively with guns; traders may switch from selling openly in public to only selling withingwithin a close, trusted network of buyers.
Perpetrator Replacement	When an offender group leaves an area, or is removed, new individuals 'step into their shoes' because the opportunity is still seen as rewarding.

RHINOS POACHED, KRUGER NATIONAL PARK VS KWAZULU-NATAL, SOUTH AFRICA 2010 - 2019
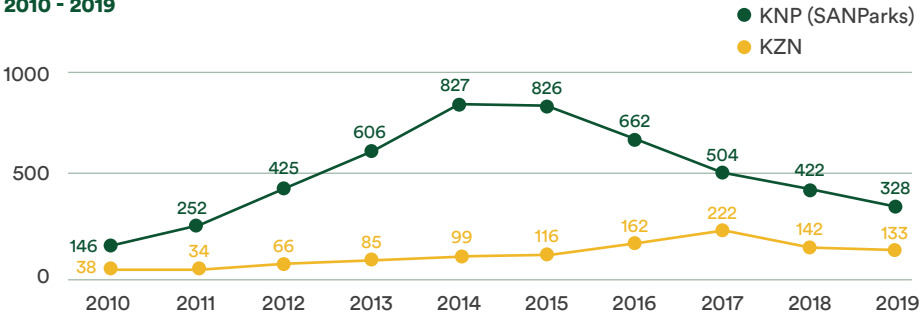
RHINO POACHING IN SOUTH AFRICA: IS THERE EVIDENCE OF SPATIAL AND TARGET DISPLACEMENT?
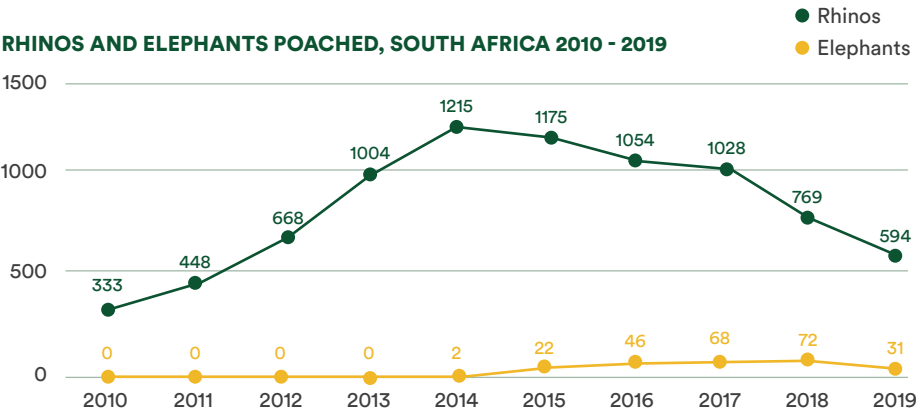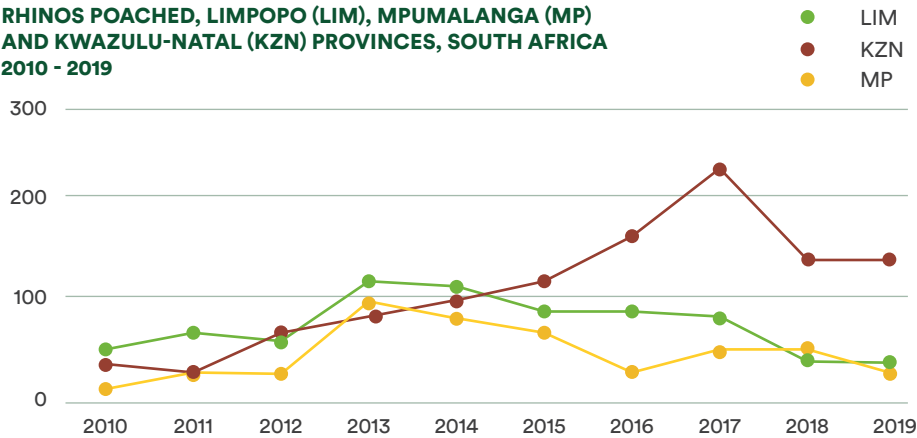
Kruger National Park (KNP) is the epicenter of South Africa's rhino poaching problem, but the number of rhinos lost over the years has been decreasing since a peak in 2014/2015. At the same time, rhino losses in the KwaZulu-Natal Province increased in 2016/2017, with the 2015-2019 period averaging higher losses than the first 5 years. KNP and the neighboring provinces received a large proportion of anti-poaching resources. This made KZN a 'softer' target for hunters; hunting pressure increased as KNP's decreased. Interviews with rhino hunters operating in KZN at the time indicated they were being recruited by organized crime syndicates operating outside the province (read more); the problem continues in 2022 (read more).

Kruger National Park (KNP) is found in the Mpumalanga and Limpopo Provinces in NE South Africa; as rhino poaching decreased in Kruger, these provinces would be the nearest opportunities. Rhino poaching in these provinces peaked in 2013, and have slowly declined since. The shift to KZN, more than 500km away, could be related to decreasing rhino stocks and increased risk of detection in the KNP area. Either way, it shows how organizations with means can adapt to enforcement actions and target availability to meet market demands.

It is also interesting to note that elephant deaths rose sharply in 2015, and continued to increase as the number of rhinos poached decreased; except in 2019. Ivory is worth significantly less than rhino horn per kilogram, meaning poachers may have been 'settling' for elephants as it became harder to find rhinos or as a way to ensure a hunting trip earned some income. | Poaching data obtained from: www.poachingfacts.com which compiles official reports from the South African Department of Environmental Affairs.

SECTION 4
NOMINATE, PLAN AND DEPLOY YOUR RESPONSE

RHINOS POACHED, LIMPOPO (LIM), MPUMALANGA (MP) AND KWAZULU-NATAL (KZN) PROVINCES, SOUTH AFRICA 2010 - 2019

- ● LIM
- ● KZN
- ● MP

RHINOS AND ELEPHANTS POACHED, SOUTH AFRICA 2010 - 2019

- ● Rhinos
- ● Elephants

Rhinos: 333, 448, 668, 1004, 1215, 1175, 1054, 1028, 769, 594

Elephants: 0, 0, 0, 0, 2, 22, 46, 68, 72, 31

Gareth Whittington-Jones. Panthera

Step 37
Pre-empt and forestall displacement and adaptation

Expect offenders to modify their behavior to try and find ways around your response and new opportunities. This is displacement. Over time successful displacement may become fixed, and the population of offenders is said to have adapted. Displacement and adaptation can reduce the impact of your response over time. Anticipate ways in which displacement is most likely to occur and be alert to signals of displacement from different sources.

Predict where displacement is likely. Understanding why offenders exploit certain crime opportunities, and what their motivations are will help you predict likely crime displacement. As your response makes certain places, times and tactics more costly or riskier to use, others may become more attractive. Knowing what the other available, but underused crime opportunities exist, will help you predict where displacement is highly likely, or not at all. Get into the offender's shoes: how would you get around the response?

> *The more you understand why certain crime opportunities are used, the easier to predict crime displacement.*

Displacement may take on various forms. A time-specific intervention, for example more patrols at a specific hour, does not necessarily lead to offending at different times. It might, but this intervention may just as well lead to tactical displacement or a combination of both. For example, targeted day patrols for a snaring problem, might push hunters into checking their snares at night (which is more dangerous), or it may cause hunters to switch to active hunting methods, such as with dogs or guns, which are less detectable by the targeted patrols.

Don't be discouraged by displacement. Displacement does not mean your response is ineffective. Displacement is costly, it forces offenders to work harder and endure greater risks for lower rewards.

Monitor displacement and forestall undesirable displacement. Stay alert to signals that displacement is occurring and implement countermeasures when it appears that a new opportunity may become more widely exploited. Not all forms of displacement can be predicted. Where practical, consider implementing measures to prevent likely displacement from occurring. These can be simple, low-cost modifications to your response.

Preparing for Displacement

Manta ray gills rose in popularity as a traditional Chinese medicine in the early 2000's leading to a rise in commercial manta fishing by specialist fishermen from Lamakera village in Indonesia. Analysis by Booth et al. (2021) found that hunting was highly concentrated in space and time, as mantas congregated at the sea surface over cleaning stations between March and October, peaking each month around the new moon. Targeted patrolling on manta aggregation areas during peak times in the month were conducted as part of a larger, holistic strategy to reduce the problem.

The project resulted in landings of manta rays reducing by ~86% in 2017 compared to the 2013 baseline. The results indicated there were signs of target displacement, with devil rays being targeted more often than before the intervention. The table on the next page shows how you could brainstorm about displacement for a specific intervention such as this.

An integrated approach to tackling wildlife crime: Impact and lessons learned from the world's largest targeted manta ray fishery | Booth et al. (2021)

THE IMPACT OF TARGETED PATROLLING TO REDUCE MANTA RAY HUNTING: Identifying and Containing Displacement

Type of Displacement	Example of Displacement	Likelihood	Monitoring Strategy	Containment Strategy
Spatial	Hunters switch to unpatrolled manta cleaning stations further from communities. Hunters target cleaning stations once a patrol has left.	Moderate	Patrols conduct random spot checks of other known cleaning stations. Ask with community contacts, tour operators and researchers to report sightings of hunting vessels.	Ensure patrols do not follow a predictable spatial protection plan.
Temporal	Hunters change season of peak hunting. Hunters change time of hunting during the day to avoid patrols.	Low / High	Patrol teams record time of interception made, ask researchers and tour operators to report time hunting vessel seen.	Ensure patrols do not follow a predictable time schedule.
Target	Hunters switch to increase focus on other species of rays.	High	Ask project staff and community contacts to monitor landings. Ensure patrol teams can identify different ray species and record them during interception.	None
Crime Type	Hunting teams switch to focus on drug smuggling.	Low	Check with sea and land police records. Monitor prosecutions for known hunters.	None
Tactical	Hunters process manta gills at sea to avoid detection on landing. Hunters switch from harpooning to use gill nets to evade detection.	High / High	Patrol teams record state of manta ray parts when seizure made at sea and type of equipment being used. Post arrest interviews with hunters. Ask community contacts whether shift occurring.	None
Perpetrator replacement	Hunters from other coastal communities move in to exploit decrease in hunting pressure from Lamakera	Moderate	Patrol teams check community of origin of offenders and vessels stopped and checked at manta stations.	Expand community response to other coastal communities if displacement detected.

Step 38
Set SMART targets

Targets shape the speed at which you move and the kinds of responses you should consider. They set the parameters in which you need to operate. Specific targets for specific problems both help focus teams responsible for implementing responses, and in teams evaluating impact. Targets tell you what needs to be accomplished, they don't specify how you will do it. Two important types of targets are goals and objectives.

Have a clear idea about where you want to go. What is the goal for dealing with the problem? Do decision-makers want the problem to go away completely? Or is the objective to bring it down to a manageable level? If so, what is that level? Targets are set by decision-makers, but the process should be collaborative. Decision-makers understand resource availability and scheduling, you understand how the problem will react to responses implemented, and what should be realistic expectations of reduction.

Goals and objectives: think in the long and short term. Goals give you the long-term view of where the project is going, objectives are your immediate targets to hit to take you there. In both cases, these should be SMART- specific, measurable, achievable, results-oriented and time bound. The goals must make sense from a wildlife population recovery perspective.

Beware perverse target traps. Some targets can seem reasonable on paper but can backfire when used to pin accountability on individual staff or drag the project off-course. Targets such as 'zero poaching' have had a stifling effect on reporting transparency while interim performance targets such as 'km patrolled' have led to fixation on achieving that target rather than reducing primary threats. These traps can be overcome by decision-makers clearly communicating how the targets should be interpreted, and by making sure they are results-oriented.

Clear targets give you parameters to work within. They tell you where you need to go, not how to get there.

SMART Targets	
Specific	The target is extremely clear to everyone, leaving no room for ambiguity.
Measurable	Progress can be measured precisely.
Achievable	The target is ambitious yet practical.
Results-Oriented	Represents necessary changes in target condition.
Time-bound	Dates are set by which progress should be expected.

SMART Objective: By end of 2015, rural clinic will be fully functional and at least 15 people fitting the profile of bushmeat poachers from target villages will have begun drug rehabilitation programs

SMART Goal (problem): By end of 2018 bushmeat poaching in the national park will have declined by at least 40% from 2012 levels

SMART Goal (wildlife): By end of 2020 three focal ungulate species in the national park will have increased occupancy by at least 30% from 2012 levels

READ MORE

Strategic Planning in Conservation

These steps are intended to spark your thinking about how to turn your analysis into an effective response, but this is not a guide to strategic planning and managing conservation projects. For guidance on this we recommend visiting the Open Standards for the Practice of Conservation www.openstandards.org.

Step 39
Use indicator maps to describe how targets will be reached

As you begin to design response strategies, indicator maps will help you plan. Your problem analysis gives you options for making change, and you want to monitor impact as you roll out an intervention. Thinking about how an intervention should change someone's behavior helps you find ways to measure your impact.

Start with a hypothesis from your analysis. Your response will target a specific facilitator or driver. Think carefully about how the intervention alters this context to change behavior. For example, if bushmeat hunting is driven by a need for money to buy drugs, then reducing drug dependency would reduce the need to hunt (see hypothetical on next page).

Try to keep things simple; one intervention, one mechanism of change. Measuring change is hard enough. Try not to overcomplicate your indictor map by mixing interventions together. The indicator maps on the next page show how two interventions, with different mechanisms of change could be mapped. While many of the indicators are different, indicators for the overall change in the problem are the same.

Make multiple maps to help see overlap and synergy between interventions. By making separate maps for different interventions, it will become clear what kind of data you will need to monitor the implementation and impact of your response. If you are going to begin collecting new data, it is best to collect information that can be used to measure multiple indicators.

Think about how you will measure the deployment. 'Increase focused patrolling' sounds nice, but how would you measure this? You want to know how much effort you put into your response, but also how large the 'dose' was. For focused patrolling you might measure what percentage of patrols were problem-specific and the frequency of these patrols over time.

Put yourself in the other's person shoes. This will help you come up with better ideas about how people will react and adapt to your intervention. What happens when you lose access to a key person or tool? What are the consequences if you are caught? How would you adapt to overcome the intervention?

Try to think of at least three disruptions or adaptations. The indicator maps on the next page each have three examples of how the intervention disrupts the behavior of a hunter, causing them to adapt. When making indicator maps, do not limit yourself to three adaptations. There may be many more! Think hard to come up with clever ways to measure behavioral change.

Consider ways current data can measure the indicators. Do not limit your thinking to indicators based on your current data set alone but do give this data priority. Finding ways to restructure data you have or analyze it more specifically is important. These data flows are already established making it easier to continue data collection and make historical comparisons.

Identify what new data will need to be collected. A detailed indicator map will likely show you additional data collection will be necessary. As you get more specific, both with your problem and response, context matters. This means you'll probably need some detailed information that isn't covered in general reporting. Remember that many times partners have data you need or can help you with collection. Working together will likely save time and money!

BUSHMEAT HUNTING HYPOTHETICAL: MAKING INDICATOR MAPS

The problem team was under pressure from decision-makers to deliver analytic products that could immediately be used to start controlling the problem. Monthly spatial and temporal analyses were created by the analysts to guide patrol teams. This resulted in several arrests, which pleased the managers, but also allowed the team to conduct in-depth interviews with hunters. Indicator Map 1 shows how the impact of intervention could be monitored.
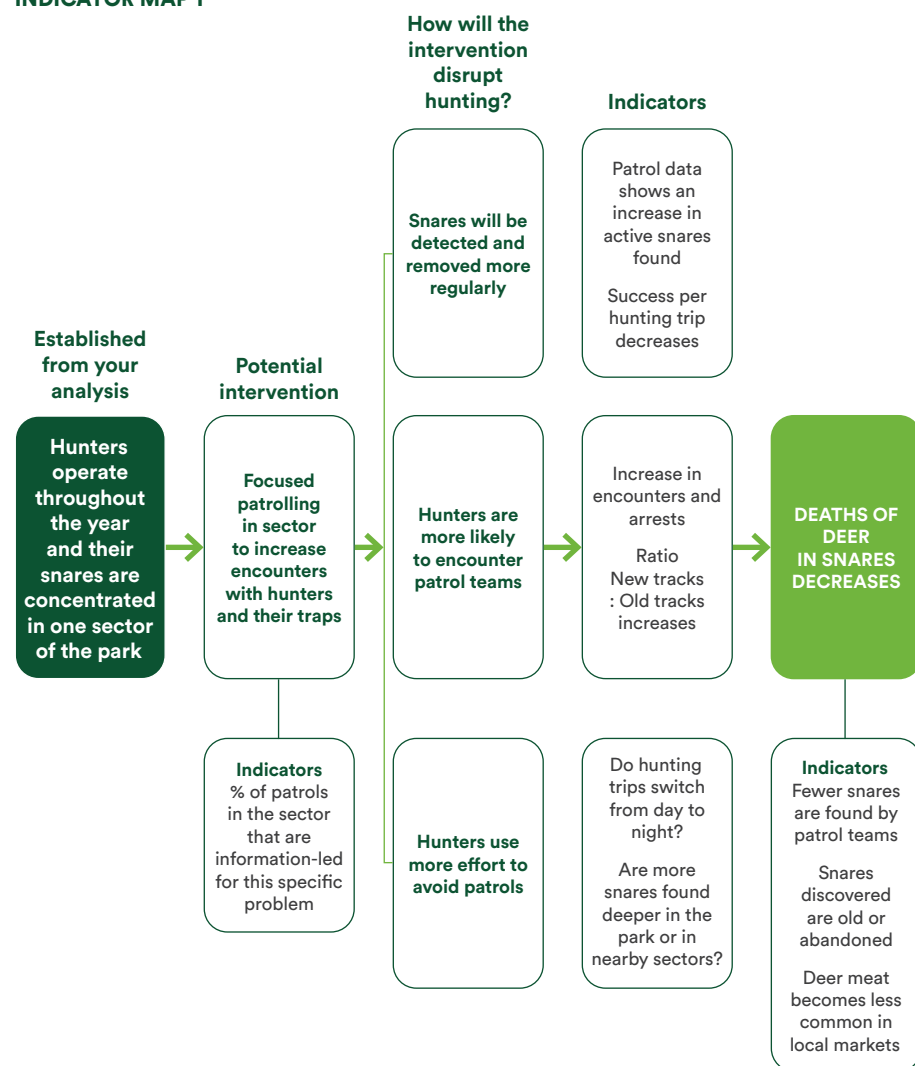
Interviews identified a major motivation; cash generation to finance hunter's methamphetamine addiction. The team briefed their managers and recommended involving other specialist partners. The manager supported this idea and introduced the project team to the Rural Health Department and a humanitarian NGO working in the landscape.

The project team continued to guide the patrol work, but they also met regularly with the partners interested in supporting the villagers' health and wellbeing. This led to a shared understanding of the nature of methamphetamine addiction and the indebtedness poverty trap; ultimately generating enough interest that partners started their own program for hunters (see Indicator Map 2).
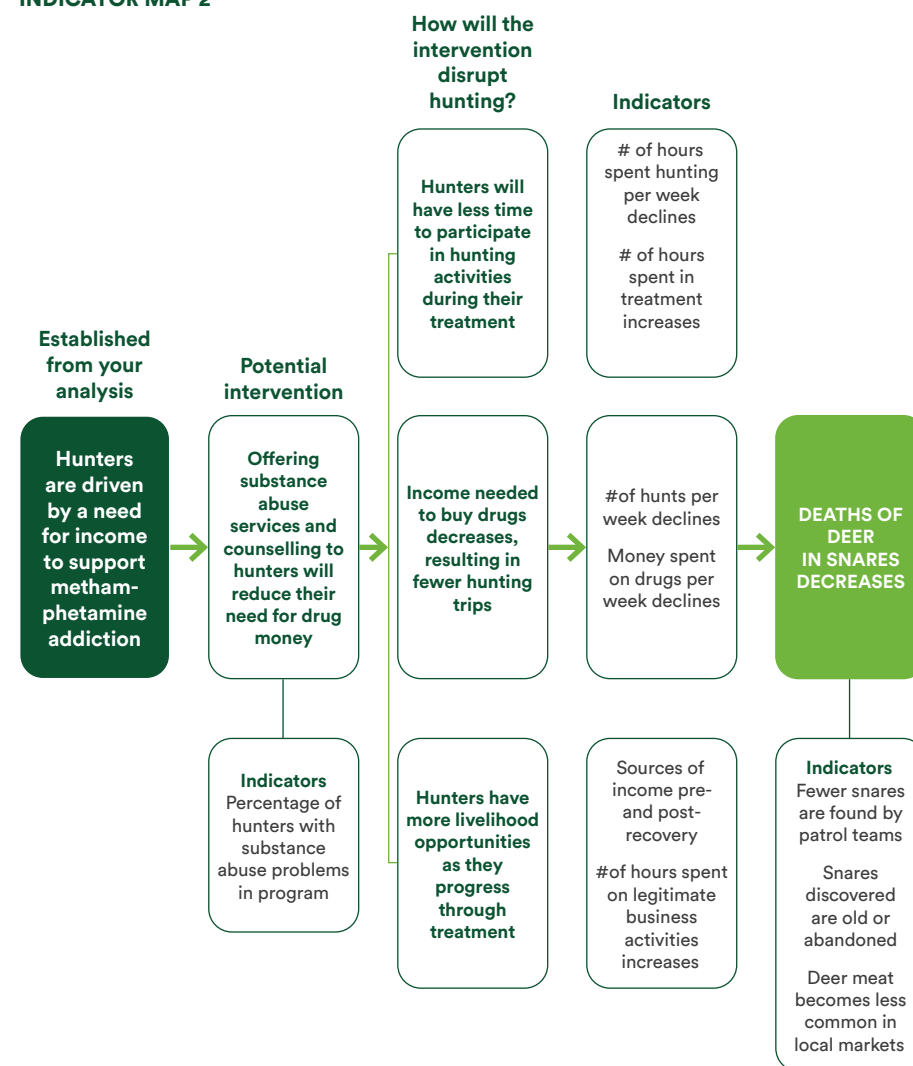
INDICATOR MAP 1

How will the intervention disrupt hunting?

Indicators

Patrol data shows an increase in active snares found

Success per hunting trip decreases

Snares will be detected and removed more regularly

Established from your analysis

Potential intervention

Hunters operate throughout the year and their snares are concentrated in one sector of the park

Focused patrolling in sector to increase encounters with hunters and their traps

Hunters are more likely to encounter patrol teams

Increase in encounters and arrests

Ratio New tracks : Old tracks increases

DEATHS OF DEER IN SNARES DECREASES

Indicators
% of patrols in the sector that are information-led for this specific problem

Hunters use more effort to avoid patrols

Do hunting trips switch from day to night?

Are more snares found deeper in the park or in nearby sectors?

Indicators
Fewer snares are found by patrol teams

Snares discovered are old or abandoned

Deer meat becomes less common in local markets

INDICATOR MAP 2

How will the intervention disrupt hunting?

Indicators

# of hours spent hunting per week declines

# of hours spent in treatment increases

Hunters will have less time to participate in hunting activities during their treatment

Established from your analysis

Potential intervention

Hunters are driven by a need for income to support methamphetamine addiction

Offering substance abuse services and counselling to hunters will reduce their need for drug money

Income needed to buy drugs decreases, resulting in fewer hunting trips

#of hunts per week declines

Money spent on drugs per week declines

DEATHS OF DEER IN SNARES DECREASES

Indicators
Percentage of hunters with substance abuse problems in program

Hunters have more livelihood opportunities as they progress through treatment

Sources of income pre- and post-recovery

#of hours spent on legitimate business activities increases

Indicators
Fewer snares are found by patrol teams

Snares discovered are old or abandoned

Deer meat becomes less common in local markets

Step 40
Consider quick wins and prepare to adaptively manage your response

In your role as analyst, you will be intensely aware of time pressures. Your managers will ask you for analytic products and recommendations to deal with a problem NOW. They don't want to experience 'paralysis by analysis'. You and your problem team are unlikely to have the luxury of developing a perfect understanding of the nature of the problem.

Quick wins build momentum. Your analysis may identify certain small low-cost interventions that could be implemented straight away using current resources. It can be beneficial to put these in place early. These are sometimes called 'no regrets' options because risk of failure is low, and if failure does occur its unlikely to backfire and jeopardize subsequent longer-term responses which could have more impact on the problem.

Avoid the 'leap to action' trap. Fixating on short-term solutions that have a marginal effect on crime prevention or none at all, can suck up available resources and your available time. Efforts can become very reactive. It's your job as an analyst to explain these constraints to your managers, make sure impact from short-term actions is duly evaluated, and point out where you could achieve greater crime reduction impact.

Opportunistic quick wins can help you build momentum, but beware 'leap to action syndrome'.

Use quick wins and rapid feedback to expand response options. Communicate early results to increase buy-in from colleagues and partners. This will also help you identify and fix implementation problems earlier in the process. Successful responses generate more information and an improved understanding about the problem, which in turn enables you to identify other response options.

Adaptively manage the project. As the response gets underway, regular assessment of progress together with new information from your analysis will help tweak the tactics you use and identify information gaps you need to fill. Early hypotheses may be falsified, or setbacks in implementation may require plans to be changed. It is important that the project is set up to be able to absorb modest changes.

Anticipate the effective limits of your response. An initially successful response can become less effective over time. Complacency builds, urgency decreases, and staff may become used to an easier way of working. Funding may wane as the threat appears to have been solved. Responses based on diverse partnerships may come under increased strain as pressures mount within each partner organization to reallocate resources. Without adaptive refinements and reinvigoration, the response may become blunted by a build-up of myriad forms of displacement. Even with excellent implementation, an intervention may also have natural limits to how long it can depress a problem without further supporting responses (see Step 42).

Lay the groundwork for more profound responses. When you begin, your focus may simply be to depress the problem from its current state which your managers have judged unacceptably high. Implementing responses that address root causes of problem may not be immediately feasible. Effort may need to be invested in finding and building relationships with partners, the project may need investment in training or acquiring additional funds. Factoring this development of the enabling environment into your response plan, will allow for growth of the project to a next phase. The figure below illustrates how enhanced analysis, assessment of what is working, enhancements in the enabling environment feed into refinements of the responses implemented and allow the introduction of new responses.

LOOK BEFORE YOU LEAP

Before embarking on a new project, checking why previous attempts to solve the problem have failed will help avoid preventable mistakes. Good ideas may have failed because of implementation hurdles, or because they were implemented below a threshold needed to have any impact. There may also be initiatives in progress which have showed signs of success which could be adapted or expanded. Review any reports or evaluations of previous projects and speak to people involved. And of course, share your own failings with others!
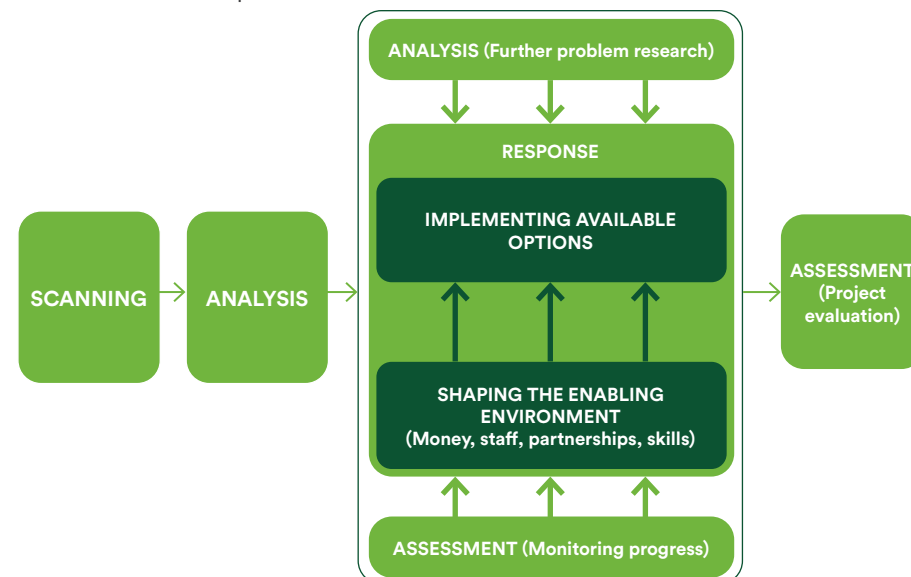
READ MORE

Implementing POP: Leading, Structuring, and Managing a Problem-Oriented Police Agency | Scott & Kirby (2012)

Step 41
Prepare to change the equilibrium of a chronic problem

A problem may have persisted so long it becomes chronic, and chronic problems can be highly resistant to efforts to reduce them. Repeated failed attempts to reduce the problem may cement perceptions it is unsolvable. A problem may appear to have been successfully reduced, only to strengthen back to pre-response levels after several years. Relapses are particularly likely to occur after short, concentrated law enforcement surges.

These types of problems are exactly what POP was originally designed to solve and why we encourage you to think about removing the opportunities and drivers that enable the problem.

As Olsson et al. suggest, it is useful to think of the problem like a ball bearing sat in a hole in a state of equilibrium. Attempts to push the bearing out of the hole result in it rolling back into the bottom whenever pressure is released. You may provide enough force to push the ball bearing on to the edge of the hole, at which point there is a window of opportunity, but the ball bearing is unstable. It could roll in any direction, and you will need to carefully navigate it to its new home.

Consider thresholds of response needed to achieve impact. Small piecemeal interventions may not stack up to enough force to cause the problem to reduce. An intervention may be theoretically sound but could be so resource intensive that it is impractical.

> **BUSHMEAT HUNTING HYPOTHETICAL**
> **Windows of opportunity and transitions**
>
> The figure below shows how the team working on the hypothetical bushmeat hunting problem pushed it into a new state of equilibrium. Using a variety of interventions, and implementing them in the correct sequence, they were able to seize a window of opportunity to get hunters into rehabilitation and livelihood programs.
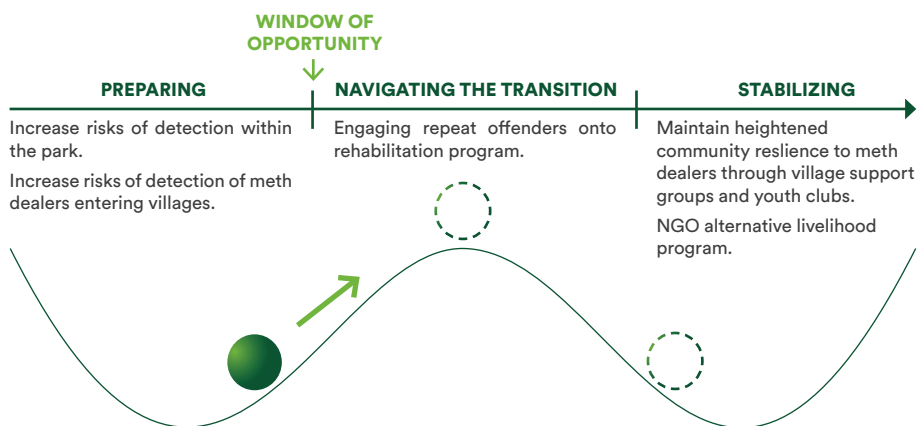
Plan how to shift the problem into a new state and sustain it there.

A Big Bang or incremental strategy? In some cases, massive changes need to be introduced all at once to shock the problem out of its equilibrium and into a new state. That may mean holding off incremental steps, and potentially sacrificing short-term gains. When dealing with organized crime groups, and entrenched systems of corruption, simultaneous implementation of responses will have a longer lasting impact compared to implementing them one at a time.

Get the sequencing right and coordinate your response implementation. The order in which you implement your response will influence the project's overall success. Some responses are only feasible once certain enabling conditions are met. Uncoordinated and disjointed responses can create confusion and may backfire.

Windows of opportunity and tipping points. Sustained pressure against the problem can bring it to a tipping point from which you can catalyze it into a new direction by bringing on additional responses at that critical time.

Response progression and stabilization. The final point is planning the exit strategy, looking ahead to where expensive, intensive wildlife protection can be eased off, and resources reallocated, while avoiding relapses.

Harmonize pull and push approaches. Sometimes it will be useful to assist compliance and increase risk at the same time. This may involve offering offenders a way out from being locked in a pattern of arrest and repeat offending (see focused deterrence in Step 28). Similarly, a project aiming to transition a community to alternative livelihoods may have slow uptake without a jolt of pressure increasing the costs of non-compliance.

WINDOW OF OPPORTUNITY

PREPARING

Increase risks of detection within the park.

Increase risks of detection of meth dealers entering villages.

NAVIGATING THE TRANSITION

Engaging repeat offenders onto rehabilitation program.

STABILIZING

Maintain heightened community reslience to meth dealers through village support groups and youth clubs.

NGO alternative livelihood program.

> **READ MORE**
>
> Building Transformative Capacity for Ecosystem Stewardship in Social–Ecological Systems | Olsson et al. (2010)
>
> The Character of Harms | Sparrow (2008)

Step 42
Prepare to sustain the gains, and avoid relapses

A problem may appear to have been successfully reduced, only to strengthen back to pre-response levels after several years. Relapses like this are more likely to occur after short, concentrated law enforcement surges. After a short period in which criminal actors keep their heads down, activity resumes as the pressure is removed. That doesn't mean the surge itself was a failure, it may have bought extra time in preventing local extinction of a population, last but the response overall failed by not having an intervention ready to introduce which could change opportunity structures and drivers of the problem.

Problem solving and funding cycles. Step 41 (equilibrium) highlighted the importance of planning beyond the immediate reduction of the problem and avoiding trap of claiming 'mission accomplished' prematurely. Successful problem reduction projects should show that the problem has been sustained at a lower level for extended period of time- years after the response first began. As you develop your project, showing decision-makers where you see this going after three years will help them get the funds secured to prevent it becoming a flash in the pan.

Shape the enabling environment with partnerships. You may be under time pressure to implement available responses. You may not have had time to develop the partnerships with the right agencies and organizations who could play a role in sustaining the problem at a lower level. If so, then include this shaping work as part of your response work.

Anticipate the effective limits of your response. An initially successful response can become less effective over time. Complacency builds, urgency decreases, and staff may become used to an easier way of working. Funding may wane as the threat appears to have disappeared. Responses based on diverse partnerships may come under increased strain as pressures mount within each partner organization to reallocate resources. Without adaptive refinements and reinvigoration (Step 40), the response may become blunted by a build-up of myriad forms of displacement (Step 36). Even with excellent implementation, an intervention may also have natural limits to how long it can depress a problem without further supporting responses.

Break the inertia traps. In chronic wildlife trade problems, actors may have been conducting the activity for so many years, in some cases passing skills down generations, that the draw to resume is very strong. Knowledge, tools, connections, and an established pattern of life are not easily abandoned. These forces of inertia will start trying to pull the problem back up to pre-response levels.

SECTION 4
NOMINATE, PLAN AND DEPLOY YOUR RESPONSE

TIMELINE OF ACTIVITIES

STRATEGY 1
Focused Patrols

Focused patrol program

STRATEGY 2
Substance Abuse Program

Engagement sessions and targeted emergency support

Discounts at rehab and referrals for those arrested by patrols

Community self help groups

Local business development

YEAR 1 **YEAR 2** **YEAR 3**

SHORT TERM (1-2 YEAR) OUTCOMES

| | PROBLEM | WILDLIFE |

STRATEGY 1
Focused Patrols → Snares discovered by patrol teams decrease by 20%, arrests increase → More individual deer survive

MEDIUM TERM (3-5 YEAR) OUTCOMES

| | PROBLEM | WILDLIFE |

STRATEGY 2
Substance Abuse Program → Snaring reduces by 60% compared to baseline levels, patrols encounter fewer human signs and make fewer arrests → Deer population increases

Sun bear canines recovered from a poacher's camp in Malaysia represent a successful interdiction, but a failure to prevent mortality. Dissecting each counter-poaching operation enabled the site analyst to pin-down recurrent failure points. Working with the manager, patrol leader, and expert patrollers, a joint team of the Department for Wildlife and National Parks and Panthera Malaysia refined tactics and developed a deep-forest counter-poaching doctrine. This resulted in the certainty of arrest of a poaching team rising from 1 in 20 in baseline years to 1 in 3 in treatment years, and poaching incursions by Cambodian teams subsequently dropping by 62%. Evidence suggests the elevated risks may have deterred Cambodian poaching attempts.

SECTION 5 | DETERMINE WHAT WORKS, WHAT FAILS, AND WHY

Senior game scouts describe spatial patterns of poaching to the head ranger, predicting hunter behavior in the landscape for better patrol targeting. Assessing whether the tactics are causing the problem to decline, enables decision makers to make informed choices on resource allocation. This process prevents unproductive tactics being continually funded and helps tweak and refine those that show promise to make them even more effective.

STEP 43
Set parameters for your assessment

This section provides tips on evaluating your response. The nature of your evaluation will depend on what you are trying to show. In some cases, proving an annoying problem has declined is the only thing required. Here we encourage you to take the next step. Show your response caused the problem to go away, show why the response worked and how, and under what circumstances others could replicate your response if dealing with a similar problem.

This does come with a health warning. Committing to this means devoting much more time to planning, monitoring and evaluation. Setting up an experimental design with controls will provide the most rigorous evaluation but require the most resources. Decide with your managers what the purpose of the evaluation is as this will determine the time and resources you will need (Step 7).

Evaluation Purpose	Time and Resources Required
Be certain the problem declined	Low
Be certain about the role of the response in causing the decline	Moderate
Be able to guide other teams dealing with similar problems	High

Assessment is an iterative process. Different interventions will have different lag times until you can expect to see a decline in the problem, but it is important not to wait until years have passed to begin assessing. As your teammates are implementing tactics check for short-term indicators that can tell you your strategy is on the right track and tell your manager and team what you are finding.

Do tactics need refining? Could their effectiveness be improved if we tried something else? And if so, do we need to bring in another institution? No response will emerge perfectly formed from the drawing board. Each will require incremental improvements, which is why SARA has a feedback loop from assessment to response.

At the same time, once you've launched your response, you might realize that some metrics have problems and need refining, or there may be more information you need to clarify whether displacement occurred. That is fine, you learn as you go, and once you begin to share results, you will likely open more opportunities for collaboration, funding, and deeper evaluation. The important thing is to make sure that in the short-term, decision-makers have good, quick feedback to guide them, which sets you up for a thorough evaluation after the project has been running for a year or so. Section 6 gives you some ideas about how to communicate your findings regularly and effectively.

Assessment begins when your response starts. Aim to give quick regular feedback to decision-makers and conduct a deeper evaluation every year or so.

"Did the problem actually decline?" is the most important question you will be asked. To answer that, you will need to compare the amount of problem after the project with a baseline before you started. That requires good metrics and the ability to measure the problem itself.

"Did our response cause the problem to go down?" This is a different, but equally important, question. It tells you how well your response works, if it was a good investment, and whether or not you might consider it for similar problems elsewhere. The four criteria for claiming causation are shown below.

"How can others implement the response?" Who should use this response and in what contexts can they expect it to work? What resources and conditions are required before someone should consider using it? Where are pitfalls to beware? And bottom line, how much will it cost (or save)? These questions are important for guiding others working on similar problems. Answering these questions involves more work but make your project far more useful than solving your one problem.

Use EMMIE to evaluate your responses
EMMIE is a useful framework to help you with your evaluation. The table on the next page provides an illustration of how EMMIE was used to evaluate alley gating in reducing crime and antisocial behavior in street alleys. Alleys can attract offenders due to perceived crime opportunities and facilitate crime by providing inconspicuous access to properties. 'Alley gating' is a crime prevention technique to prevent burglary involving installing lockable gates to restrict access to the alley for non-residents. Sidebottom et al (2018) evaluated the evidence for the effectiveness of this technique and what it took to make it work.

Eck's 4 Point Test for Causality	
1	There is a plausible mechanism for how the response causes the problem to decline
2	The amount of response and amount of decline in the problem are related
3	The response comes before the problem's decline
4	Alternative explanations are eliminated

READ MORE

Introducing EMMIE: An evidence rating scale to encourage mixed-method crime prevention synthesis reviews | Johnson, Tilley and Bowers (2015)

Gating Alleys to Reduce Crime: A Meta-Analysis and Realist Synthesis | Sidebottom et al (2018)

Assessing Responses to Problems: Did It Work? | Eck (2017)

SECTION 5
DETERMINE WHAT WORKS, WHAT FAILS, AND WHY

EMMIE		Alley Gating Example
EFFECT **Impact on crime**	Does the evidence suggest the intervention led to an increase, decrease, or had no impact on crime?	Burglary fell faster in areas with alley gates installed compared to control areas without alley gates. Burglary declined in buffer zones around the gated areas at a greater rate than in control areas, suggesting diffusion of crime control benefits.
MECHANISM **How it works**	What is it about the intervention that could explain its effect?	1. Increased the effort to commit burglary by having to get passed a locked gate. 2. Increased the perceived risk of committing an offense by extending guardianship and assisting natural surveillance as residents take greater pride and care of the alley and feel more empowered to act as guardians. 3. Removed excuses for offenders' presence in private space making it easier for residents to challenge potential offenders. 4. Fixed broken windows. Creating ordered space provided cues that the alley was not a suitable place to offend because risk of disruption, detection and arrest was high. 5. Deflected offenders away from the wider area as offenders' awareness space declines, reducing awareness of potential crime opportunities and the attractiveness of the area in general.
MODERATORS **Where it works**	In what circumstances and contexts is the intervention likely to work / not work?	1. Neighborhood context. Poor regulation of access to gate keys and high turnover of residents reduces effectiveness. 2. Community cohesion. Communities with low social cohesion reduce effectiveness of implementation. A few awkward individuals opposed to the gate can undermine the initiative. 3. Physical environment. Poor gate design which hinders access can lead to residents piling rubbish, suggesting the area is uncared for.

IMPLEMENTATION **How to do it**	What conditions should be considered when implementing an intervention locally?	1. Consultation and consent of residents is essential before implementation. 2. Community buy-in needs to be initially stimulated and maintained. 3. Consultation with local service providers potentially affected by the alley gate is needed to check the gate won't compromise essential services. 4. Gate design needs to be strong and large enough to prevent people jumping it. It may need to be lit at night and aesthetically sympathetic to the residential area.
ECONOMIC **How much it costs**	What direct or indirect costs are associated with the intervention and is there evidence of cost benefits?	Median cost per alley gate was $950 (Range $205-$1,453). Cost-benefit ratio showed that every $1.30 spent on alley gating yielded a return on investment of $2.42-$3.64 in associated costs of burglary reductions.

Step 44
Measure more meaningful metrics

After planning your response, you should have a clear map for how exactly it will change conditions and prevent the problem from occurring. As you begin to implement your response, you will need to record metrics for what you did (inputs), the immediate results (outputs), and the change on the problem itself (outcome). Output metrics are important in helping show your response caused any decline in the problem, but they can be tough to record and easy to neglect.

What makes a good metric? A good metric faithfully and objectively represents what you are trying to measure and is sensitive to change. It can be measured the same way by different people over periods of time. In practice, the data for the metric can be feasibly collected without excessive manpower or financial burdens.

Plan how to collect your data. Recording a metric requires you to put together a monitoring design for how exactly you will get the data you need to track a trend. The checklist below is a useful way to think through the practicalities.

Watch out for output metrics generated by the response. Many of the metrics you will use will rely on investing effort to observe and record the data. This can create the pitfall that the more effort you put in, the more observations you make, and vice versa. For example, you patrol less meaning you find fewer snares. Where possible avoid over-reliance on output metrics generated by the response itself or triangulate from multiple independent information sources (Step 18).

Focus on how your inputs drive outcomes. For example, a project focused on improving the criminal justice system with awareness trainings (input) for officers and magistrates, might lead to increases in arrests and successful prosecutions for wildlife offenses (output). The output metric shows the trainings seem to be working but says nothing about how the threat to wildlife has changed (outcome). It is also important to remember with this example that holding a training is not an output. Key Performance Indicators (KPIs) measuring inputs such as kilometers patrolled, or snares removed can help in the short term to show agreed activities are taking place, but guard against these becoming goals that direct your project. Understanding how the outcomes change is essential to know if anything you're doing is having impact.

Meaningful Metric Checklist	
Precise	Can it be defined the same way by all people measuring it?
Measurable	Are you able to record and analyze the metric in quantitative and/or qualitative terms?
Consistent	Can you measure the same thing in the same way across the duration of your project?
Sensitive	Does the metric change proportionately in response to the actual changes in the condition being measured?
Practical	Can data for the metric be collected by the project team? Are the financial and manpower costs to collect the data reasonable?

PROBLEM - TURTLE EGG HARVESTING Outcome Metric--% of turtle nests raided annually on sample beaches	
Who is responsible for recording the metric?	NGO research team
What does the metric show?	The percentage of nests observed to be raided by people is an accurate indicator of nest raiding intensity.
What are key assumptions?	The five sample beaches faithfully reflect nest raiding pressure over the whole river. Human activity remains observable between monitoring visits.
What are potential biases and how will they be overcome?	Risk of misidentifying a nest raided by natural predators. Only when there is clear sign of human interference is it recorded as human raided.
Where will recording take place?	Treatment River Z from point A to point B at 5 sample beaches. Control River Y from point A to point B at 5 sample beaches.
When does the metric need to be recorded?	Nest data recorded from June 1 to July 30 during the nesting season every year.
When is it sensitive, over what time frame?	Year to year change.
How will recording work in practice?	The monitoring team performs a full sweep of the river once every two weeks with two boats, five surveyors per boat. All nests found are recorded with GPS point, date and time and classified as confirmed successful hatch; confirmed natural predation; confirmed human raid; uncertain raid. Recorded nest holes are refilled to avoid double counting.

TURTLE EGG HARVESTING HYPOTHETICAL: Measuring meaningful metrics

Throughout Section 5 we use a hypothetical to demonstrate some of the concepts. Switching from the bushmeat hypothetical in Section 4, we focus on a problem-oriented project to reduce the problem of harvesting river turtle eggs (see Step 15). In this example, a team launched a project to reduce the problem of harvesting river turtle eggs along a river. Analysis revealed this was driven by travelling farm workers, and that the turtle nesting season corresponded with a period of low work on the farms. Analysis also showed a small number of highly prolific egg harvesters accounted for more than half of all bags of eggs sold at clandestine depots in the local villages. The eggs are later sold again in the nearby town. The team developed a response involving seasonal micro job schemes to keep young men occupied and generate income during the most vulnerable months. These schemes were particularly targeted at the prolific egg harvesters.

The table above shows how the team designed a key outcome metric. While brainstorming, they considered a simple count of nests raided by people, but realized total nests may fluctuate each year depending on river condition, hunting of adult turtles, etc., so it is more accurate to estimate total number of nests and how many were raided. That meant a lot more work, so the team reduced the number of beaches surveyed, and carefully selected them to reflect pressure on the river in general.

STEP 45
Conduct a process evaluation

A process evaluation examines how you implemented your response. It focuses on what you did (inputs), and what results this gave you (outputs). Without a process evaluation it is difficult to say how much your response caused a change in the problem. A decline in the problem despite elements of your response not being implemented as planned could suggest some other factor was responsible. That reduces how firmly you can say your response works and recommend it for similar problems (the impact evaluation).

> *The response itself might be good, but the project fails because of implementation.*

Even good plans run into challenges. Hold ups in delivering the response on time, partners not committing as intended, and other hurdles may arise and force you to adjust your response mid-way. At the same time, your understanding of the problem likely improved during the project, and new options may have arisen, allowing you to tweak and refine the response. The important thing is recording what happened, even if it did not happen as planned. Collecting information from well-defined inputs and outputs from the start will make this job easier.

Write a timeline and keep notes. Sometimes it is not just what activities you did, but when you and your partners did them and in what order that's important. Keeping a timeline of when specific events occurred- a patrol training, a fence construction, the launch of an information campaign, will help the process evaluation.

TURTLE EGG HARVESTING HYPOTHETICAL: Developing, tracking, and updating the response

Analysis suggested those involved with egg harvesting were mainly farm hands with few duties during the nesting season. People had more free time and lacked earnings. Within this group some individuals harvested far more heavily than others. The project team developed a seasonal job scheme targeted at this group as shown in the figure below. The process evaluation looked at how and when the job schemes were implemented and how much uptake there was among the farm hands. Participants were asked to fill in a simple anonymous questionnaire about their egg harvesting to classify how many low, medium, and high-volume harvesters were on each scheme.

In the first two years of the project the team ran job schemes, but delays caused these to begin only after the nesting season had begun and harvesters had started going out. The only participants were medium or low volume harvesters. In Year 3, the job schemes began ahead of the nesting season and the team promoted them on the radio and by leaflets to the farms along the rivers. That resulted in higher uptake. However, high-volume egg harvesters only began to join the scheme in the project's fourth year after the team started to identify and engage the high-volume harvesters directly and used a range of approaches to recruit individuals on to the job scheme.
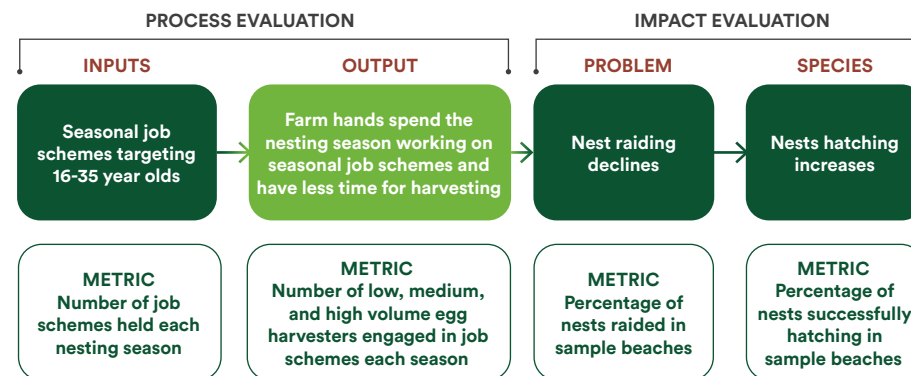

PROCESS EVALUATION: INTERVIEW STAFF INVOLVED TO UNDERSTAND HOW YOUR RESPONSE WAS ADAPTED ALONG THE WAY

"We were struggling to get the high-volume harvesters signing up for our job scheme. Interest remained quite low until the park's patrol team made a series of arrests. The week after three people in one of our target communities were arrested for egg harvesting, we had a large number of people show up to our office asking to join the job scheme."

"We spoke to the patrol team and gave them leaflets about the job scheme. They started to hand these out when stopping and checking boats on the river. After we started to work together like this, we quickly had high-volume harvesters getting on our job scheme."

Community Liason Officer

FARM HANDS ENGAGED IN SEASONAL EMPLOYMENT SCHEME
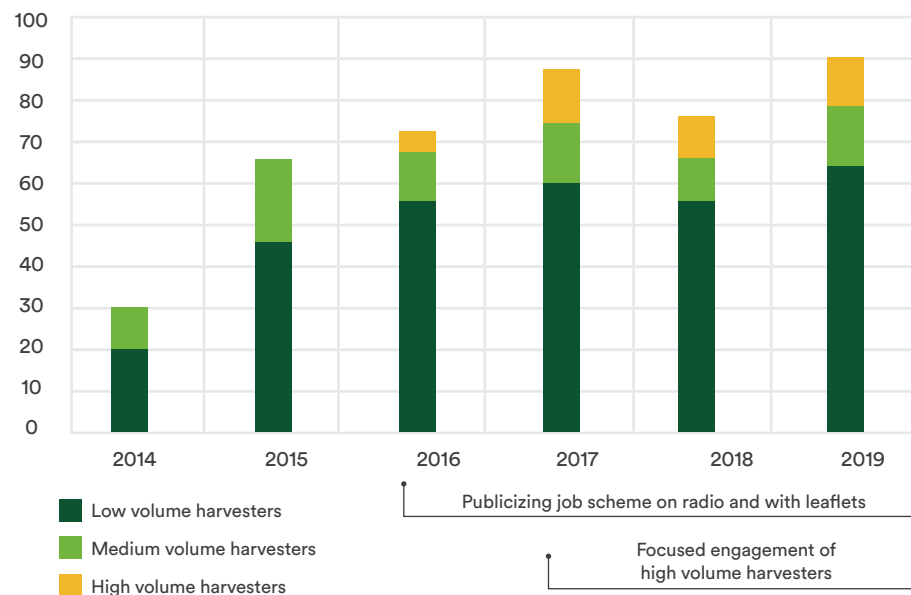
STEP 46
Conduct a before and after test

A before and after test is the simplest way to check if the problem declined, and whether your response may have caused the decline. This involves the assumption that any trend in the problem before beginning your response would have continued if you had not implemented your response. That assumption is often wrong but provides a good starting point for further analysis. This step provides a few things to consider when using your time series for evaluating project impact.

Select an appropriate measure of change. You can check how the problem changed before and after starting your response in two main ways. You can compare the **average amount** of the problem over the time series before starting your response, with the average amount after. Or you can compare the trend in the problem before the response with the trend after. Comparing the immediate change in problem counts just before your response and immediately after can be useful when there are distinct step changes, such as example A.

Each measure can lead to different interpretations of how effective your response was, as shown in examples A and B on the right. In A, the average amount of the problem dropped following the response, but the trend remained static. In B, the average amount of the problem remained the same after the response, but the problem's trend reversed from increasing to decreasing.

Select the measure that most accurately reflects the change in state of the problem. Using multiple change measures can help you to examine how the problem might be reacting to your response from different perspectives.
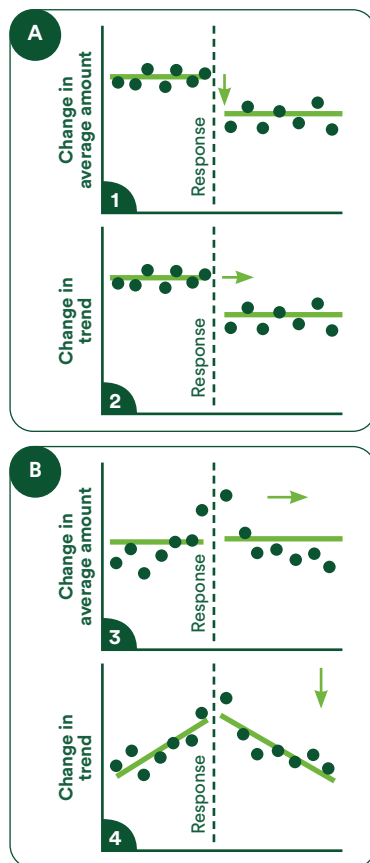
1 Amount of problem reduced: Response effective

2 Problem static after response: Response ineffective

3 Amount of problem same: Response ineffective

4 Problem declining after response: Response effective

Interpret the problem's over time. Describing the shape of the problem's graph is the start, you now need to interpret it to understand your response's true impact. Longer time series and frequent data recording combined with a strong initial analysis of the problem's nature makes this process easier. The graphs on the next page show some examples of problems changing over time and what this means for interpretation.

1 Response accelerates a long-term decline

The problem may have been declining before the response began. In that case comparing average amounts of the problem before and after would give a misleading impression of how effective the response was. But, a steeper declining trend after the response could suggest that it had some effect in accelerating the decline.

2 Problem declines naturally from an unusual high

The problem may have been selected because it has become extremely bad and your response was implemented when the problem became abnormally high. In some cases, problems subside back to normal levels even if nothing is done, known as **'regression to the mean'.** There are many examples of this occurring after COVID 19, when short-term employment disruption led to spikes in bushmeat poaching which subsided as work resumed. Understanding what factors are going in on in the background to drive the problem up or down is crucial.

3 Seasonal rhythms

Your problem may have natural repeating rises and falls due to shifts in seasonal activity by offenders, such as a mid-year activity spike in this example. Comparing equivalent time frames is important to control for this.

4 Response prevents problem rising further

Despite your response, the problem might stubbornly remain at the same level. The plateau could mean you prevented the problem increasing further, but an additional response would be needed to actively drive a decline in the problem. Again, you'd need to explore other sources to check the problem's increase hadn't eased for other reasons (such as a decline in abundance of the target species).

5 Problem's decline lags response

Lags might be expected depending on the context of your problem and response. For instance, it might take years to raise awareness of elevated poaching risks and efforts if different groups are in infrequent contact, far from the response area, and able to target a wide number of alternative areas. Understanding that context will help you anticipate how rapidly information diffusion is likely to occur.

6 Problem declines prematurely

Offenders may believe the response starts earlier than you have planned. This is known as 'anticipatory benefits' and has been found to occur in 40% of crime prevention studies. This is more likely to occur when the response has been preceded by and strong awareness campaign, and offenders are expecting risks to substantially rise.

READ MORE

Evaluating impact using time series data | Wauchope et al (2021)
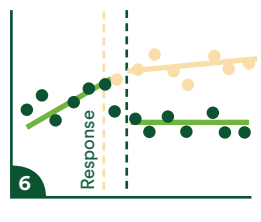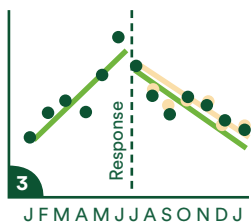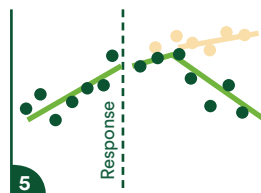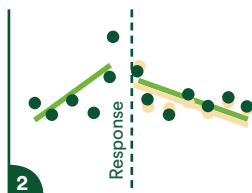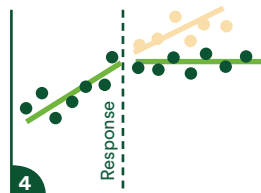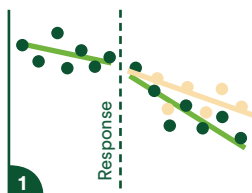
DETERMINE WHAT WORKS, WHAT FAILS, AND WHY

AMOUNT OF PROBLEM

● **Observed**

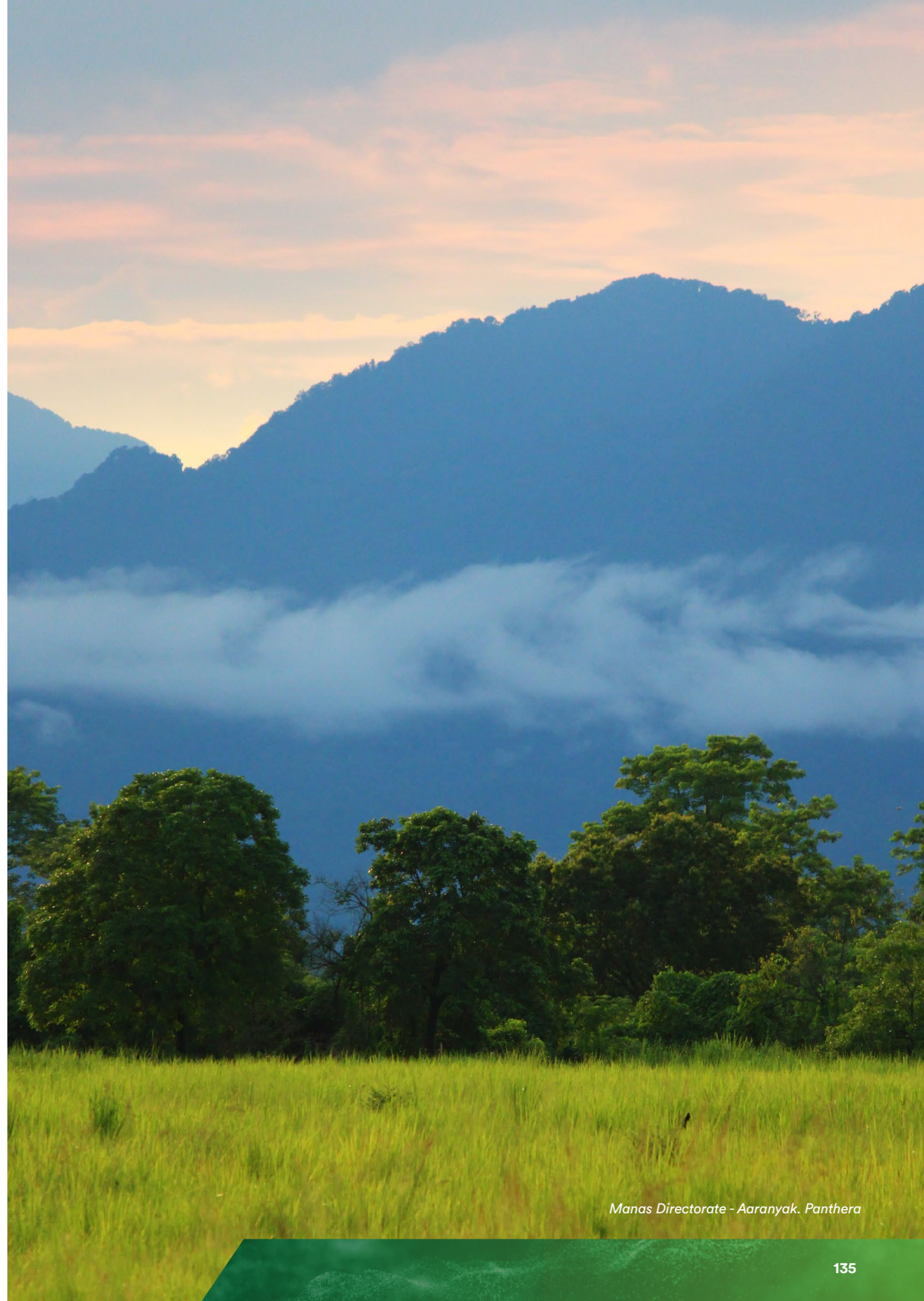○ **If no response had been implemented**

GAIN CONTROL

Much of the uncertainty in interpreting your time series can be removed if you can compare how the problem behaves where you are implementing your response, to places where you are not. Using these 'controls' is covered in Step 47.

Manas Directorate - Aaranyak. Panthera

STEP 47
Consider controls

Ask yourself what would have happened if you did not implement the response. Would the problem have declined anyway due to other factors, would it have remained stable, or did you prevent an increase in the problem? These counterfactual scenarios require a strong understanding of the problem and can be tricky to develop. One way of creating more reliable counterfactuals is to use controls. A control is a standard against which to compare your results and allows you to rule out effects from other factors.

When testing new medicines, researchers divide people into a group receiving the treatment (response group) and a control group that does not; both will be monitored the same way over time. Improvement in the response group, when the control group shows no change, provides confidence that the treatment was indeed effective. Controls like this require planning and resources. They are challenging to do with wildlife protection problems, but not impossible. Use the checklist below to find suitable controls.

Good controls, pragmatic controls. Control Areas should have similar conditions to your Response Areas to make the comparison valid. Ideally the Control Area will not be influenced by the changes occurring in your Response Area, so you can say a rise in the problem in the Control Area is what you avoided in the Response Area, not what you caused by pushing offenders next door. Be pragmatic with your experimental design: it will be impossible to ensure all conditions are standardized in Controls and Response areas, but factoring this into your assessment plan from the outset will substantially strengthen your findings.

A good control shows you what might have happened to your problem if you didn't implement your response. It helps you rule out other causal factors.

Use natural experiments. You might not have controls but think about other ways you can check if your response is causing the problem to reduce. The graph below shows three distinct episodes in which the amount of response and problem are correlated, one of the four criteria for claiming causation. Here, the problem declines after the response is implemented. Then problem rises as the response is reduced. Finally, the problem falls again as response levels recover. Reducing the level of response may have been driven by funding cuts but provided a natural experiment.
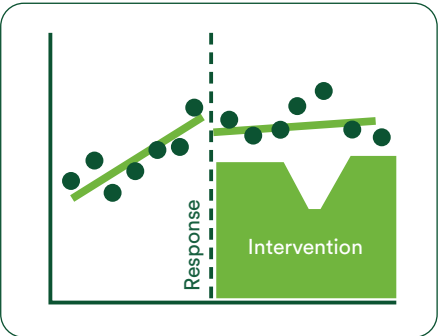

Response | Intervention

Randomized Controlled Trials: The Gold Standard of Experimental Design

In randomized control trials, you do not rely on just one response area and one control, but multiple, and most importantly, randomly decide which areas get the response. This approach helps to rule out many confounding factors and bias providing greater certainty of findings.

A Western Australian Police Force (WAPF) team examined the impact of foot patrols on crime hot spots within Perth. The team selected 15 200m x 200m crime hot spots. Every day a 20-minute patrol would be conducted in three randomly assigned hot spots. The remaining 12 hot spots were considered 'initial controls', if there was more than one day since the patrol, and 'extended controls', if there were over 5 days since a patrol. The team found offenses at hot spots on patrol days were reduced, and stayed low for up to four days afterwards, before climbing up again on day 5 (graph below left). This showed the 20-minute patrol created a residual deterrent effect which faded after four days.
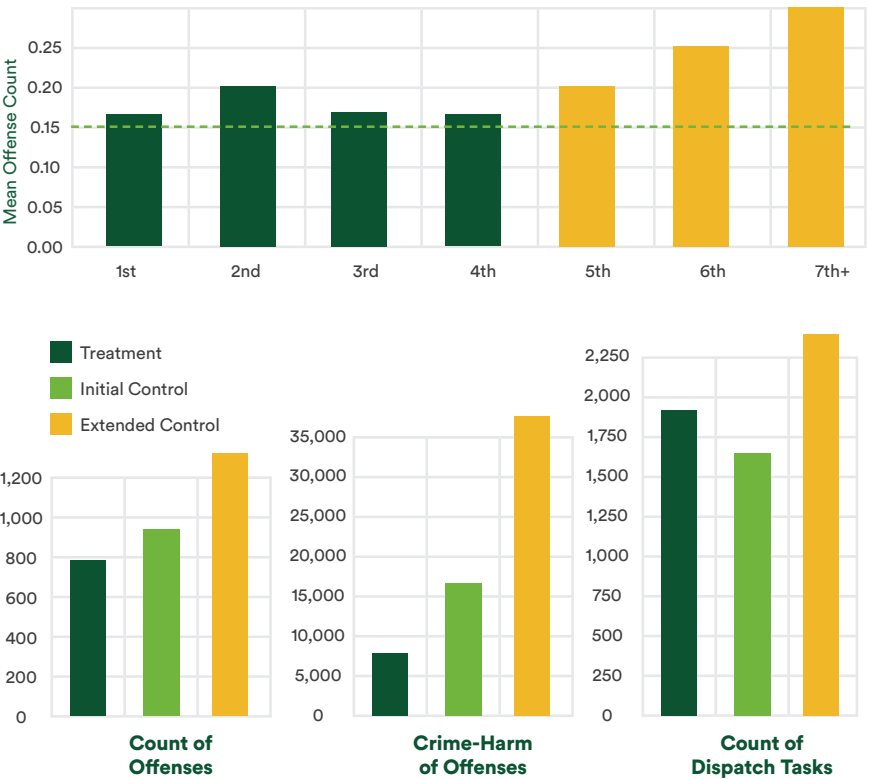

Crime-harm of offenses committed showed that after four days the nature of crime changed, with an increase in more severe offenses (above right). The team also found that the number of dispatch tasks the police had to deal with increased past the four-day mark, whereas during the 1-4 days after a patrol, police enjoyed four free days of crime reduction. A strategy of waiting four days before revisiting a hot spot would free up 537 police dispatch tasks each year.

DETERMINE WHAT WORKS, WHAT FAILS, AND WHY

PERCENTAGE OF TURTLE NESTS RAIDED BY HARVESTERS ON FIVE SAMPLE BEACHES ON EACH RIVER
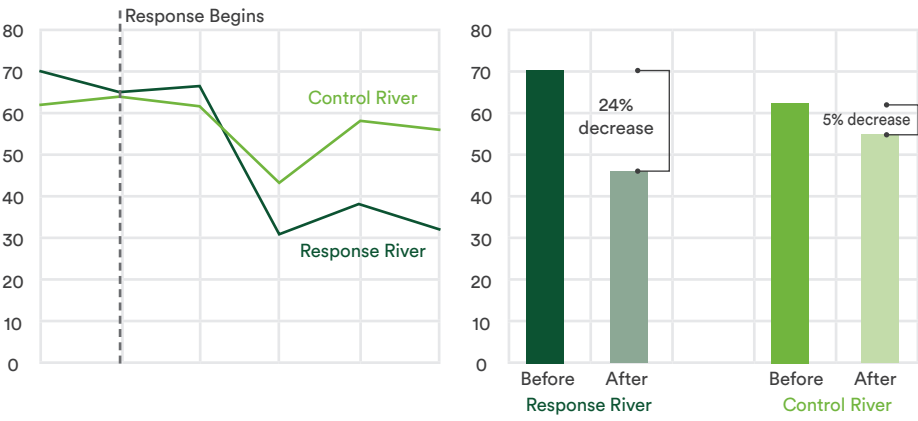
5% decline in Control River | 24% decline in Response River | 19% amount of decline can be attributed to response.

TURTLE EGG HARVESTING HYPOTHETICAL: Setting up a control

The team selected a Control River to monitor that had similar egg harvesting pressure to the Response River. It also a similar number of nesting beaches, which were equally accessible to boats from the communities. The analyst compared the final year of the project to the baseline for percentage of turtle nests raided by harvesters. The time series showed nest raids declined in both Response and Control Rivers, but the change was greater in the Response River. The analyst considered the Control River provided a good counterfactual, and that it was likely the same pattern of 5% decline in nest raiding would have been seen in the Response River if they had done nothing at all.

CONTROLS CHECKLIST

Comparable	Is the Control Area experiencing the same problem as your Response Area? Is the problem being measured in the same way?
	Do Response Area and Control Area experience the same seasonal rhythms?
	Are Response Area and Control Area exposed to the same external socio-economic factors?
Independent	Is the Control Area sufficiently distant from the Response Area that it is unlikely to be influenced by displacement?

J. Monkivitch

STEP 48
Check what moderates the response

When doctors prescribe medicine, they often calculate how much a person will need based on their body type and size of the problem. Getting the dosage of a treatment right is crucial. Too little might have no effect, whereas too much would be a waste of resources or harmful. Adults require larger doses of medicine than children, while some treatments will not work together with others. Think about your response in this same way, it is a tailored treatment to reduce a problem.

Going beyond proving your response was indeed the cause of a problem's decline, can you Identify in what circumstances and contexts your response works best, and where it is less effective? That will tremendously strengthen the value of your evaluation and help guide others.

Your response might work well with some offender groups, but poorly with others. Identifying moderators like this lets other teams know what impact to expect.

Dosage and thresholds. As resources are limited, it helps to know what is the minimum response necessary to cause a reduction in the problem, and if there is a threshold below which the response has little or no effect. The patrol hot spot example in Step 47, showed time since last patrol was an important moderator. The team identified a 'sweet spot', with a 20-minute foot patrol causing residual deterrence for up to four days afterwards. The optimal dosage of twenty minutes' patrol every four days struck a good balance between keeping crime at low levels and freeing up police resources.

Setting up an experimental design to find the right dosage and quantify the effect of moderators requires substantial planning before implementing your response. If you did not do this, can you spot different units or groups in your data, and did you achieve different results in different groups?

TURTLE EGG HARVESTING HYPOTHETICAL: Moderators influencing the effectiveness of the job scheme intervention

1. **Offender income source.** The scheme worked well with low volume egg harvesters who did ad hoc collecting as an income sideline alongside other activities. The scheme was least effective with high volume harvesters for whom the eggs were a primary income source.

2. **Distance to village.** Offenders who lived on farms furthest from the village were reluctant to travel to the village each day for the employment scheme. The project team experimented with incentives such as subsidizing boat fuel for travel.

REDUCING DEFORESTATION THROUGH RURAL HEALTH CLINICS

A project was established in Gunung Palung National Park, Kalimantan, Indonesia, to address the problem of illegal logging. Analysis by Jones et al. (2020) revealed malaria was widespread among 36 villages surrounding the park and treatment was expensive. Community members felled trees for timber to obtain fast cash to pay for expensive anti-malarial treatment, while the logging itself created better conditions for mosquito breeding. Intensive agriculture in the communities had exhausted soils, causing farmers to regularly purchase expensive fertilizer, creating a second poverty trap.

The project involved creating a discount scheme at the rural clinics in which communities received discounts based on community-wide reductions in illegal logging. A second part of the project provided support for regenerative agriculture to improve crop yields and reduce need to buy fertilizer.

The analysis separated community members into low, medium and high categories for engagement effort, calculated as cumulative person-contact hours between project staff and community members. Deforestation rates were calculated using satellite image data. The findings (below) showed deforestation rates decreased depending on the strength of intervention, but that only high levels of engagement effort resulted in illegal logging communities decreasing activity.
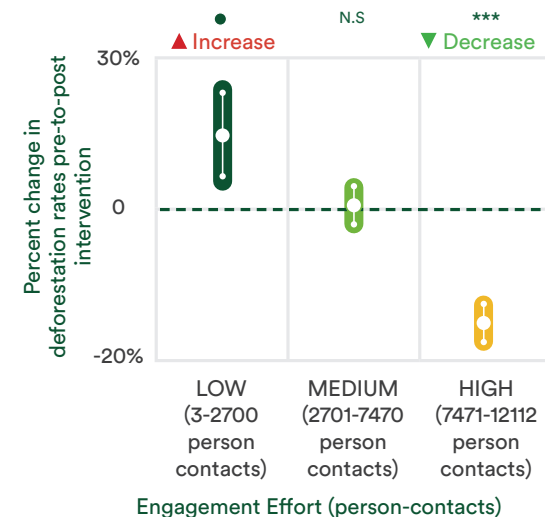
READ MORE

Improving rural health care reduces illegal logging and conserves carbon in a tropical forest | Jones et al (2020)

STEP 49
Check for displacement and unexpected benefits

Take your evaluation a step further. Can you assess the overall gains made, accounting for positive and negative shifts in the problem beyond the area you implemented your response in, or beyond your focal problem?

**Crime displacement can be malign or benign.** Malign displacement means your intervention worsened the situation, in other words, it backfired. Benign displacement involves offenders continuing, but causing lower overall harm, such as switching poaching to a less important area, or using less effective weapons, still resulting in net gains in problem reduction.

Diffusion of benefits occurs when crime declines beyond the response area or in non-target problem types. Offenders may overestimate the area where your intervention is implemented causing risks of arrest to be elevated, resulting in deterrence outside your response area, known as the 'halo effect'. Offenders may also develop an exaggerated perception that the rewards from a particular crime no longer outweigh the effort needed, resulting in discouragement.

This can substantially boost the impact of your intervention. Diffusion of benefits and displacement occur equally often, in about 25% of crime prevention efforts.

> *Accounting for how your intervention caused shifts in the problem beyond your response area will give you a truer picture of how effective it really is.*

Test for geographical displacement and diffusion of benefits. Measure the problem in three evaluation areas: the Response Area itself, an area buffering this where the problem would be expected to shift to (the Displacement/Diffusion Area), and (ideally) a comparable yet independent Control Area. The displacement/diffusion area should have a logical connection to the response area and be an equivalent size and free from other interventions that might confound the results. An ideal control area is geographically separate but shares similar characteristics to the Response Area, including similar levels of the same problem (Step 47).
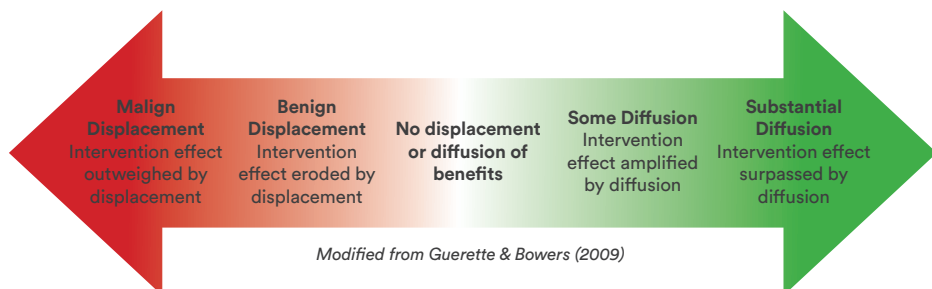
Calculate the Total Net Effect (TNE) of an intervention. Use the equation below to account for changes in the control area and the displacement/diffusion area. The more positive the number, the more effective the response was, while negative numbers suggest the response was not effective overall. See the read more box below for more detail on measuring crime displacement.
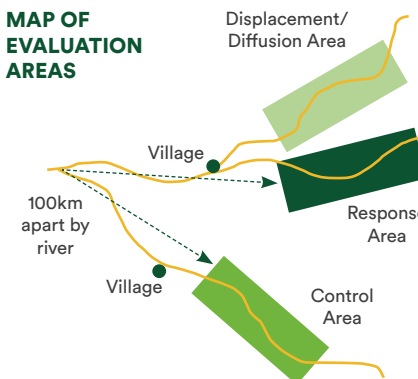
TURTLE EGG HARVESTING HYPOTHETICAL: Checking for displacement

The team tested for geographical displacement and the diffusion of benefits. They selected an area of a separate river, equal distance from the village as the response river area and with similar numbers of beaches for turtle nesting. The control river area was selected as it was far from the response river area and challenging to reach from the focal village. It was also a similar distance from a village where egg consumption was high. All three areas were equivalent in length and number of sample nesting beaches. The team compared nest raid percentages in all three rivers and found there was a greater magnitude of decline in nest raiding in the displacement/diffusion area than in the control area, resulting in a total net effect (TNE) of 31.45. This suggested the project had diffusion of benefits and was successful overall.

MAP OF EVALUATION AREAS

TOTAL NET EFFECT
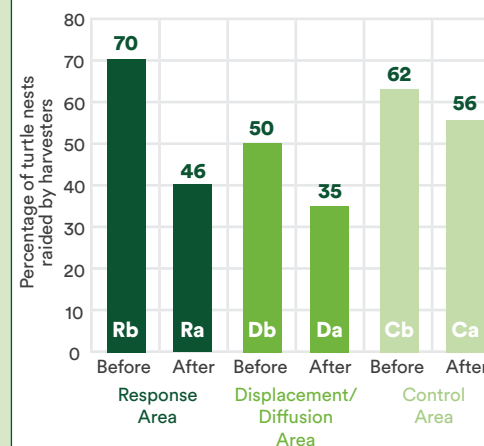
$$TNE=(RB*(CA/CB)-RA)+(DB*(CA/CB)-DA)$$

$$TNE=(70*(55/62)-40)+(50*(55/62)-35)$$

$$TNE = 31.45$$

READ MORE

Analyzing Crime Displacement and Diffusion | Guerette (2009)

Assessing the Extent of Crime Displacement and Diffusion of Benefits: A Review of Situational Crime Prevention Evaluations | Guerette & Bowers (2009)

Crime Displacement: What We Know, What We Don't Know, and What it Means for Crime Reduction | Johnson et al. (2014)

| Malign Displacement Intervention effect outweighed by displacement | Benign Displacement Intervention effect eroded by displacement | No displacement or diffusion of benefits | Some Diffusion Intervention effect amplified by diffusion | Substantial Diffusion Intervention effect surpassed by diffusion |

Modified from Guerette & Bowers (2009)

STEP 50
Rule out alternative explanations

You can only state with confidence that your response caused the problem to decline by ruling out other likely explanations. Controls will help with this. Quite possibly there were several factors which combined to make the problem decline. That does not necessarily weaken the value of your response, but it does help other practitioners know what is needed to make the response work well and reduce their expectations if they cannot get that same set of conditions to align.

Be ready for unexpected events and parallel interventions. As the COVID-19 pandemic has shown, unexpected events can significantly impact wildlife crime problems; in some cases, making them worse, in other cases making them better. Remember that other agencies may implement interventions which help reduce your problem…or make it worse by displacing offenders.

Prepare to interrogate the alternatives. Make a list of other reasons the problem may have gone up or down in the area. Include these in your assessment; include information to support or reject each one. Informal discussions and interviews with individuals who have a good understanding of the problem will help. Just be prepared that this means more research, speaking to people, and collecting information.

Other forces will push the problem down or up as you implement your response…try to assess their influence.

Test hypotheses. It is tempting to take a successful decline as evidence your response worked well but play Devil's advocate. Challenge yourself to prove it was your response and not another factor. During the analysis, you tested hypotheses about the nature of the problem and how sensitive it is to different pressures, now go through that process again and examine the support for each alternative explanation for a problem's decline.

> **TURTLE EGG HARVESTING HYPOTHETICAL: Identifying alternative explanations**
>
> The turtle team examined support for alternative factors likely influencing the problem. They were able to rule out rural-urban migration but found weak support for deterrence by the river patrols and the education campaign. Through discussions with retired egg harvesters the team learned about another important factor: the price of boat fuel. The year the government increased taxes on boat fuel 50%, nest raiding fell in both the Control River and Response River, the following year a newly elected government scrapped the boat fuel tax and nest raiding rose in both rivers. Interestingly, 2017 was the first-year high-volume egg harvesters joined the job scheme. Although egg harvesting picked up again after the fuel tax was removed, it didn't bounce back to pre-tax levels, while more high-volume harvesters joined the scheme in 2018. This suggested the high-volume harvesters needed additional pressure to cease, but once on the job scheme they did not relapse but brought on other colleagues.

ALTERNATIVE EXPLANATIONS FOR CHANGES IN TURTLE EGG HARVESTING PROBLEM

Factor	How it influences the problem	Evidence that supports or refutes	Assessment
Migration to city for jobs	Reduced number of harvesters.	National statistics show rapidly rising number of rural workers migrating to the city. But, enrolment in local job scheme continued to increase each year.	Unlikely to have significantly influenced the observed pattern.
General deterrence from river patrols	Increased risk of arrest while harvesting eggs.	Analysis of boat patrol data show both Control and Response Rivers were patrolled equally.	Secondary contributing factor.
Education campaign ran by municipal authority	Reduced rewards. Demand for turtle eggs declined, price of turtle eggs dropped.	Community contacts report the price of a kg of eggs fell during the project period. Retired egg harvesters state harvest becoming less profitable. But, no change in harvesting rates on the Control River.	Secondary contributing factor.
Increase in cost of boat fuel	Increased effort. Harvesters have to spend much more on a collection trip.	The years in which fuel prices rose and fell correspond to years when nest raiding dropped and rose on both Response and Control River.	Strong support for driving short-term decline.

PERCENTAGE OF TURTLE NESTS RAIDED BY HARVESTERS ON FIVE SAMPLE BEACHES ON EACH RIVER
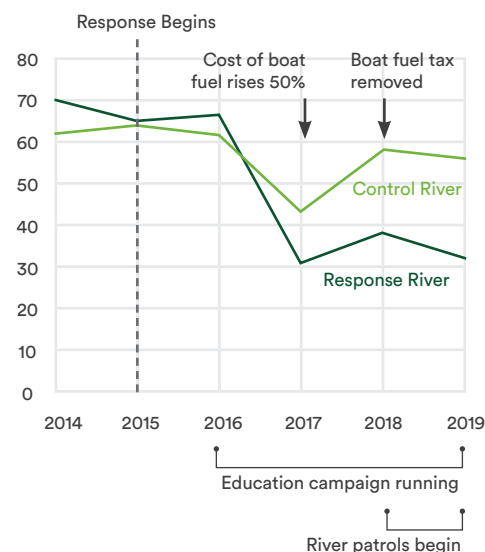
WHAT MADE YOU STOP?

Some of the best evidence will come from asking retired harvesters why they stopped and when.

"To be honest, the increase in boat fuel costs in 2016 was the main reason. It started becoming a bit riskier when the river patrol began, but some of us still knew how to avoid the patrols. The market was not quite as good as it used to be, we were getting less per kg of eggs, so when I heard about the job scheme, I decided why not. It made more financial sense. "

- Retired high volume harvester

SECTION 6 | TELL PEOPLE WHAT HAPPENED

A protection team examines a haul of jaw traps recovered from a patrol in Angola. Asking questions about the tools and weapons used to hunt and process wildlife can help you find ways to reduce poaching by controlling availability. Is there a limited number of manufacturers with the capabilities and equipment to construct the weapon or trap? Do they require access to specialized material and can the process for obtaining the components be determined? Are there distinct places where weapons are sold or advertised? A 'yes' to any of these could be a potential intervention point.

Trees still stand in Gunung Palung National Park, Indonesian Borneo. This highly species rich forest suffered degradation from illegal logging for high value timber by community members living on the forest-edge. Attrition by small scale farm encroachment and logging linked to pervasive local poverty threaten forests across the globe and present deeply challenging problems to solve. In Gunung Palung, a problem-solving team interviewed community members and identified bouts of logging were triggered by sudden need for cash to buy expensive medicine and fertilizer for the farms. Combining a rural health care subsidy scheme with training in regenerative agriculture, the team reduced the key stressors and found forest loss next to communities involved in the scheme decreased 70% while infant mortality declined three-fold.

Improving rural health care reduces illegal logging and conserves carbon in a tropical forest | Jones et al (2020)

Step 51
Communicate regularly with operations and stakeholders

The final section of this manual revisits the topic of communication. As an analyst you play a critical role in managing the flow of information within your organization. You are responsible for developing strategies to collect information (Step 8), break down silos (Step 9), and share knowledge with internal and external stakeholders (Step 11). To be effective in this role, you will need to build trust and develop relationships with people that give you data, as well as end-users that rely on your analytic products. Regular communication will help develop these relationships and over time build the analysis capacity of your organization.

There are two primary reasons for communication: learn something new or share information with others. It is important to keep in mind that your relationships with stakeholders are not one directional. For example, to remain motived, people providing data would like to see it used. For your field operations team, this could be done by ensuring that their contribution to information collection is acknowledged, applied, and they receive analysis products such as patrol briefs.

Understand operational needs and be clear about why your analysis matters. Your engagement strategy needs to reflect the reality that people within your network need different things from you…and you need different things from them. If you are asking someone to contribute information to your analysis, make it clear how this benefits them. If you are sharing information, the same applies, be very clear how your analysis helps operations. Some audiences will want to meet in person informally, others may want a briefing document, and some may even ask for a formal presentation or written request. Be flexible, even if it takes more time and energy, as this will help make your relationships stronger.

Always aim to initiate your relationships in person or over the phone. From this you will get a sense for individual communication preferences which will set the boundaries for future engagement. This can even be incorporated into your information collection plans. Be open to hearing people's ideas about the information collection and sharing. For example, a ranger may not be inclined to submit a formal information report but is willing to share their knowledge in detail through face-to-face engagement. Or, a patrol planner may not want a monthly report or set of maps, but rather the ability to access the data with you in real-time. Be a good listener and try to accommodate requests such as this to build a stronger bond with individuals.
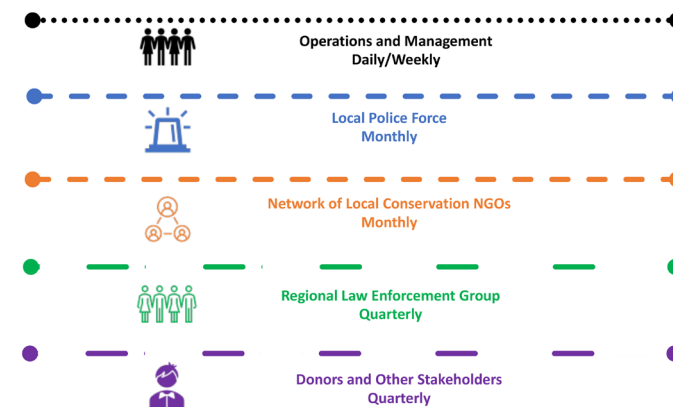
Your standing as an analyst will be earned over time. It is easy for an analyst, or their work, to be left out of the decision-making process. This usually happens when the value of the analysis process, or an individual analyst, is not recognized by an organization. If you work closely with operations and stakeholders regularly and align your work with their priorities from the beginning (Step 7), you will earn their trust more quickly. Be prepared to earn your keep…like any member of operations.

Avoid surprises…do not wait until the end of your analysis project to present your work. If you do not involve people along the way, your audience may respond poorly because (a) they do not understand why you have done the problem analysis or (b) you have not answered the questions important to decision-makers. Aim to bring decision-makers along for the journey by engaging them early and often. Regular updates of your analysis projects will encourage familiarity with your analysis and an investment in the outcomes.

Use the floor when you have it but make sure you leave time for others. When presenting your work, always budget sufficient time for questions and discussion. Feedback is a crucial improving your problem analysis (see Step 55). Make people feel comfortable to challenge your findings or explain how they think the information should be used. Being open to constructive criticism, will help build trust and ultimately improve your analytic products.
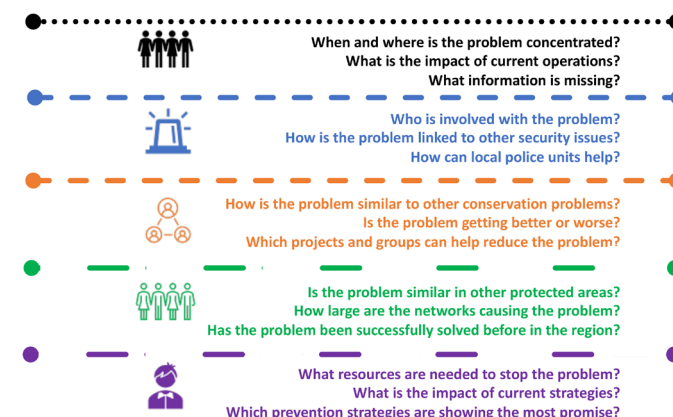

SOME GROUPS NEED MORE ATTENTION THAN OTHERS
Make a plan for how often you will communicate with operations and stakeholders

Operations and Management
Daily/Weekly

Local Police Force
Monthly

Network of Local Conservation NGOs
Monthly

Regional Law Enforcement Group
Quarterly

Donors and Other Stakeholders
Quarterly

TELL THE RIGHT STORY
Decide what type of analytic product stakeholders need

When and where is the problem concentrated?
What is the impact of current operations?
What information is missing?

Who is involved with the problem?
How is the problem linked to other security issues?
How can local police units help?

How is the problem similar to other conservation problems?
Is the problem getting better or worse?
Which projects and groups can help reduce the problem?

Is the problem similar in other protected areas?
How large are the networks causing the problem?
Has the problem been successfully solved before in the region?

What resources are needed to stop the problem?
What is the impact of current strategies?
Which prevention strategies are showing the most promise?

Step 52
Tell a clear story

At the end of the day, the impact your analysis has on reducing problems comes down to one thing…effective communication. If people do not understand what you have done, or what it means for operations, you have failed…even if your analysis is 100% correct.

Know your audience. Effective communication requires knowing who will read or see your work. If you are presenting to senior managers in charge of budgeting and operations, you will need a different approach than if you are presenting to stakeholders in the community.

Use the right medium to communicate. PowerPoint presentations may be what you learned in school; that does not mean they are the best form of communication. Some audiences will be immediately switched off by this approach. Some may want to read your work, giving them time to think it over and come back with questions. Videos and pictures are also excellent options for engaging people; especially with short, targeted messages.

Do not forget to KISS. Keep It Simple Stupid, or KISS, is a good rule to keep in mind when communicating. You know your analysis better than anyone…too well…just keep it simple and lay out the most important points. Do not get bogged down in the details unless you are responding to a specific question.

Choose your words carefully…and be consistent. Remember audiences will react to words differently. For example, the words 'poacher' and 'offender' are commonly used in law enforcement circles, but in communities and civil society, they may be avoided. Here you might use the word hunter instead, as this removes the label of criminality, but appropriately captures the behavior in question. Once you have picked the right word, use it consistently, to avoid confusion.

Remember that every story has a beginning, middle, and end…just maybe not in that order. When presenting your analysis, it will help your audience if you show them where you started, how it developed, and what it means. That said, you might be better off starting at the end, by stating your recommendations up front, and then returning to the beginning to explain your reasoning. This captures the audience's attention but may also help them understand the analysis process better.

STORYTELLING BASICS

Know your audience
Who will be seeing your work?
Why do they care about it?
What is their role in solving the problem?
How do they normally present?
How do they normally get new information?
How many presentations or reports have they seen before yours?

Choose the right medium
Does the audience like reading?
Would a facilitated discussion work better than a presentation with questions?
What about pictures and videos?

KISS
What is the most important finding?
What the most important next step?
Who is the most important stakeholder?
What is the 30 second version of your story?
Can you only use pictures and graphs?

Choose the right language
What is the background of your audience?
Are you talking about sensitive subjects?
What word would a 10-year-old use?

Have a beginning, middle, & end
Why did you start your analysis?
What did you learn along the way?
What does this mean for operations?

Each year the Center for Problem-Oriented Policing accepts applications for the Herman Goldstein Award for Excellence in Problem-Oriented Policing. The application is a useful set of questions that help you capture what happened during the SARA process.

A. SCANNING
- What was the nature of the problem?
- How was the problem identified?
- Who identified the problem (e.g., community, police managers, officers, politicians, press)?
- How and why was this problem selected from among problems for special attention?
- What was the initial level of diagnosis/unit of analysis (e.g., crime type, neighborhood, specific premise, specific offender group)?

B. ANALYSIS
- What methods, data and information sources were used to analyze the problem (e.g., surveys, interviews, observation, crime analysis)?
- How often and for how long was it a problem?
- Who was involved in the problem (offenders, victims, others) and what were their respective motivations, gains and losses?
- What harms resulted from the problem?
- How was the problem being addressed before the problem-solving project? What were the results of those responses?
- What did the analysis reveal about the nature and extent of the problem?
- What did the analysis reveal about the causes and underlying conditions that precipitated the problem?
- What other information was analyzed to better understand the problem (e.g., time of occurrence, location, features of the physical and social environment of the problem)?
- What were the community perspectives on the problem?

C. RESPONSE
- What were the project goals and corresponding measurable objectives?
- What range of possible response alternatives were considered to deal with the problem?

- What, specifically, did you learn from your analysis of the problem that led to your choice of a new response to the problem?
- What responses did you use to address the problem?
- Who was involved in the response to the problem?
- What factors were considered in deciding which potential responses to implement (e.g., legality, community values, potential effectiveness, cost, practicality)?
- What resources were available to address the problem?
- What difficulties were encountered during response implementation?

D. ASSESSMENT
- Were response goals and objectives achieved?
- What specific impact did the implemented responses have on the problem?
- How did you measure your results?
- For how long was the effectiveness of the problem-solving effort evaluated?
- Who conducted the evaluation?
- Were there problems in implementing the response plan that affected the project outcomes?
- If there was no improvement in the problem, were other systemic efforts considered to handle the problem?
- How might the response have been more effective?
- Was there any evidence of displacement (i.e., shifting the problem somewhere else or to some other form of problematic behavior)?
- Was there any evidence of diffusion of benefits (i.e., that the responses had a positive effect beyond your expectations)
- Will your response require continued monitoring or a continuing effort to maintain your results?

Step 53
Make maps, tables, and figures

Maps and graphs can be an analyst's best friend...but they can also be your worst enemy. Maps, graphs, and other visuals usually fail when you try to do too much at once. Much like storytelling, if you can keep things simple, it will be easier to walk your audience through your analysis.

One figure...one finding. This is a good rule of thumb to use when creating visuals for your work. If a single map or figure is used to make 5 or 6 important points, it is likely your audience will feel overwhelmed. Instead, consider having a series of figures that make the same points, one at a time. When in doubt, ask yourself which finding is the most important and make it your priority.

Figures should stand on their own. If you do your job well, the visuals you make will tell the story you want. A reader should be able to pick up your report, only look at the figures, and have a good idea what your analysis found.

Figures should be readable. When creating your visuals, take extra care to make sure all of the text and data displayed is easy to read. Maps with small points are hard to see, and graphs with very small labels are difficult to interpret. If you must zoom in on any part of your document to read some of the text, remake the figure.

Use supporting text for interpretation, not repetition. Many people have a bad habit of using the text around a figure to describe what's already visible. Try to only write the highlights of the data, saving the rest of your words for interpretations of the patterns seen. For example, a good figure means your reader will be able to see if there has been a large increase or decrease in the problem; your text should describe what caused it rather than rewriting the actual numbers.

Use tables to summarize important raw data. Some audiences will only want to see a nice picture, others will want to see the data themselves, and some will want both. Add a table in the appendix of your document so people that are interested can double check how your figures were created. This is also useful for making comparisons across sectors, treatment groups, or problems.

Labels and legends are your best friend. Make sure you clearly label all axes and be sure to include a legend anytime symbology is used. This ensures you audience can quickly and easily understand the different types of information you are displaying.

Titles are more than placeholders. Use the title to provide your audience with as much information about the figure or table as possible. A good title summarizes the data used and how it is being compared. It might also summarize the major finding. For example, 'Rhino Poaching Decreasing in Kruger National Park but Increasing in KwaZulu-Natal Province (2010-2019)'.

Add overlays as needed. Sometimes a great chart is made even better by highlighting a crucial piece of information with an arrow, box, or text. Do not be afraid to add these elements to a figure or map when it helps tell your story. For example, adding an arrow that shows where a shipment was headed before it was seized adds valuable information about trafficking routes. Take care that you do not use too many overlays, as this will become distracting.

Stick to the basics unless something more advanced is adds value. When it comes to figures, sticking to the basics is usually best. 3D effects, animations, or custom color schemes often distract more than they help. However, you may want to use interactive maps or animations to show changes over time. Be sure to ask yourself, does this really help me make my point, or does it just look nice? Things that look nice usually take a lot of time to make...determine if the time is worth the impact on your audience. Remember you goal is to help them make decisions, not impress them with visualizations.

Step 54
Use case studies for learning

As an analyst working in wildlife protection, it is unlikely you will be setting up huge experiments to test the impact of your interventions. It is more likely you are going to have limited time, data, and resources to give decision-makers an answer to the questions… What happened? Did it work?

Case studies help capture context. Problem-solving is complex and adaptive. Decisions are often made with limited information because they must be. Capturing these decisions and changes is important for understanding why an intervention works or fails.

Case studies are a good way to document problem-oriented work. Being focused lies at the heart of problem-solving. This means interventions are likely to involve specific places and individuals, not general areas and populations. By treating individual problems as cases, you will start to produce small, digestible pieces of research for decision makers.

Case studies have advantages compared to other forms of research.

- They provide in-depth information about a problem solving exercise
- They help identify new ways to research and measure problems
- They provide evidence where it was not possible or ethical to set up randomized controlled trials to test interventions
- They can be done retrospectively if the appropriate information is available
- They are usually less expensive than large studies

They also have disadvantages.

- They are hard to generalize to other settings because they are specific
- It is more difficult to prove success because there are often few, if any, comparison groups

Learning with Case Studies

In the 2021-2022 academic year, Harvard Business School (HBS) celebrated 100 years of educating students using the case study method. Rather than lecture, professors moderate discussions about business case studies. Over the course of their two -year education, HBS students are presented 500 different case studies. Each one is 10-20 pages long, written by a real person, working to solve a real business challenge.

Students read through the case studies, which by design have incomplete information, and begin to think about how they would solve the problem. Small groups meet before class to discuss their ideas and talking points.

In class, students debate the best way to solve the problem. They combine their own real-world business experiences with the information presented in each case study.

This style of learning emphasizes the need to take an active role in discussions, but also to improve active listening skills as the ideas of others may be or inspire a better solution.

After class students reflect on what they heard and how it will impact their own decision -making process in the future when leading companies or teams.

By exposing students to 500 case studies, the HBS program broadens their understanding of business in general, by talking about it specifically. The in-depth studies capture the context of the individual problems, while the sheer volume of case studies helps improve student's general knowledge about business practice. New case studies are developed each year for the curriculum.

For more information: HBS Case Study Method

COULD THE HBS MODEL BE ADAPTED FOR WILDLIFE PROTECTION?
A note on education opportunities

Providing educational opportunities for wildlife protection decision-makers to learn using the case study method seems obvious. Having a collection of case studies for training professionals, written by leaders solving real problems, would not only increase the availability of evidence about the effectiveness of interventions, it would also help inspire those leaders to produce case studies of their own.

Take time to consider how your organization might use case studies internally or externally. Writing a case study for internal use will be easier than making it an external or public document. Internal studies will help you communicate with your colleagues and capture their experiences. Discussing a case study with field teams may be an excellent way to connect operations with analysis. As an active listener you will pick up interesting ideas for how to better measure or respond to a problem. Ask yourself these questions:

- Could case studies help you better capture your crime prevention work?
- Are there opportunities for learning with case studies? At which levels?
- Do you have any cases that would be a good example to write up?
- Would there be interest to create an internal collection of case studies?
- Would there be interest to contribute to an external collection of case studies?

Also take time to consider the value of sharing your case studies externally. Much like the Herman Goldstein Awards for Excellence in Problem-Oriented Policing, an open-access collection of wildlife protection case studies would be a valuable learning resource. As the collection grew, say to 500 case studies, there would be a wealth of information to use for education and research.
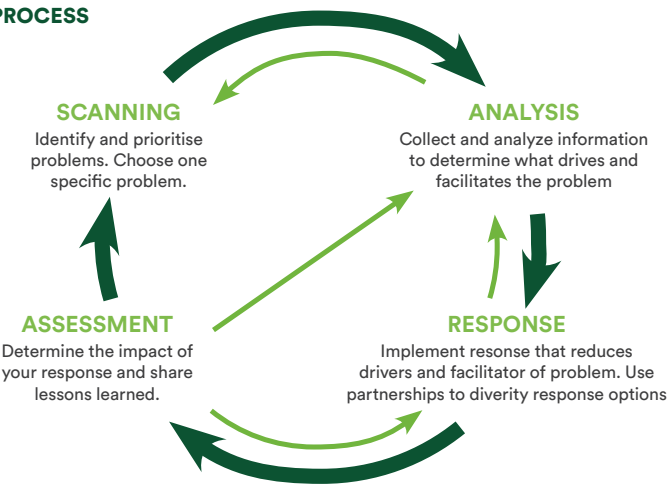
Step 55
Improve your work with feedback

When you present your work, it is likely you will receive questions about your findings or criticism on how you interpreted the data. That is OK…in fact, it is exactly what you want. If you present to a room full of decision-makers and no one asks a question, you have failed to communicate effectively. So, prepare yourself for feedback when you present, and use it to make your work even stronger.

Do not forget problem analysis evolves. Analysis helps you track problems over time, develop solutions, and determine how well they are working. This means you are likely to be monitoring the problem for some time and may need to make adaptations along the way. Use feedback from your partners and colleagues to stay on top of changes that may impact the effectiveness of your intervention or how the problem is measured.

Remember that SARA is an adaptive process. The figure below shows the feedback loops built into SARA. As you work on a problem, you may have to move backwards at times, i.e., when assessment shows the response is not working and needs to be adapted. Moving backwards is not a problem, if anything it shows your monitoring system works well.

When you fall off the horse, pick yourself up and get back on again. Sometimes you will feel like your work was criticized unfairly or that it falls on deaf ears. You might be right. That said, it is your job to learn from those experiences and try to avoid them from happening again.

THE SARA PROCESS

SCANNING
Identify and prioritise problems. Choose one specific problem.

ANALYSIS
Collect and analyze information to determine what drives and facilitates the problem

ASSESSMENT
Determine the impact of your response and share lessons learned.

RESPONSE
Implement resonse that reduces drivers and facilitator of problem. Use partnerships to diverity response options

TEMPLATE FOR FEEDBACK ON 55 STEPS MANUAL		
Section	**Comment**	**Potential Solution**
General	The pdf is not easy to read on a smartphone.	Create mobile / web version.
Step 2	The manual should include reference to additional resources.	Reference 1, Reference 2
Section 3	There is no step on network analysis.	Add additional step.

Section	Indicate which part of the document your comment refers to. This may be a specific step, one of the sections, or it could be a general comment about the document.
Comment	Describe how the document could be improved. Is there a case study that could be referenced? Is there research that could be included?
Potential Solution	Explain how you think the comment should be addressed. Does a new step need to be written? Does the language need to be edited? Would you like to be involved in the process? Include references, preferably with attachments, where possible.

Dear Reader,

We encourage you to use this template to submit feedback. As noted at the beginning of the manual, we recognize we could not capture everything by ourselves and undoubtedly missed some resources and concepts. As this step describes, collecting feedback on your work helps polish and shape it into a more reliable product that gets used more often.

Please submit feedback to make55stepsbetter@proton.me

Thank you in advance.

Andrew, Rob & Damian

A.M. LEMIEUX

Andrew was a researcher at the Netherlands Institute for the Study of Crime and Law Enforcement (NSCR). He worked with numerous wildlife-protection organizations in Africa and Asia including governmental, non-governmental, and private entities. His work revolved around the collection and use of data for decision-making, with an emphasis on problem solving and situational crime prevention. As of 1 Sept 2022, Andrew works for LEAD Ranger, overseeing the organization's Problem-Oriented Wildlife Protection program.

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R.S.A PICKLES

Rob supports teams of Panthera analysts and problem-solvers worldwide to understand wildlife crime problems, design tailored responses and evaluate impact. Having worked closely with counter-poaching teams for the last seven years, Rob is particularly focused on overcoming the challenge of preventing poaching in remote, deep forest environments with small resource-strapped ranger teams. Rob earned a Ph.D. in ecology from the University of Kent and Zoological Society of London in 2010 and joined Panthera in 2012.

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D. WEEKERS

Damian leads the development of decision support systems for tactical and operational programs across the Great Barrier Reef Marine Park in Australia. With a background in intelligence analysis, Damian works to advance evidence-based and problem-oriented approaches in compliance management practice in Marine Protected Areas. Damian completed a Ph.D. in Criminology at the University of Queensland in 2020, where his research examined the utility of applying environmental criminology theories and prevention techniques to illegal fishing in MPAs. His postdoctoral research interests focus on the practical application of crime science to help support conservation programs.

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Acknowledgements

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In a moment of hope for its population, a young Arrau turtle emerges in Brazil's Rio Trombetas Biological Reserve. Each dry season these turtles nest on sandy beaches along the rivers. Each species' characteristics determine how it is likely to be threatened by exploitation or persecution, and how it may recover with intervention. Understanding the ecology and seasonality of the focal wildlife species will help you refine your response and measure success.

DNP/Panthera