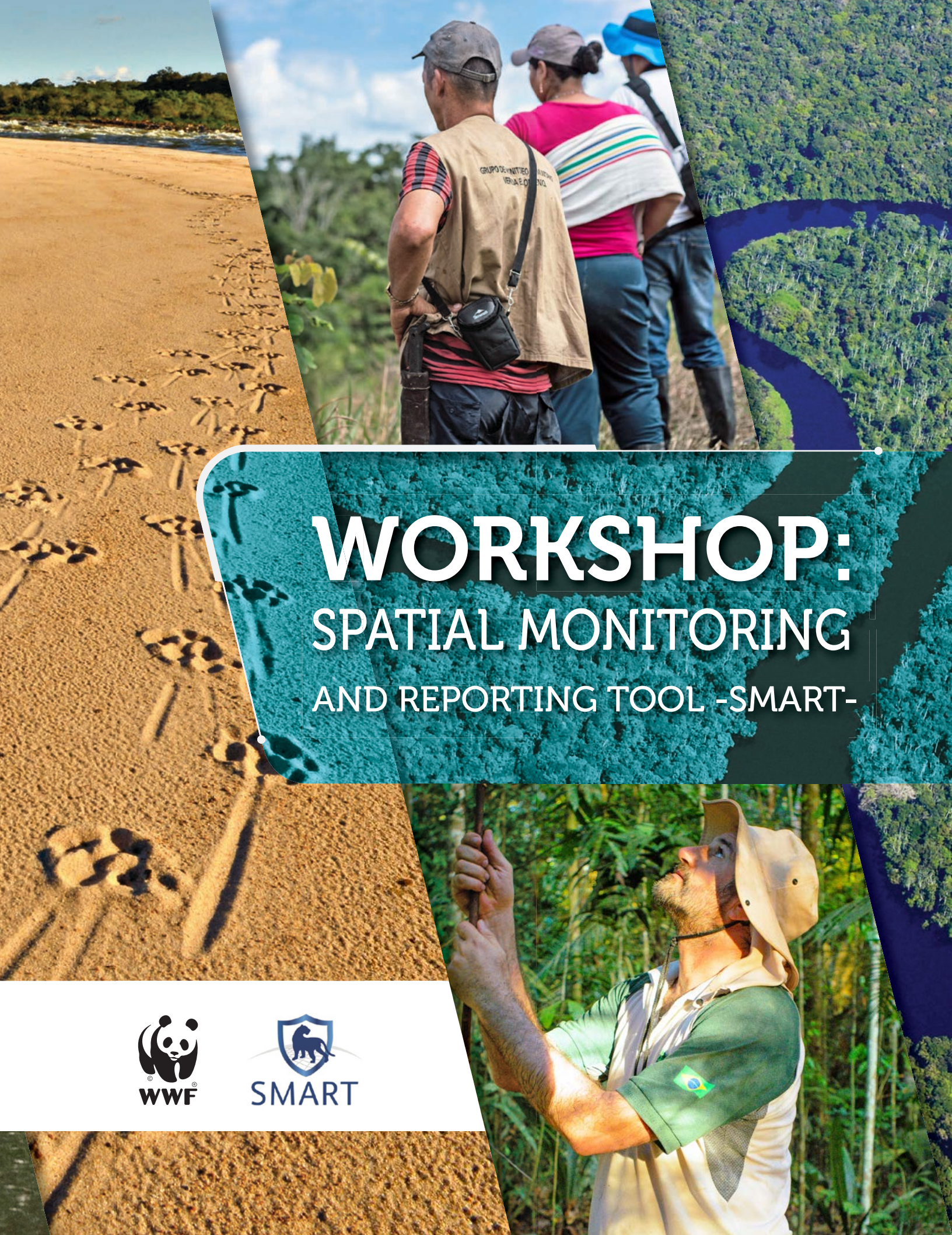


WORKSHOP:

SPATIAL MONITORING

AND REPORTING TOOL -SMART-

WWF

SMART

WORKSHOP:
SPATIAL MONITORING AND REPORTING TOOL -SMART-

September 13 and 14, 2018
Bogota

WORKSHOP:
SPATIAL MONITORING AND REPORTING TOOL -SMART-

Proceedings compilation:
Diana Carolina Fonseca Espejo
Biológica Soluciones

Editorial coordination:
Carmen Ana Dereix

Diego Fernando Amorocho
WWF-Colombia

Design and layout:
El Bando Creativo

September 13 and 14, 2018
Bogota

TABLE OF CONTENTS

List of Figures

List of Tables

OBJECTIVES

- Understand the role of SMART in monitoring of target species (such as jaguars and their threats)
- Spell out the procedures on information gathering, sharing, reporting and roles and responsibilities for doing so.
- Sensitize all relevant stakeholders on how SMART can help reduce and mitigate the effects of human-jaguar conflict.
- Convince stakeholders on the role of SMART as an effective tool for managing conflict.
- Formalize the reporting structure and identify focal points for SMART implementation for each site.

AGENDA

DAY 1		
9.00 – 9.15	Registration	Biológica Soluciones
9.15 – 9.30	Welcome remarks	Diego Amorocho
9.30 – 10.00	Presentation 1: Introduction to the WWF supported conservation work	Rohit Singh
10.00 – 10.45	Presentation 2: Introduction to Law Enforcement Monitoring (LEM) using SMART (Video & presentation)	Rohit Singh
10.45– 11.00	Break	
11.00 – 11.45	Presentation 3: Successful case study on SMART implementation (from the region and from outside the region) Brasil-Bhutan	Felipe Spina - Rohit Singh
10.45 – 12.30	Questions and answer session	Rohit Singh
12:30 – 13.30	Lunch	
13.30- 14.30	Experience in the implementation of the SMART tool (Colombian National Parks PNN)	Jenny Paola Devia
14.30-15.30	Demonstration of SMART • Explain different components of SMART and how they can help to keeping all data organized and easily accessible	
15.30 – 16.00	Break	
16:00- 17.00	Share SMART reports and get their feedback	

DAY 2		
9.00 – 10.30	Interaction session Show how to run queries in SMART Share the database and let the participants play with SMART	Rohit Singh
10.30– 11.00	Break	
11.00 – 11.30	Interactive session (continued)	Rohit Singh
11.30 – 12.30	Requirements of SMART human resource, final resource, etc.	Rohit Singh
12:30 – 13.30	Lunch	
13.30- 15.30	List the future steps from SMART implementation in each site	
15.30 – 16.00	Wrap up	

PARTICIPANTS

Name	Institution	E-mail
Rohit Singh	WWF	rsingh@wwfnet.org
Felipe Spina	WWF	felipeavino@wwf.org.br
Diego Amorocho	WWF	dfamorocho@wwf.org.co
Cesar Suarez	WWF	cjsuarez@wwf.org.co
Esteban Payan	Panthera	epayan@panthera.org
Jaime Cabrera	WWF	jaime_andresc@yahoo.com
Joaquin Carrizoza	WWF	jecarrizosa@wwf.org.co
Mario Chavez	Corpoamazonia	mario900611@hotmail.com
Luz Angela Flores	WWF	laflores@wwf.org.co
Ilvia Niño	WWF	inino@wwf.org.co
Mara Contreras	WCS	mcontreras@wcs.org
Gina Gomez	Procat	ggomez@procat.conservation.org
Catalina Moreno	Procat	catamo85@gmail.com
Nicolai Ciantesco	WWF	nciantesco@gmail.com
Carlos Valderrama	Panthera	cvalderrama@panthera.org
Bibiana Gomez	Humboldt	bgomezv@gmail.com
Jormmy Machado	MADS	jmachado@minambiente.gov.co
Jorge Parra	WCS	jparra@wcs.org
Jenny Paola Devia	PNN	jenny.devia@parques.gov.co
Luisa Fernanda Ortíz	WWF	comms@wwf.org.co


© Adriano Gambarini / WWF-Brazil

DAY 01

WORKSHOP OPENING BY DIEGO AMOROCHO

Welcome to the workshop by Diego Amorocho, who briefly explains SMART: a tool for monitoring and reporting, used by different organizations. Diego presents Rohit Singh, leader of SMART -WWF, president of Rangers Federation Worldwide, and Felipe Spina, in charge of the use of this antipoaching tool in Brazil.

The objective of the workshop is to define the use, purpose, and meaning of SMART, and how it could be improved and adapted by different countries to be used to reduce jaguar's current hunting threats. SMART can be used for different purposes, not only for jaguar monitoring, but also for other endangered species distributed in protected and non-protected areas.

© Adam Markham / WWF

Afterwards each attendant gives a brief presentation:

- **Cesar Suarez.** WWF-Colombia
- **Esteban Payan.** Panthera
- **Jaime Cabrera.** WWF-Colombia
- **Joaquin Carrizoza.** WWF-Colombia
- **Mario Chavez.** Corpoamazonia
- **Luz Angela Florez.** WWF-Colombia
- **Ilvia Niño.** WWF-Colombia
- **Nara Contreras.** WCS
- **Gina Gomez.** Researcher
- **Diego Amorocho.** Program coordinator
- **Rohit Singh Sighn.** WWF International
- **Felipe Spina.** WWF-Brazil
- **Machado.** Biologist MDS
- **Catalina Moreno.** Researcher
- **Nicolai Ciantesco.** WWF-Colombia
- **Carlos Valderrama.** Panthera
- **Viviana Gomez.** Humboldt
- **Luisa Fernanda Ortiz.** WWF-Colombia
- **Jorge Parra.** WCS

1 INTRODUCTION TO THE WWF SUPPORTED CONSERVATION WORK

Rohit Singh presents his experience in Africa and Asia, with special attention to Nepal, the objectives he pursues are to share his expectative and hear from the participants how could be not just the use of SMART, but as its implementation as a conservation community.

The most important thing is to see SMART as more than just a tool, it is about how effective it is and how it's successful implementation experience can be shared with others. The main question is: ***Why do you want to use* SMART? *What is the value in your context?***

Joaquin Carrizosa: It is about an exploratory process. A comprehensive way to understand the environmental, monitoring, improving, understanding conservation and many different topics.

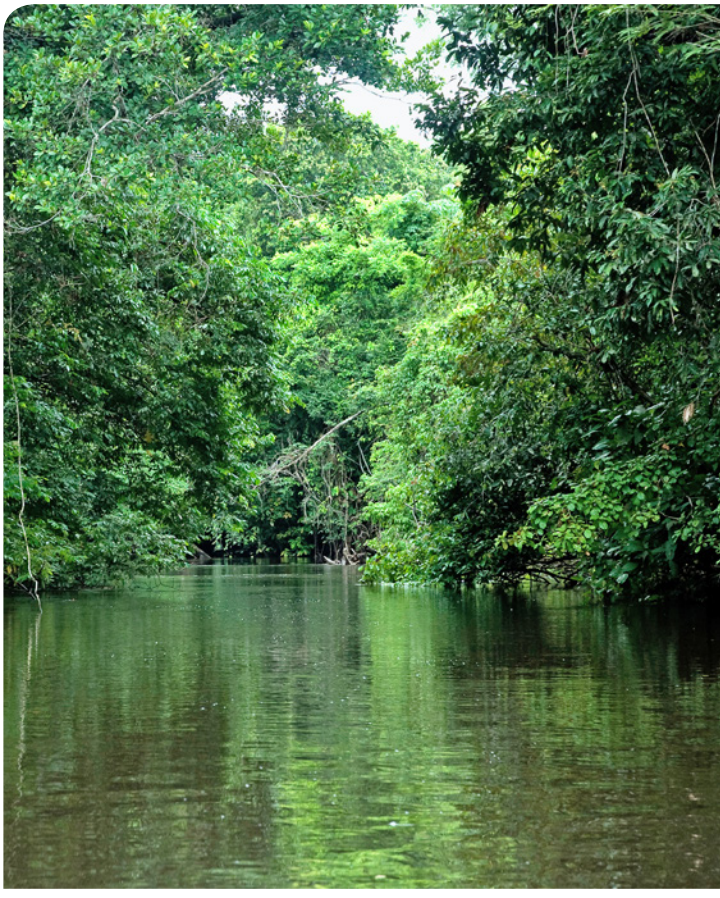
Esteban Payan: to understand, to control, measurements and standardize processes

The objective of the workshop is to define the use, purpose, and meaning of SMART, and how it could be improved and adapted by different countries.

Nara Contreras: support the tool to Natural National Parks. Strengthen the planification process to the control and monitoring program, planning the best routes to develop activities to identify pressures and identify impacts. To complement the pressure monitoring of the areas.

KEY POINTS:

Understanding 3 main things: save people from animals, save animals from people, save people from people. If you can do these 3 things effectively, you can manage your protected area (PA), and here is where SMART comes in, to help you to understand all the issues better. How do you monitor those things with a tool and in a standardized way? With SMART.



© Adriano Gambarini / WWF-Brazil

A lot of technologies were implemented and proposed by various NGO's, different conservation groups and companies, looking for a way to solve different issues, but the technology must fit in 3 ways: **usable, scalable** and **affordable**: SMART fits in these 3 criteria. **Affordable**: available free cost, with low investment: get some trainings, some equipment and a laptop; you will need financial resources when you identify gaps, for instance when you realize that the patrol team is not enough to cover the whole area. **Flexible** enough to fit in any protected area, and **scalable** to use it in any site or area. It is not always necessary to invest a lot of money in too many technologies, for instance: drones. Investing in boots for rangers, is more important than investing in drones.

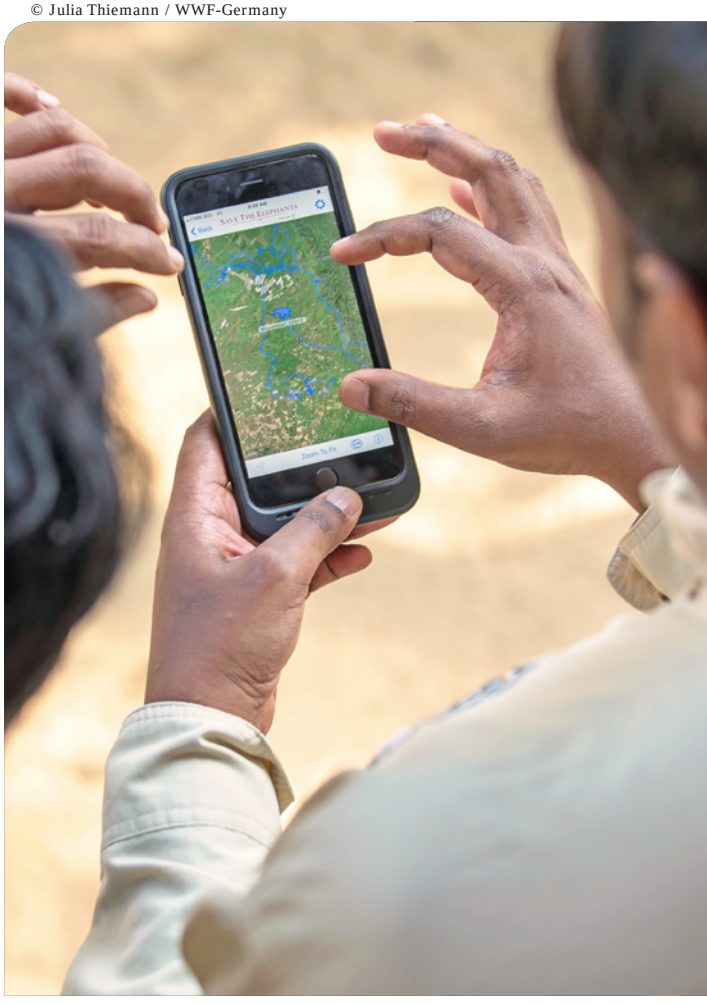
SMART: ***improving protection by allocating resources in right areas –*** **Rohit Singh**

- Increasing demand for wildlife products
- Wildlife crime increasing, it is well-financed, organized and connected to criminal networks
- Limited resources support conservation

Fundamental rule: If I don't know who is coming to my protected area, then it is not a protected area, it is just an area and there is no point to call it a PA. It is necessary to change the way we work to get a PA, and it will depend of 2 main things: Community Rangers and technology.

To begin with the tool, we must ask to ourselves: What kind of tool do we need to improve protection of wildlife in PAs? A tool that should address 3 stakeholders: Protected area managers to do more effective coordination, frontline conservation staff to have more effective protection and national authorities to use the information.

The SMART partnership has 3 pillars: effective software tools, rigorous standards and capacity building and support. In that



The SMART partnership has 3 pillars: effective software tools, rigorous standards and capacity building and support. In that way, the main goal of SMART is to have an effective management of protected areas through capacity building and implementation of monitoring tools, best practices and standards, through collaboration of agencies, sharing efforts to address one of conservation's greatest challenges: Work hand-to-hand!

© Roger Leguen / WWF

way, the main goal of SMART is to have an effective management of protected areas through **capacity building** and implementation **of monitoring tools, best practices** and **standards,** through collaboration of agencies, sharing efforts to address one of conservation's greatest challenges: Work hand-to-hand!

Effective use of SMART: NGO's should not manage SMART, it should be the governments as national authorities; SMART should not be used as a database, in that case, just use Microsoft Excel. If you don't use the report tool, then there is no point to use SMART. The tool allows to determine information on where patrols need to go and get information on how the patrols are performing. The main functions of SMART are monitoring the PA effectively and to see the effectiveness in a standardized way.

Is SMART *standardized for a Protected area only? Is it possible to use* SMART *in another context different form* PA?

Rohit Singh mentioned that when SMART was designed, they intentionally called Conservation Area, not Protected area. In SMART, that conservation area can be or not a Protected Area, what you need is some structure. It has been used for different purposes, such as forest monitoring, the key is to understand why you want to use it, you must define your needs at the beginning.

Ordinary people will be able to introduce information into SMART?

Rohit confirm and mentioned that it is available to the citizens to use the platform and include information into SMART.

***Main functions of* SMART:**

- Intelligence: For the first time, we are using AI to predict where something is going to happen
- Patrol planning and evaluation
- Mobile data gathering, by simple mobile phones. There is a SMART mobile application called Cybertracker.
- Powerful analytical engine: you can design your own questions
- Available in local languages: Portuguese, Spanish, English, among others.
- Cross conservation area analysis: check PA, compare to decide where more resources should be put
- Large volume of data can be stored (pictures, animal's data, threat data, intelligence)
- Platform and plugin framework
- Enables you to include other aspects of conservation work
- Case-tracking under development

HOW DOES SMART WORK?

Figure 1. SMART Workflow. Taken from 1. SMART Presentation

© Luis Barreto / WWF-Colombia

© Ricardo Lisboa / WWF-US

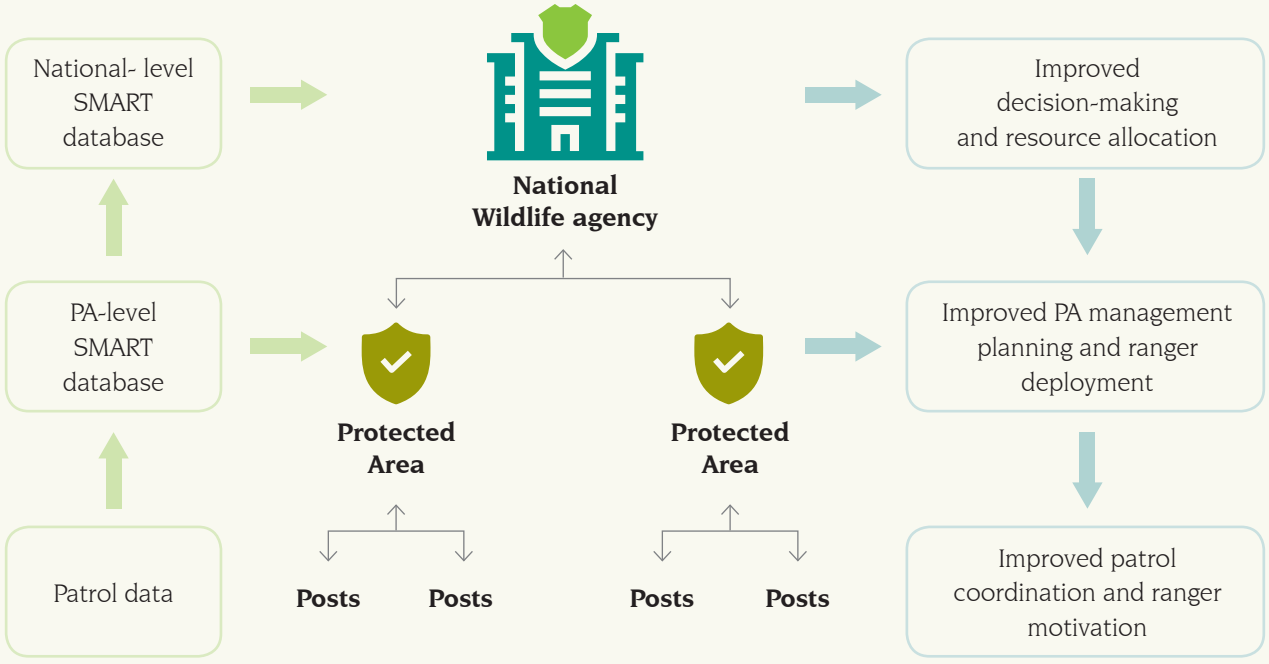


Figure 2. How SMART works at national level. Taken from 1. SMART Presentation

Rohit Singh shows examples of applications: evaluation of patrol effort and coverage, ranger performance and accountability, monitoring threats, mapping wildlife distribution, measuring impact, standard reporting.

Rohit Singh shows examples of applications: evaluation of patrol effort and coverage, ranger performance and accountability, monitoring threats, mapping wildlife distribution, measuring impact, standard reporting.

***Main Key features of* SMART**

- Free, open source
- Available in 9+ languages
- Mobile data collection
- Easy to use at local level
- Enhances accountability
- Terrestrial & marine
- Highly variable capacities
- Long term vision and support
- Powerful analysis, reports, mapping
- Analysis across multiple PAs
- Driven by the user community
- Improves transparency

Rohit Singh shares a video about Rangers and SMART for conservation.
https://www.youtube.com/&feature=youtu.be

SMART - Spatial Monitoring and Reporting Tool

SMART helps you to decide where the resources are needed, additionally it works as a support tool to make decisions and improve the PA, gives an idea on what is going on inside the area, but it is not the solution. SMART gives you an idea to model the world and allocate in a more effective way to decide where the resources will go.

2 SUCCESSFUL CASE STUDY ON SMART IMPLEMENTATION (FROM THE REGION AND FROM OUTSIDE THE REGION) BRASIL-BHUTAN

CASE OF STUDY: ROYAL MANAS NATIONAL PARK-BHUTAN (ROHIT SINGH)

Bhutan is considered the happiest country in the world, 60% of their geographical area is protected, it is mandatory that the cover protected be 60%. In figure 3 (Map Conservation-Bhutan), you can see in light green the non-protected areas and the other dark areas correspond to protected areas

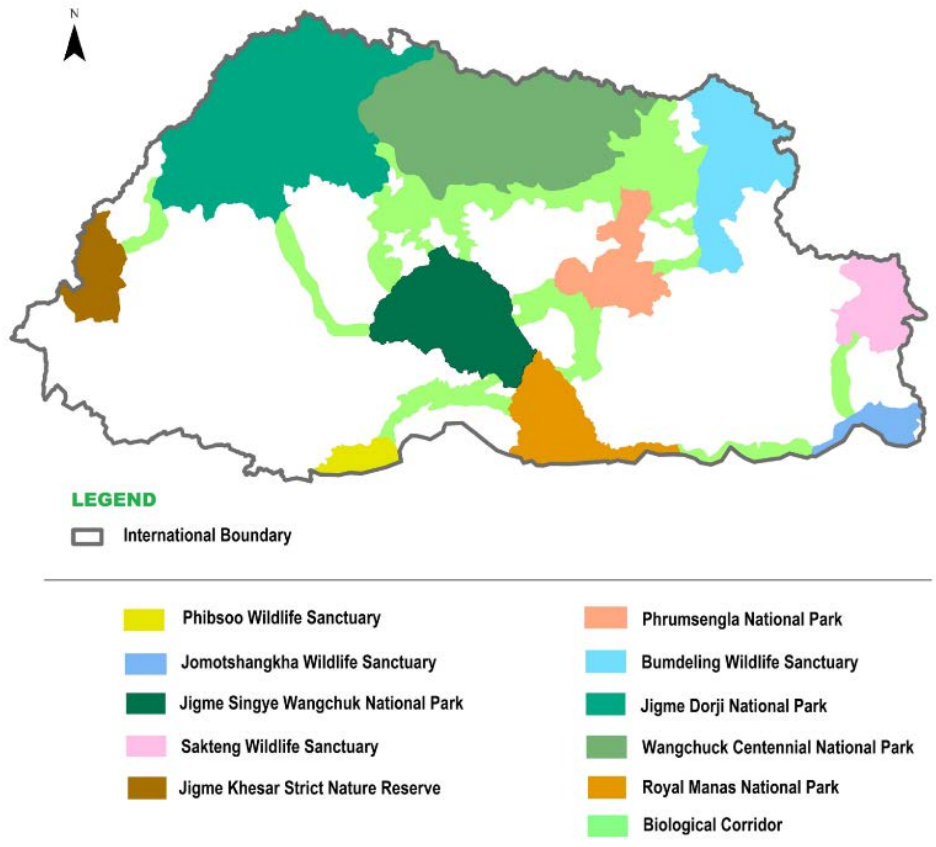


Figure 3. Map Conservation-Bhutan. Taken from 2. SMART Bhutan Case Study_PPT_KT

WWF and the park services had a meeting to present the SMART Tool, the main goal was to introduce the tool and show how SMART can address different needs in any NP. In that sense, the National park services gave to WWF a NP to implement the tool for 12 months, get feedback on the experience, and obtain results; thus, the NP chosen was the Royal Manas National Park. The RMNP is 1057 km^2 and is the oldest NP in the central foothills of Bhutan, the heartbeat of TRaM-Ca (Transboundary Manas Conservation Area), it has various habitats and high species diversity.

Bhutan is between 2 big countries: China and India, it is a mountainous country, and was selected because it has a lot of threats, for instance, tigers get in and out from India to Bhutan and it was necessary to monitor this species in the Royal Manas National Park. The implementation of SMART in Bhutan began with some trainings, talking to rangers and teaching them how to use SMART, re-train data officers and park manager, to make sure that the meetings happen. For getting the data, we started with a GPS and after 1 year, moved to mobile phones, to make sure that the information gathered is correct. The idea is not just teaching data officers how to use the devices and the tool by clicking (which can also be learned from the manual), but the most important thing is teaching them what is the reason to click in one option or another. The data officers produce some results and reports to improve the patrol planning and then patrolling and monitoring, go to the field and get data collection to mobile phones. Now, they are managing different sections more effectively, you know which section is being more or less patrolled, so you can see the patrol frequency. Some of the results gathered from the tool are wildlife sighting records by year (tiger, elephant, bear and sambar deer observations), ranger performance, reports of threat observations, patrol planning, human-wildlife conflict monitoring, among others.

At the beginning, SMART was an offline program, it means that someone must physically bring the devices, connect to the laptop, download the information and then produce the reports. Now, with SMART Connect, you can use SMART devices, the patrol records the information and send the information to the Connect Platform.

SMART CONNECT IN BHUTAN

At the beginning, SMART was an offline program, it means that someone must physically bring the devices, connect to the laptop, download the information and then produce the reports. Now, with SMART Connect, you can use SMART devices, the patrol records the information and send the information to the Connect Platform. SMART partnership is supporting about 15 sites, meanwhile WWF is supporting 11 sites, WCS is supporting Philippines. SMART Connect can help in: collect and share field data in real time, manage real time alerts to be more effective in the responses, centrally manage SMART deployments at multiple sites and improve analysis, visualization and impact data for decision making. SMART connect is also capable of integrating different source of information such as cameras and drones, as well as web platform information, for instance deforestation or alerts.

© Emmanuel Rondeau / WWF-UK

To use SMART Connect it is possible to use any server, you can use the regular servers that you already use, you just need online space. But, you can use the Amazon servers and just pay for the service and forget about the maintenance.

The reports only make sense if someone reads them, to have an impact for the decision making and adaptive management, if this does not happen, there is no point in using the tool. If you want to use SMART as database, you must instead use Microsoft Excel, but if you want to change the PA, then use SMART and use it for adaptative management. At the beginning of the pilot in Bhutan, the NP had only 8 tigers, nowthey have 22.

? The first step to use SMART is think about the requirements and question: ***What do we need? What do we want to get from* SMART?** Once you understand the needs, then the tool works well.

As the Bhutan case, it is necessary to begin with one case of study, test the tool for a period (12 months) and then prove to the partners that the implementation of the tool works, and in that way, it is possible to obtain the needed resources.

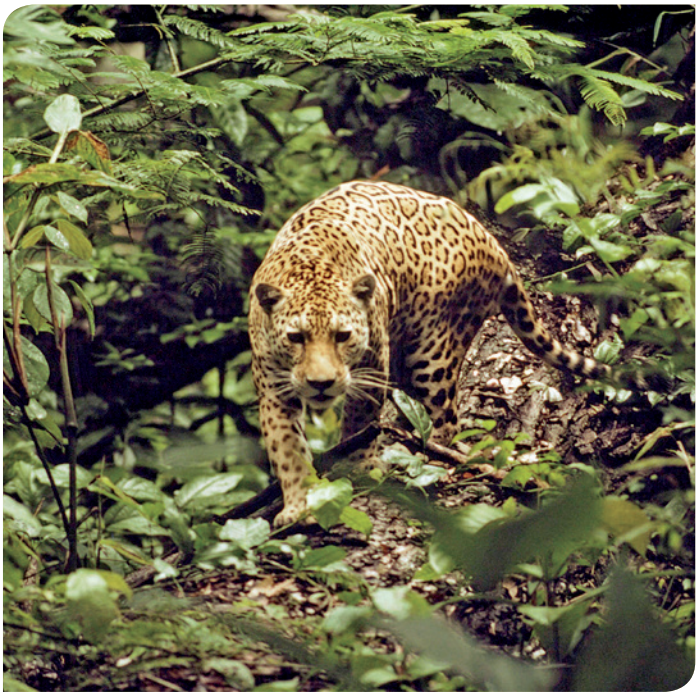
CASE OF STUDY:
AMAZON REGION PROTECTED AREAS -ARPA- BRAZIL (FELIPE SPINA)

This program has not implemented the SMART tool yet, but the idea is to present what the expectations and the needs of the program are. So far, ARPA is the biggest conservation program worldwide, the goal is to consolidate 60 million hectares of protected areas in the Brazilian Amazon.

The main barriers for the ARPA implementation revolve around the information and the resources: lack of ground data, availability and human resources. Once the issues and the needs have been identified, SMART could help to solve them.

The ARPA Program, has 3 main parts:

1. RAPPAM: Rapid assessment and prioritization of Protected Area Management
2. PADD
3. Conservation Technology



© André Bärtschi / WWF

The third component is focused on the integration of monitoring technology using SMART Connect. To kick- off the project, it is necessary to:

- Translate the tool to Portuguese and adapt it for Brazil. It will be available in the next month
- Meeting with the government for implementation
- Capacity building in the government to run and manage the tool
- Use Cybertracker to assist the implementation
- Test key features: connect, ecological records and intelligence
- Improve the tool to produce a protocol

The main idea is to test SMART Connect integration with different sources of information, such as bioacustic, camera and drones, to monitor different species in the PA.
To develop the implementation of SMART, the next steps are:

2018: Adapt and translate the tool
2019: Training Field trials ARPA
2020: Evaluation tool consolidation
Goal: obtain ARPA Standard Protocol

ARPA is a huge area, so the program has been having a meeting with the government to determinate the pilot areas to test the implementation of SMART.
So far now, what we have done is share experiences, involve the community to supporting and get a successful implementation of SMART. Our challenge is finding the way to convince and involve the government and change the scheme or the way we have been doing our work.

REQUIREMENTS TO SET UP SMART:

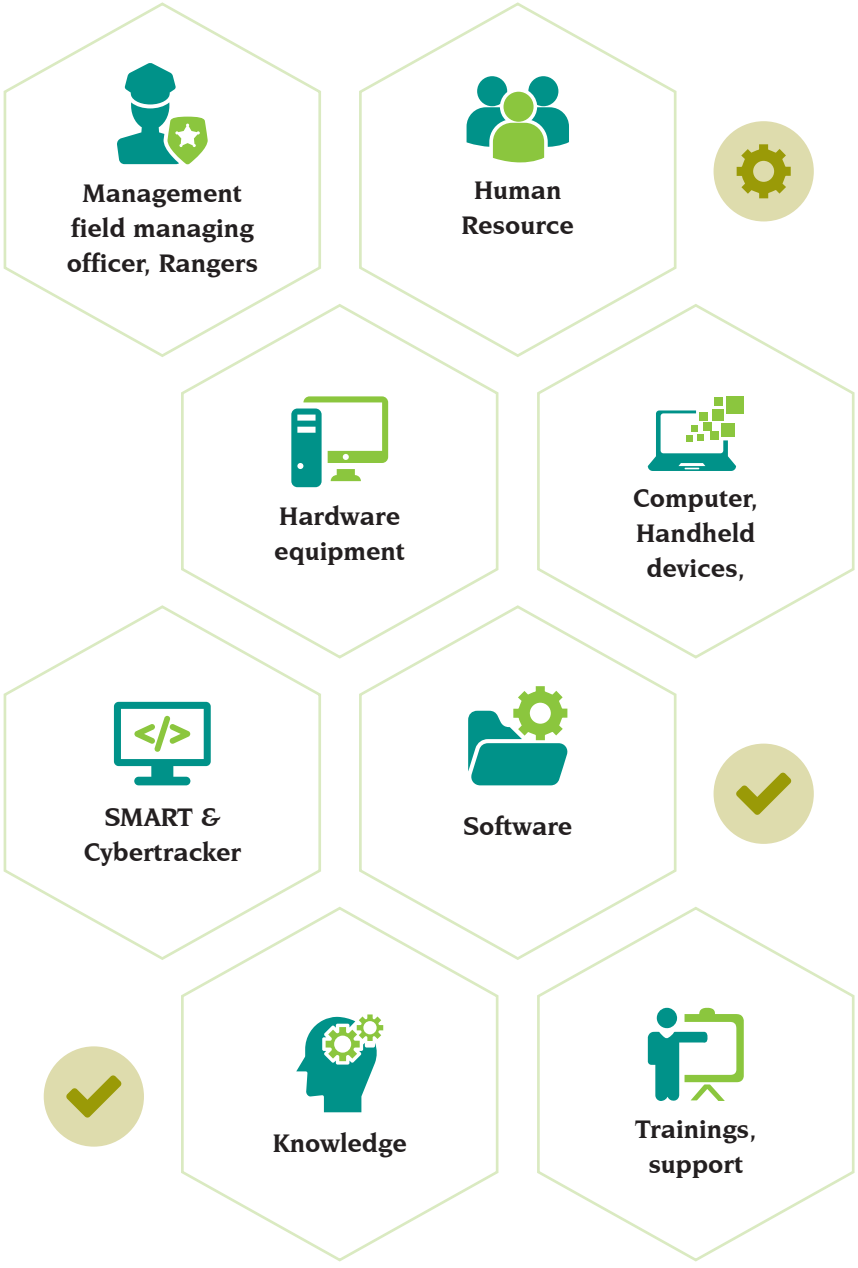


Figure 4. Requirements to setup SMART in Brazil

3 EXPERIENCE IN THE IMPLEMENTATION OF THE SMART TOOL (COLOMBIAN NATIONAL PARKS PNN) -JENNY PAOLA DEVIA

Jenny Paola Devia, works at PNN (Colombian National Parks) in Information Technology and knowledge area. She has been working in the adaptations for the SMART tool.

This has been an initiative since 2013. Before, PNN had an application for control and vigilance using a database. WCS requested it to build an additional platform, from here it began the adaptation and implementation to use the SMART platform. Adaptations began with the change of the application name, so, the platform name is SICO-SMART (**S**istema de **I**nformación de **CO**ntrol). The following steps were the appropriation in the institution and community campaigns, such as communications and divulgation adjustments.

WHAT HAS BEEN DOING PNN SINCE THEN? IN A TIMELINE:

2014	2015	2016	2017	2018
3 Test PA -Tuparro, Sierra Nevada de Santa Marta and Corales	5 PA - SMART Implemented	20 PA - SMART Implemented	3 PA - SMART Implemented	59 PA **GOAL.** It has implemented the most part of the 59 AP

Figure 5. Time Line PNN

How PNN did the first steps? Understanding the logic of the platform, assemble the database as needed, improvement of information flow and quality, implementation for visibility, tied to issues of unsupervised POA (Annual Operative Plan) for vigilance and control in PAs. Trails, routes, broad analyzes for visibility data for those who make the tours. Strengthening data capture on the ground, because PNN has been training for GPS use for 20 years: coordinates system and generate information standards: formats to fill in the captured data, which was being done through a format sheet, at the end PNN had a lot of sheets with analog information. In that way, the transition from analog data to digital data had a hard work, and now the data model is captured on the platform directly.

Jenny explains an example of the beginnings of the adaptative management in the Chingaza Natural Park. In the development of the implementation, PNN noticed that it was necessary to build a dictionary to have the same terminology and thus everybody could understand the same meaning. The goal was to build or develop the adaptive management in the PA. So, the tool allows to consolidate and analyze information such as observations, sightings of species and pressures, as well as patrolling, referred to as control and vigilance routes in PNN. Also, allows to measure the effectivity of the PA, the monitoring of conservation objectives (that was not available in that date) and evaluate the progress of management plan. 4 years ago, the adaptive management, began to take relevance in PNN, operators or technicians were able to take the information, but have no knowledge of the role it has.

So far, with the support of WCS, PNN has been developing a brochure document for divulgation, that explains what SMART is, what it is for, what are the main goals of SICO-SMART, when the implementation begins, what are they doing to improve SICO SMART, and the future of the platform.

Jenny explains an example of the beginnings of the adaptative management in the Chingaza Natural Park. In the development of the implementation, PNN noticed that it was necessary to build a dictionary to have the same terminology and thus everybody could understand the same meaning.

© Luis Fernando Gómez / WWF-Colombia

About the actual work to improve SICO SMART, the GPS are very important, but the costs are higher because the devices that are being used are from Trimble, called Juno with Android OS. Regarding the future of SICO-SMART is to work with SMART Connect, but they have had some issues because of the engineering adaptation and the database in the cloud, due to the kind of contracts with a government institution it is very difficult to have something in the cloud. However, PNN acquired a cloud where most of the database is, some tests have been carried out, but it has not been possible to make it operational. There are 2 ways to connect the PA with SMART Connect: ETB (internet provider) and "kioskos vive digital" (government solution to connect areas with difficult access), to synchronize the information collected to the database. Now, each PA has a database, currently in version 4.3, and the version upgrade implies an adjustment in the infrastructure. Some of the limitations

The software SMART is open source and has the capability to be adapted as the institution needs, is up to you if you want to change something, for example in the database. What you must do is ask to the consortium and request the plug in.

of the full implementation of SMART Connect are the infrastructure required to deploy a useful server in the cloud; the tests done with the cloud bought revealed that a bigger instance is necessary; the hiring process with Amazon is not possible; and the poor internet connection in some areas of the country.

With the data collected from SICO SMART, PNN has worked on a dashboard http://dashboard.parquesnacionales.gov.co/, where each item is information from the database; the main idea is that the dashboard allows to organize, structure and analyze data for decision makers. The routes and the areas where there are more pressures are reviewed, the routes are enhanced where there are more pressures in order to understand where and why there are more pressures. Currently, PNN has been working in cartographical information obtained from SICO SMART, and geographic information standardized from the generated routes. It has been necessary to do some tasks called Boundaries Precision, to update the real boundaries of the PA, going to the field and walk through the limit and update it; the reason to update the boundary is because the base information to demark the boundary was mistaken, due to multiple factors such as scale of the base information (1:1500000).

Another information used to develop analysis is the Land Coverage Map by the Corine Land Cover methodology, using information from Planet and Quickbird, develop some interpretation of coverage on a window area, the interpretation shows pressure areas and identifies spatialization of REM, all of this allows to know where to direct the control routes and vigilance.

Once, PNN has the base or input information, the methodology is carried out every 3 months by each PA. The methodology procedure is:

1. pressure analysis that affect most of the PNN System based on the records in SICO SMART; using the type of pressure identified and its location in relation to the protected area (if it is inside or in an area of influence). The idea is to identify each pressure and compare them quarterly.

© Roger Leguen / WWF

2. The second part of the methodology is to perform the pressure analysis that presents the most, regarding the records identified in SICO SMART, the pressure is classified by the number of parks in which each pressure is present.
3. The third part is classification of protected areas by pressures according to SICO SMART records and finally the analysis of situations of protected areas with respect to the presence of pressures recorded in SICO SMART.

Jenny Devia presents some results and comparison between trimesters of each pressure and results by each Territorial Direction of PNN. These results are not public, but every 6 months PNN prepares a document consolidating the results of this period in each PA.

The main monitoring of PNN is about pressures, the species monitoring is reviewed by the SULA application. Now there is a strong process of SICO SMART to collect information from species and pressures and connect it with SULA, but the technician only uses SICO SMART. This development is still in progress.

There was a review with the Territorial Amazonia, the park can have information about the routes, using radio bands UAF-VHF and connecting with the "kiosko vive digital".

The software SMART is open source and has the capability to be adapted as the institution needs, is up to you if you want to change something, for example in the database. What you must do is ask to the consortium and request the plug in. Regarding the updating process, for now, each park must upgrade "manually" the version of the database, but in the version that will be released in the next months, the update process will be easier to handle by the whole parks that currently use the tool.

Felipe asks about the process of persuasion to the entities in charge. Jenny mentions that PNN works for the incentives that the NGOs provide, it has been found that there are things that already exist that do not have to be developed, they join the collective work: forums. Divulgation and accompaniment campaign with the directors,

show interesting things, demonstrate that the platform works, show results in the committees, where they realized that the routes are made outside the park. With this process began the confidence and generation of analysis. Internal reports of PNN, plus the IDEAM deforestation reports that validate the deforestation results with the exercises that are carried out in the field and monitored with SICO SMART.

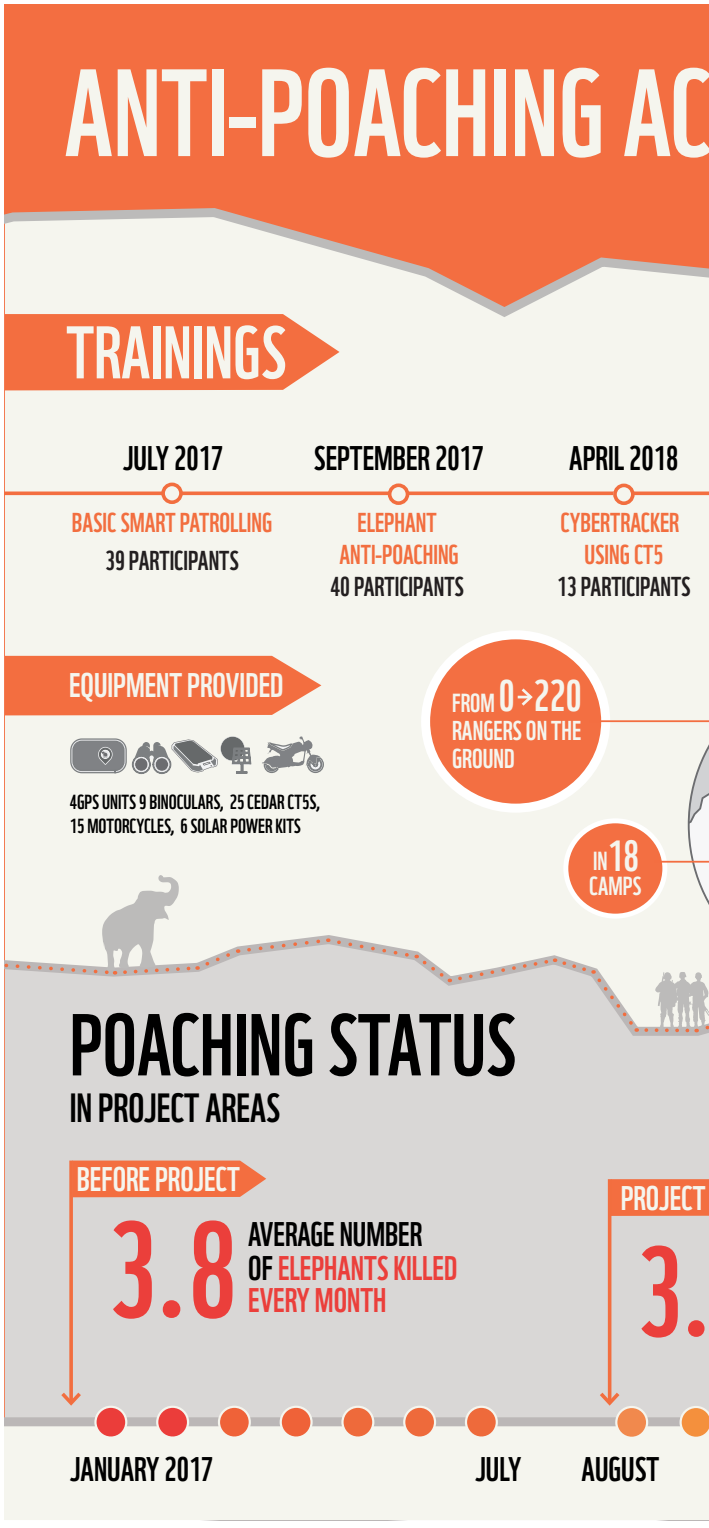
Before SMART, the information flow took approx. 3 years in the whole process: get the information, systematize and report; with SMART the results are presented every 3 months. It is not necessary to acquire more technology; the thing is to know what your needs are and what the tool is for.

4 SMART DEMO – ROHIT SINGH

The purpose of the session is to teach some features and keys of SMART to understand and give an idea of how SMART can be adapted to the Colombian context.

Rohit Singh explains the procedure to download the tool from the website and remarks that the only feature that is not available is the profile. All the other functions SMART has, you will get by default via download and you can ask the plug-in for the profile.

The National Park selected for the demo, has the information required to understand the questions feature.



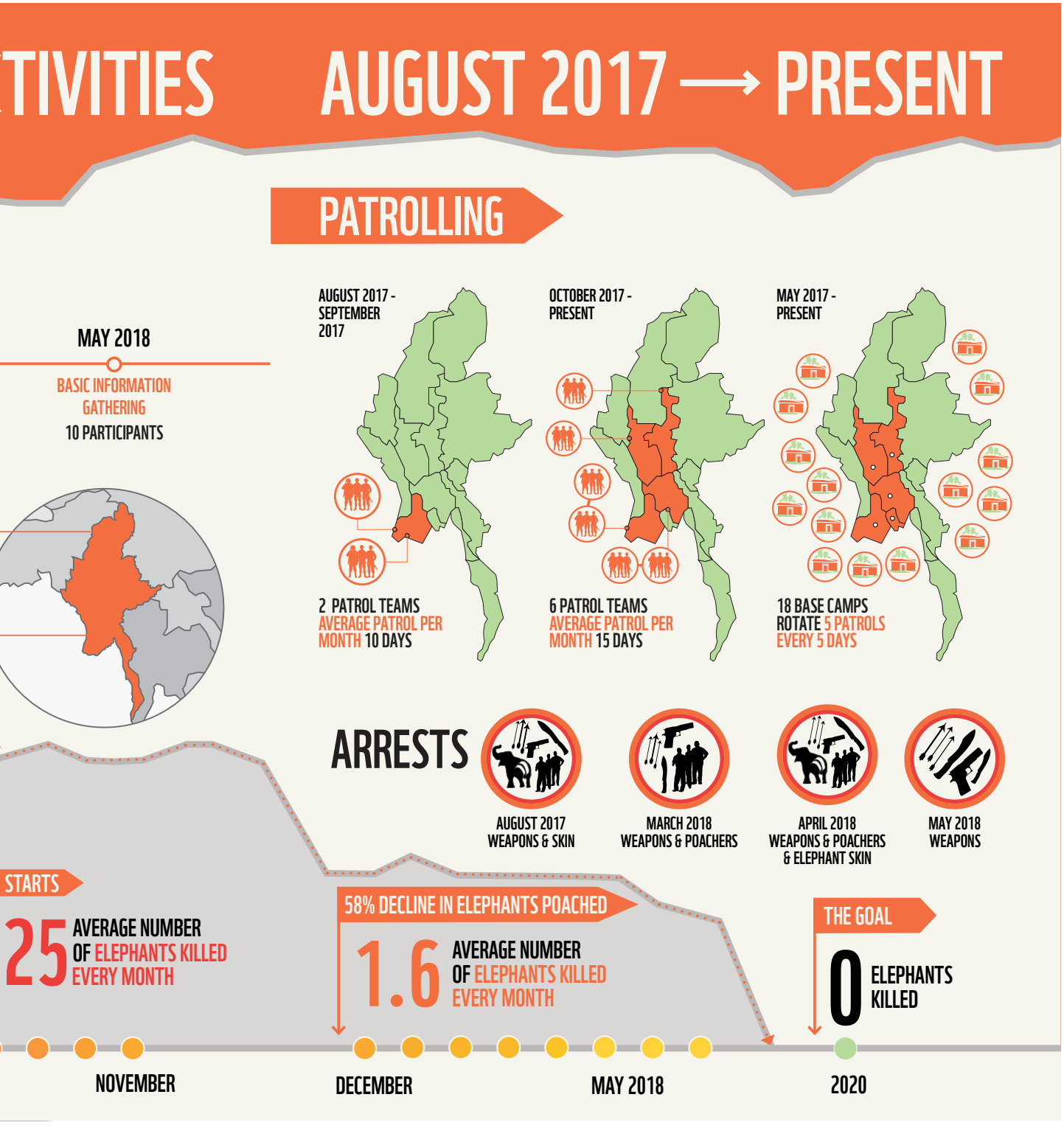


Figure 6. Anti-poaching activities

© Zig Koch / WWF

With SMART there is no need of GIS experts, the tool is designed in a comprehensive and flexible way. All the questions or analysis will be reflected on this map, you can have as much layers as you need: map of ranger patrols, a map of jaguar sightings and human's settlements together.

With SMART there is no need of GIS experts, the tool is designed in a comprehensive and flexible way.

The following table explains the modules or functions present on SMART:

Table 1. Module, function and features

	Module/Function/ Features	Activities
	Intelligence	The function for intelligence comes from information, its purpose is helping to predict, plan and protect information; for instance, the information that comes from intelligence allows you to decide where the patrol must go. This function is available in SMART and SMART Connect. It can have files uploaded, such as a photograph.
	Planning module	Module where you can create a plan for research, plan for forest, plan for community patrol, education program, by selecting the team and the target, and it will give you a pdf report with a map; if you are using a mobile phone, this map is automatically uploaded to the device and it will notify you the percentage of the progress. This module helps park managers to review the patrol progress or find out if the patrol team needs support. You can create a plan for an entire NP for 1 year and have a plan for each month.
	Independent incident	Module that allows to record something that is not part for the regular activities
	Entity tracker	This allows to track individual entities (physical body or animal body). Also allows to do biological surveys and design surveys as well. You can do easy analysis
	Field data	Enter data from a mobile device, analog information, information from cybertracker or import data from a device (laptop). You can add helpful information such as dictionary or photograph and select the language.
	Queries	Analyze the information, ask and design questions, design the template of your own report.
	Resource library	A repository of icons. Also, allows to design icons
	User levels	Administrator, analyst, manager
	Report module	Allows to run the reports created. Also design the dashboard to run reports

Rohit Singh shares reports from different countries to the workshop attending group, to analyze different outputs of reports produced by SMART.

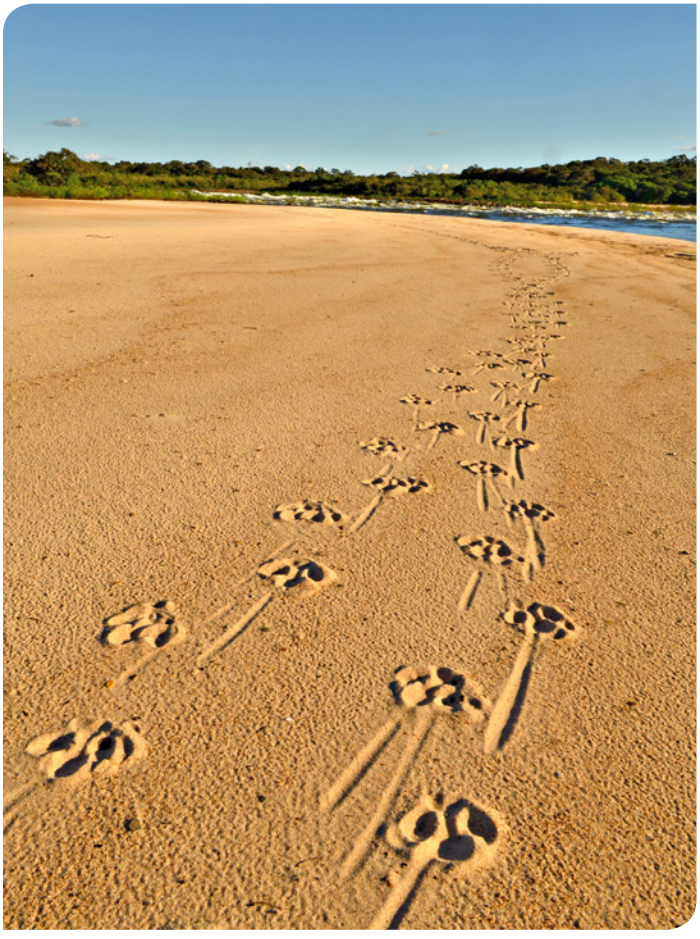
DAY 02

1 RUN QUERIES

Rohit Singh divides the session in two parts:

1. More information of SMART capabilities
2. How SMART Works operationally: WCS case-site level and National level.

The key point of SMART adaptive management is sharing the information back to rangers, they need to know what happens with the information gathered from them.



© Adriano Gambarini / WWF-BRAZIL

The purpose of SMART is to address the same need, the rangers will feel part of the entire process.

The workshop is not a training, it shows the whole capabilities of the software.

SMART is a powerful analysis tool. If you want to understand the area, problem or challenge you need to do analysis through the capabilities of SMART with the queries. This capability allows you to design your own questions, with different types of queries, in other words, this allows to ask questions to the data that has been gathered, run queries and the output can be maps, tables or any type of data that helps you to understand what is happening in the area. The queries that you design could be stored in the SMART libraries and keep running the queries as much as you need.

Rohit Singh shows some analysis or queries to give an idea to understand the capabilities of the functioning of SMART, how SMART can address the needs. You can ask some questions about patrol, surveys, biological surveys, wildlife, illegal activities, anything regarding the information you have, in SMART you can design your own questions. The questions are divided into 3 categories: Patrol (how many, where), Observation queries (what happened on this patrol) and summaries (pie chart, diagrams); however, there are lots of questions.

This capability will help you to convince the park manager through the social engineering that corresponds to 75% of conservation, 25% is science to help you understand.

The key for a successful implementation of SMART is to go step-by step, think about how you should go about SMART in each site level. The steps are suggested by a SMART partner, but the first step is understanding the challenges and identify needs for the PA, and this comes from after the discussion with the park manager, the point is looking for model the context. SMART fits the needs of the PA, it is an operational tool. SMART itself does not give the solution to solve the problems identified, the tool allows to identify, understand and support the decision making to solve the problem.

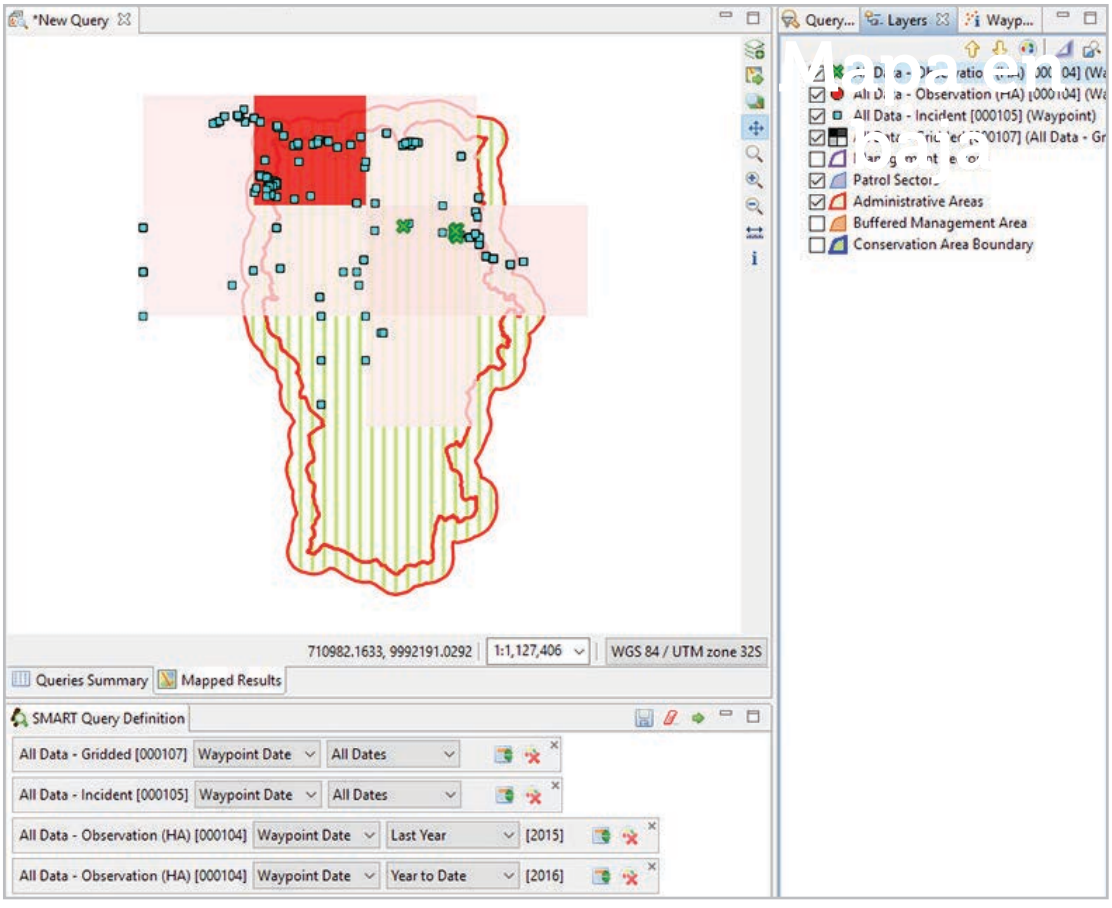


Figure 7. Example of query. Taken from http://SMARTconservationtools.org/SMART-5-experience/

Rohit Singh suggests reading a document form IUCN called First Line of defense, which is an approach to talk to the communities as partners in the fighting of Illegal wildlife trade, that will help you to design a community project.

You can design your own questions or add as many questions as you need or import queries. In the future version you will be able to import spreadsheets from Microsoft Excel, but for now, you can import XY GPS points by the function import CSV files.

You can design your own questions or add as many questions as you need or import queries. In the future version you will be able to import spreadsheets from Microsoft Excel, but for now, you can import XY GPS points by the function import CSV files.

© Greg Armfield / WWF-UK

Another type of information you can add to the platform is a shapefile, you can add external information as you need, and you want to understand better the PA situation.

? Rohit wants to know from to the attendants, what questions do they think can be asked in SMART in their areas?

Panthera: Where are most animals killed? Where do we have more incidents like hunting?

PNN: Learn the limits of PA, results of this patrol community walk, pressures in those limits.

WWF: pressures, know patterns to plan, to predict, to get a strategy.

The idea of SMART is minimizing the GIS components so that the rangers can use the tool in an easy way and they don't need to know about GIS, so the interface is very friendly for their use.

Corpoamazonia: the implementation could be in a regional level. Corpoamazonia handles 20% of the national territory, so the implementation of this tool would be a challenge. There are not enough human resources and this is a big area.

Rohit Singh indicates that this situation is all around the world, there are not enough rangers. You need SMART when you have limited human and financial resources. SMART has been designed not only for PA, but for any area that may need it, such as corridors where the area is not protected, there is no restriction of application. It depends on the needs and the financial and logistic capabilities.

Procat: Hunting areas, we want to know what kind of attacks are more frequent, landscape, where is the forest.

2 WCS CASE OF IMPLEMENTATION – JORGE PARRA

Jorge presents the WCS implementation of SMART in PNN

Before start with SMART in PNN, there was a planning process to understand the current

© Luis Barreto / WWF-Colombia

situation of each PA. The planning process involved an update management plan, that included conservation objectives, target objectives, critical threats, and define critical points for the decision makers, and then began with the plan to use SMART.

The biggest challenge in the implementation and use for the employees of PNN, was the fact that they don't know why they are gathering information in their patrols, or what the information is for; therefore, it is planning, and training is necessary training to understand the real reason, they don't know that they are protecting to an object conservation. It was not easy to use the tool, because it is hard to change one work scheme, the challenge is to understand if the tool helps to do their labor in an easier way. SMART allows to integrate information from other sources, such as biological information, SIB-Colombia, gather by Humboldt Institute, what it needs is standardize the information to be uploaded into the platform.

3 GUIDE TO START USING SMART - FELIPE SPINA

This guide is available in Spanish.

This is the first thing you should do if you want to work with SMART. What do you have to consider working with SMART?

Key points before starting: the PA must have a management structure and support of the local government or local community. Commitment to improve the management system with the local community open for improving the adaptative management of the PA. Requires financial planification to ensure the resources needed in the project.

Steps to implementing SMART

Table 2. Steps to implementing SMART

Steps	Develop
Conduct a threat analysis and define conservation objectives and indicators	Analysis with the community managers, what information is available, indicators that are very important for the PA, objectives, questions to configure the data model, if there are no questions it is very difficult to configure the appropriate data model
Define reporting needs	SMART can define an analysis pattern to perform automatic analyses at certain times. Define the frequency of data that you want to report. What will be the use
Identify any additional intelligence gathering mechanisms	What kind of information is going to be collected and how
Design the data model and collection protocols	You can start with the SMART base. You can start with the basics, use the same structure to integrate the data
Identify appropriate mechanisms for adaptive management and regular feedback	Improve management systems of adaptive management and feedback. Type of agreement with the area manager to see what the process will be like.
Consider a performance-based ranger evaluation system	Evaluation based on the performance of rangers. Community park rangers, motivation. Be careful with the incentives, don't give cash. For communities is necesary to think about how this is going to be, design the incentives
Configuring the SMART database	SMART database must be configured for the conservation area
Defining responsibilities	The responsibilities of all staff involved in the application of the SMART Approach for patrol management should be defined
Monitoring program	To evaluate performance against conservation objectives
Developing a clear timetable for implementation	All the tasks in the implementation should be tested and evaluated

For SMART Marine, the data model changes, you can decide what the boundaries are and the transect for your PA (used for a dolphin monitoring), the data collection and the operational techniques are different from SMART. The database already has the information of fish species, you don't need to create them. Currently there is PNN that is using SMART Marine for monitoring, also Belize develops vigilance and control with drones and loads the information into the SMART platform.

For those who have a low educational level and use SMART, Rohit Singh recommends Mobile Phones, Not Trimble, because it is too expensive and not worth it, could be a Black View Chinese, which is a cheaper option and is enough. You could ask to the partnership to buy the mobile phones.

If you want to use SMART, in the web page of WWF there is a form to be filled out with the information about the project, this would help to understand what the needs of the PA are. The information required in the form, corresponds to each step presented, such as the data model, questions, responsibilities and scheduling, also if the project has the validation from the local government or local community, partners and the financial plan. Another important document to prepare are the responsibilities at each level involved of the PA.

The main concern is how to manage the implementation at all the present levels: local, regional and community. The idea is to pick a window area that includes the complete scenario: stakeholders, NGOs and attendance of all levels.

4 STUDY CASE PNN SELVA DE FLORENCIA - JORGE PARRA WCS

Jorge Parra presents a case study where SMART is used in a protected area, where the installed capacity already exits; a monitoring professional and the professional for prevention, surveillance and control as well, there is availability of the technical equipment to gather information using SMART as a tool to make decisions.

Jorge's team has worked on different projects, one of them was with WCS, where they designed a monitoring program for the amphibians of the jungle of Florence. In this program, different variables were integrated such as prevention, control and surveillance of the protected area. The purpose of this project is to use SMART technology to analyze all the data and to make decisions. This project is not institutionalized but has been recognized as a test within a protected area for decision making through the problem tree methodology.

© Elizabeth Sánchez / WCS

The Jungle of Florencia is in the Cordillera Central, it is an area of approximately 40,000 hectares, the objective of the project that is being developed in this jungle is to use SMART for decision making. To approach these decisions, it was necessary to answer some questions that they made from the protection area. One of the most frequent questions was whether to increase or decrease the patrolling for prevention, surveillance and control to reduce the pressure exerted by solid waste on the protection area and increase the occupation area of amphibians.

The main objective of the project is to expand the area occupied by the frogs, while minimizing management costs. The number of frogs observed in the protected area is an indicator proposed by PNN which aims to achieve 90% observation of the species during the PVC (planning, monitoring and control) routes.

How to model the influence of decisions? This can be achieved through a model to estimate the cost of the management actions, for this it is useful to generate a decision tree where the components that affect the decision making are physically represented.

It must consider what the possible decisions that must be taken are, the expected results of some factors, etc. and in this case, what the expectation was to see how to maximize the tasks of prevention, surveillance and control by reducing costs. So how does SMART fit here? As presented on the first day of the workshop there is a planning module; in this planning module, all surveillance routes are planned, and this is where the first decisions begin to be made, for example increasing the routes or continuing with the same routes, then monitor the pressures. In SMART you can create a data model, to begin to take information about the pressures that are inside the area, if the solid waste is increased or remains the same, then at that point they begin to have values that must be placed on the tree of decisions, and finally you can also monitor the status of amphibians, which would be the case with an occupation model, because the records are captured with SMART and we can see if the occupation is increasing or decreasing. These would be future probabilities, what would be the occupation of these frogs depending on the path you have? and that is where the decisions would be made.

© Elizabeth Sánchez / WCS

For the appropriate operation of the SMART tool it is indispensable to have quality information that allows making decisions. Therefore, in several parks surveys are being carried out to gather information, which serves as a basis to know the current condition and run the occupation models using the covariates. The information is reviewed to measure the frequency and probability, for instance, of finding solid waste.

Concurrently, the occupation model is developed, in which the covariable frequency of solid waste is included, and at this point the objectives and the analysis of possible decisions are considered, in order to choose the best one.

Then Jorge presents a scenario where amphibians are found in good conditions and two possible decisions for this scenario are suggested: keep the number of routes or increase them to continue protecting the species. According to Jorge, the scenario to eliminate completely is where amphibians are in poor condition and the number of trips continues to increase without improving the conditions of the frogs, since this scenario is not favorable neither for the amphibians nor for the costs of the planning.

Then Jorge presents a scenario where amphibians are found in good conditions and two possible decisions for this scenario are suggested: keep the number of routes or increase them to continue protecting the species.

In the model developed by Jorge's work team, values from 1 to 4 were assigned, where the worst scenario is rated with 1 and the best is rated with 4. The classification of the best and worst scenario is made through the data collected with SMART and with a decision tree that allows analyzing each of the occupation models. This analysis allows to make decisions related to the prevention, surveillance and control routes, defining if they are increased, maintained or decreased.

To accomplish a proper development of the analysis, it is necessary to make use of statistical variables that allow the occupation models to be made and use them later in the decision tree. The objective is to be able to make informed decisions in relation to prevention, surveillance and control tasks as a protected area management strategy. This analysis is being developed taking into account other threats and different times of action, not only preventive but also educational around environmental issues. This was the example presented by Jorge Parra on how to integrate all the information in SMART to make informed decisions within a protected area.

How was the weight of the variables defined?

The weights of the variables are defined by means of the information obtained on the pressures exerted by each threat. For example, if the pressure is good or bad, if the occupation of the amphibians is high or low. At this point, adaptive management or the theory of change comes into play, where the information on the current state of the protected area is evaluated and this information is constantly monitored to make the best decisions. It is important to consider the effective costs that derive from each of the decisions that are made.

What was the feedback from the park about the process?

It really is an example area, the work that is being done is worth of being highlighted, because, Jorge indicates, not in all the protected areas in which he has worked is there such a coordinated and effective work on protection issues and environmental planning.

And this is one more exercise for the area, not for the central level, an exercise for the area to demonstrate how it can improve its control and surveillance routes and how to maximize the few resources that are reaching them within the area, it is noteworthy that it requires a great effort. That is why WSC is focusing on working, on the one hand, in all the training needed by the staff working in the 55 protected areas and on the other hand in getting to use the tool with all its functions to standardize the information and to be able to use the information to get to make management decisions.

How is information standardized in SMART?

Within the SMART tool there is a module called ecological records and, in that module, you can place the standardization design of the information; it is important to highlight that SMART is a monitoring program which is standardized so that it is repeated over time, in order to organize in the same way the information that is being collected.

Rohit mentions that 55 sites are currently using SMART for the planning of protection areas, of which only 4 work in a connected and coordinated manner.

Can SMART calculations of occupancy probability be made?

That is what is sought, in the meetings that have been held with the consortium, the need to integrate R into SMART has been raised, but it is not yet possible.

Who is responsible for the databases?

The employees of PNN make the routes and that information is uploaded to SMART at the central level to make the decisions.

Each protected area has a team made up of the park rangers, who collect the information, a prevention, surveillance and control professional, who systematizes the information of the protected area, and by another prevention, surveillance and control professional at the territorial level. In the end everything is linked to a single person who is at the central level who is responsible for collecting all the information of the 59 areas.

© Luis Barreto / WWF-Colombia

5 OPERATIONAL DISCUSSION

Rohit begins his speech explaining that rangers oversee carrying out the patrols and fill out the forms for the collection of the information; with this information, the reports are made and then uploaded to the web page for consultation. These reports are available to be downloaded, the main and most relevant information is publicly shared, but the same does not happen with the patrol route information, which must be treated with some security parameters. Also, he reiterates that although the public report does not have information on the route taken by the patrol, SMART has a tracking system that allows to know in detail the patrol route.

Rohit mentions that 55 sites are currently using SMART for the planning of protection areas, of which only 4 work in a connected and coordinated manner. Regarding the number of people who handle the tool, it says that there are 55 people handling the tool to process the information (one for each protected area that SMART uses)

Not all the members of the team that make up the search engine (all entities) read the reports, the challenge is that all those who nourish the information, use it and read it.

He mentions some aspects from his experience that can be referred to as challenges. The first one is reluctance, in most of the countries they want to put a GPS to the officers that make the patrols. Not to control

© Diego Amorocho / WWF-Colombia

the worker but to track the route and patrol, this action is badly received by the workers because they believe it is done to control their productivity and activity at work. The second it is necessary to count on the support of the territorial entities, the third is the approval and fourth the financial capacity.

Informs that of the thousand institutions that are using the SMART tool, 70% do not do it correctly because they upload the information, but do not review the report.

Rohit questions everyone about how to improve the program's connectivity, and the challenges discussed the day before. He wants to know honest opinions of each of those present at the event. With the question: 'Where do you think SMART implementation can improve AP sites?' Referring to the consensus and the challenges expressed the day before (connectivity and other challenges), he questioned whether they should

© Luis Fernando Gómez / WWF-Colombia

really focus on that. From the participants it is mentioned that the Regional Autonomous Corporations (CAR) could be improved with the implementation of SMART, since through the CAR it is possible to reach areas that are not within the national parks; the improvement is that the analysis not only remains in the national parks but it transcends the smaller scale sites since there are many parks of regional scale (hundreds) not only national. In the National Natural Parks, where can they be improved? It was one of the questions asked by Rohit. One of the improvements and challenges is to reach the 59 National Natural Parks and use SMART for decision making. And that the information that is currently used is for the national system transcends to a higher level. Another challenge within natural parks is to train people in the territories, and in case it is necessary to improve the training of personnel working in national parks.

Another challenge highlighted by Rohit is that entities should improve in how they exploit information, improve the handling of information because, although at the national level it is doing well, reports and other resources at other scales do not work properly. At the central and territorial level, people are being trained, so they seek to improve training at a territorial level.

While there are 55 sites that work with the tool, not all use the same tool, it depends on internet access and infrastructure. The reports are sent by email to national parks and they use the information and return it to the parks.

Rohit highlights the importance of entities from different levels, such as national and regional, working together using the SMART tool. At the national level there are good examples to highlight for the good work they are doing. He also mentions that SMART is a tool that can be used at different levels, and in different places, highlights the case of the forest of Florence presented by Jorge and the work exhibited by Felipe of what is being developed in Brazil. Choosing the right area for SMART to be used takes time. The tool is so wide and diverse that in many places not all its functionalities are used, but only those required by each place.

In PNN, the entire protocol for the implementation of SMART was developed, protocols were developed for rangers, professionals and other work teams. Field visits are made, and all the steps of the field work must be followed to implement the protocols with all the current regulations, and how the routes should be done according to the legal part. SMART is the tool to organize information. Chinganza already has training and has launched the tool, which is already internalized within the work carried out by this park.

PNN performs functions of environmental authority but also of control and surveillance in which they have the support of the army or the force area to apply the sanctioning measures. Information is collected with drones and later is integrated with that of SMART for analysis and decision making.

It is important to keep the central team well trained and train them to replicate the information with the workers on site which are constantly changing. We must try to keep within the organization people who are well trained so that there is no leakage of knowledge, and the time and resource of training is not lost.

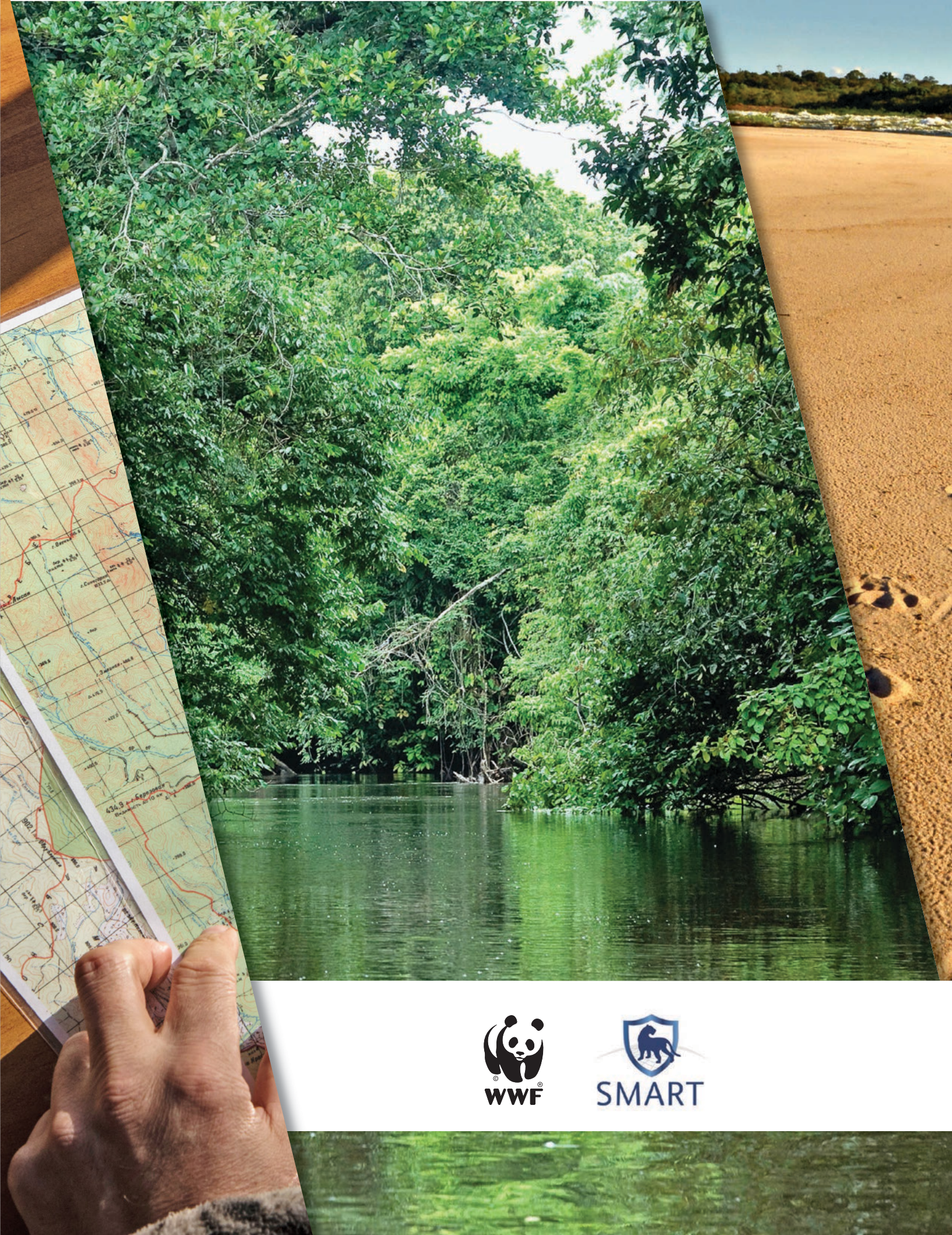
He mentions some areas such as Chingaza and Churumbelos, which may have threats like those of the Amazon, such as deforestation and indiscriminate hunting. The installed technical capacity must be created to implement SMART in the CARs with the PNN model or another model in accordance with the structure of the corporation and the region where they work.

It is necessary to articulate successful cases between CAR and PNN to work together for the planning of protected areas. It is noteworthy that entities that work together must have excellent governance indicators to work effectively.

The identification of areas for work is given through the initiative of the CAR of each region, Jorge specially mentions what happened with Corpoamazonia. There must also be an articulation with authorities outside of the environmental ones, such as the police that watch wildlife corridors. Focus special attention on corridors where there are conflicts between wildlife and human action.

As a conclusion to this discussion joint collaboration should be considered between National Parks, Regional Autonomous Corporations, Police, Navy, Army, Air Force, Ministry of environment, and other entities that can work for the protection of areas.

It is proposed to change the study area, since Chingaza has many resources, and has already implemented SMART and works very synchronously with the other entities, according to the assistants the selected area is Fraguachu: cluster made up by the Chrurumbelos-Fragua-Guacharos National Parks.



WWF

SMART