PROGRESS IN THE IMPLEMENTATION OF SMART FOR PROTECTED AREAS MANAGEMENT IN PERU

Over the last few years, Peru's National Service of Natural Protected Areas (SERNANP) has been making an effort to organize and to clarify the planning, implementing and monitoring processes of the Protected Areas (PA) management cycle, at both the system (National System of Natural Protected Areas, SINANPE) and individual PA level; all with an ecosystem focus and adaptive management approach.

Santuario Histórico de Machupicchu - Diego Pérez /WCS

CONSIDERATIONS FOR THE IMPLEMENTATION OF SMART

SERNANP is in a process of reflection on the current framework for managing PAs and the system of protected areas (SINANPE), which has allowed them to identify gaps and made adjustments to strengthen the use of SMART to improve patrolling and record data for effective management monitoring.

As part of this process, SERNANP has developed and adapted a series of tools to frame planning, implementation, and monitoring actions within the surveillance and control strategy as part of the PA management cycle. SERNANP began SMART implementation in 2014 as a tool for managing surveillance and control information.

This document is a product of the evaluation of SMART implementation carried out in five pilot protected areas (Manu National Park, Lachay National Reserve, Matsés National Reserve, Tambopata National Reserve, and Machupicchu Historical Sanctuary). This process has allowed us to identify a series of conditions that protected areas should have before implementing SMART, as well as adjustments that should be made to improve SMART. We hope that this will help SMART contribute effectively to management decisions for individual PAs and the SINANPE as a whole.

WHAT IS SMART?

SMART is an acronym for "Spatial Monitoring and Reporting Tool."

It is a free software developed by several organizations, including the Wildlife Conservation Society (WCS), World Wildlife Fund (WWF), Frankfurt Zoological Society (FZS), and others.

ADVANTAGES OF USING SMART

It is simple
SMART is an easy to use software. Entering data is quite intuitive and constructing queries and reports only requires knowledge of the data base structure. To use and create maps, you do not need to be a specialist in Geographic Information Systems (GIS).

It is a free and open source software
This means that no one owns the tool. SMART was created by a group of organizations with extensive experience in protected areas management. Anyone can modify SMART and adapt it to their own needs, and SMART can also be redistributed in its original or modified version. SMART can be downloaded for free at: http://smartconservationtools.org

It is flexible
SMART can be adapted to every users' individual needs. The structure of the database (data model) is created by the users, who can customize its use and apply it to the relevant protected area or system of protected areas. More updated versions have added users' suggestions to improve the software; for example, SMART can now be used for wildlife monitoring and is now easier to use in different contexts.

It is inclusive
SMART was created so that records can be shared with other databases. It can exchange shape files with platforms like Arc-GIS and QGIS, as well as share data in graphic format (JPG, TIFF, etc.), PDF, and Microsoft Office files like Excel or Word. It is also compatible with monitoring databases such as Cybertracker, which has applications for mobile devices (tablets and smartphones).

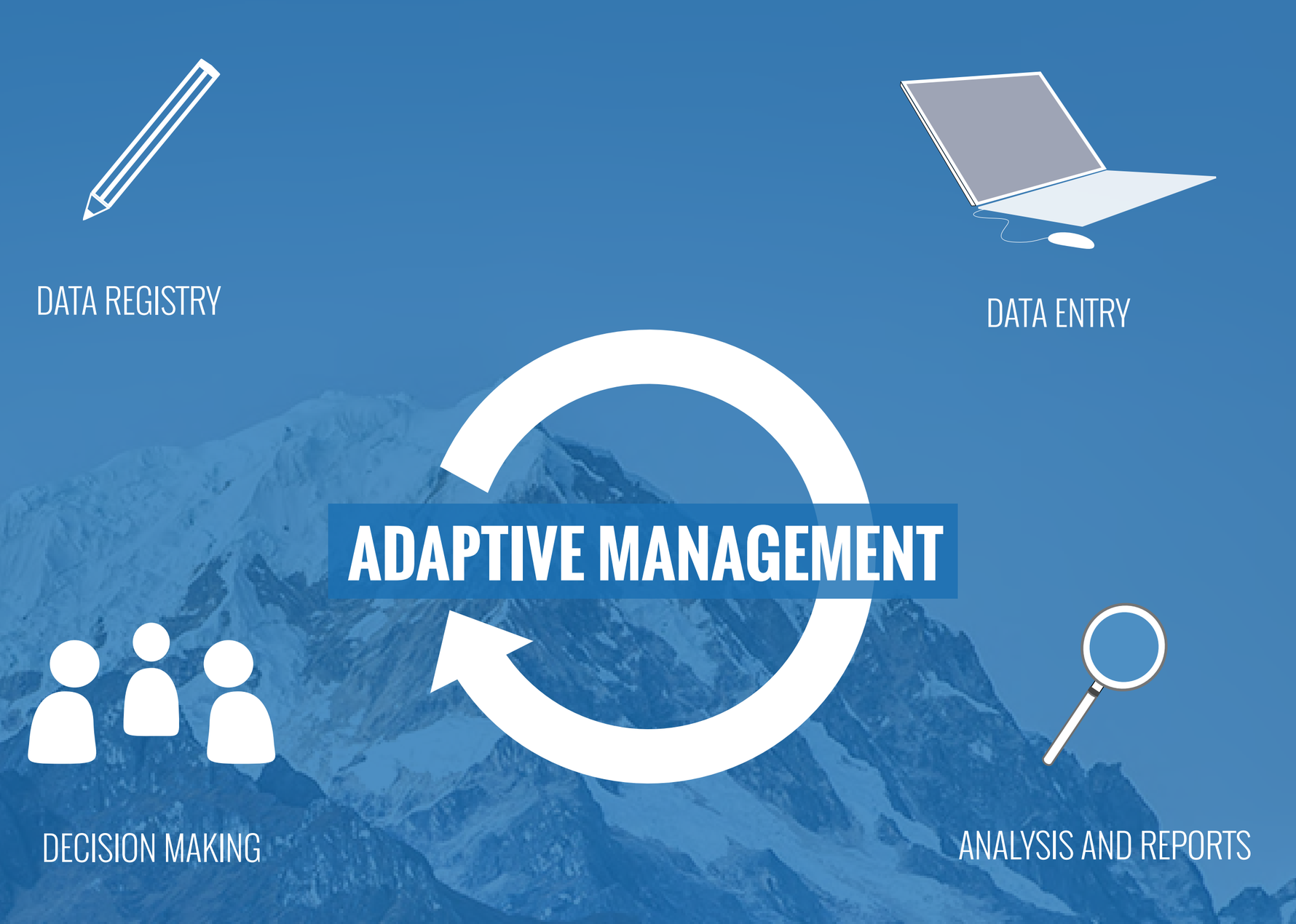
It ensures safeguarding of data
SMART allows for four different types of users, each with a set of default permissions that helps protect entered data. These permissions ensure appropriate data management, preventing any later alteration of data.

It ensures data validity
SMART has default restrictions for entering data from devices such as GPS, which ensures the reliability of the data by making sure that activities in the field were actually done. For example, SMART does not allow coordinates or paths to be assigned simultaneously to multiple patrols from one GPS; it only allows those coordinates to be assigned when dates from the GPS and SMART are the same.

SMART can be downloaded for free at http://smartconservationtools.org.

HOW DOES SMART HELP IN THE MANAGEMENT OF PROTECTED AREAS AND SINANPE?

SMART is not only a tool for data collection and data systematization; it also allows us to develop best practices by making information available to PA decision makers in a timely manner.



SMART helps in the management of protected areas by collecting data, mostly from patrols. This data is systematized in the SMART database, which streamlines the creation of queries and reports that allows protected areas to make management decisions. Under an adaptive management approach, these results help to make better management decisions and re-adjust the recording of data, improving management of information coming from PA monitoring and control systems.

DATA REGISTRY

PROMOTES THE DEVELOPMENT OF FIELD DATA COLLECTION PROTOCOLS
Any information system needs to have quality data; otherwise, it could lead to poor decisions. SMART application encourages protected areas managers to clearly define what, how, and for what purpose data will be recorded in the field, promoting the development of registration protocols including geo-referencing information so field staff can optimize their time, knowing what to record and how that information will be used.

GENERATES HIGHER ACCURACY OF RECORDS BY REDUCING THE UNCERTAINTY AROUND THE PATROL'S LOCATION
By using SMART, staff from protected areas can locate geographically the records they made during their patrols, and can therefore avoid mistakes that can occur when it is unclear if the record comes from inside the PA or its buffer zone. With SMART, field staff can quickly determine the exact location of a record, which also allows for a faster response.

DATA ENTRY

SYSTEMATIZES DATA REGISTERED IN THE FIELD
The use of SMART generates a database for each PA that collects all records generated in the field. This allows field staff to keep these systematic records at hand and helps them to incorporate feedback into their work.

REDUCES SYSTEMATIZATION TIME, ALLOWING PROTECTED AREAS TO ACT QUICKLY ON INFORMATION
As SMART is used mostly by park rangers, data reaching PA headquarters is already systematized, reducing the staff time necessary to process the data.

REDUCES ERRORS IN RECORDS, GENERATING CURRENT AND TRUSTWORTHY INFORMATION
As SMART has a graphic mapping environment, it allows staff recording data to corroborate the spatial location of the coordinates, reducing transcription errors and contributing to an up-to-date and reliable database.

ANALYSIS AND REPORTS

GENERATES INPUTS TO EVALUATE MANAGEMENT PLANS
Under SERNANP's new management model, to develop a new protected area management plan, PA managers should identify and select indicators that allow them to evaluate the implementation of the management plan. SMART implementation will contribute to creating a systematized database that can provide inputs for measuring those indicators.

FEEDS DATA INTO MONITORING METHODOLOGIES IMPLEMENTED BY SERNANP
SMART is a tool that can be can be framed under two of the monitoring methodologies currently implemented by SERNANP, addressing effects by human activities and controlled areas. SMART generates inputs for the application of these methodologies, and is currently one of the main field-based information management tools, which SERNANP is using to manage the SINANPE.

DECISION MAKING

CONTRIBUTES TO DESIGNING INTERVENTION STRATEGIES THAT MAINTAIN AND IMPROVE PROTECTED AREAS CONSERVATION STATUS
SMART allows PA managers to collect records that help them to identify locations and periods of the year with the highest number of incidents or events. This could allow them, for example, to schedule more frequent patrols in areas with a higher incidence of human activities or during months with the highest infraction records.

By providing comprehensive records of human activities in a given protected area, SMART allows managers to determine which are the most frequent or recurrent human activities in a PA and adjust strategies to reduce the threats.

By providing systematized patrol routes, SMART also allows managers to identify the locations with the most patrol routes and establish patrols in new locations where information is needed to determine their situation.

Using results obtained by SMART contributes to efficiently reorienting PA resources, leading to more efficient management.

CONDITIONS FOR SMART IMPLEMENTATION AND IMPROVEMENT IN ITS USE

In implementing SMART in the SINANPE, we established certain **conditions** that every protected area must take into account.

Based on our experience implementing SMART in Peruvian PAs, we also identified some **improvements** that should be made to optimize the use of this tool.

CONDITIONS

- Definition of field data collection protocols
- Establishment of a clear information flow
- Delegation of responsibilities
- Training on reading maps and using GPS
- Proper management of equipment
- Training and technical advice in the initial phase of SMART implementation
- Skills-based capacity building

IMPROVEMENTS

- Patrols recorded in SMART should combine different means of transportation
- The user entering data should have the option to generate reports for each patrol
- Queries should generate maps that differentiate observations by color

CONDITIONS

FOR SMART IMPLEMENTATION IN SINANPE

DEFINITION OF FIELD DATA COLLECTION PROTOCOLS
As in any information system, it is important to have quality data; otherwise, queries, analysis, and reports will not be reliable and could therefore lead managers to make wrong decisions. To obtain quality data, it is crucial that any protected area clearly define what, how, and for what purpose field data will be recorded, as well as establish the places and frequency of visits. A field data collection protocol allows field staff to optimize their time, knowing what to register and for what purpose.

ESTABLISHMENT OF A CLEAR INFORMATION FLOW
While appropriate equipment (laptops and GPS) is necessary, it is most important to have a clear information flow for data produced by using SMART, considering work habits or practices and existing equipment in each protected area. Some protected areas that are currently implementing SMART have overcome limitations of equipment in different ways; for example, in the absence of electricity and equipment in the control posts, patrol records and reports are made on paper and sent physically or communicated via radio to the headquarters, where records are entered in the database.

DELEGATION OF RESPONSIBILITIES
Just as necessary as it is to establish a clear information flow is to designate clear responsibilities for implementing SMART in protected areas. Managers must identify the people responsible for compiling patrol records generated in SMART, whether they are responsible for the information of a control post, of a basin, or the entire protected area. While every staff member can record data, it is necessary to clearly establish the person(s) responsible for compiling it from different patrols and reviewing the registered data, as well as generating reports to allow leadership to make management decisions.

TRAINING ON MAP READING AND GPS USING
At the beginning of our work with SERNANP, training focused solely on the use of SMART, but as we made progress in its implementation, we realized it was necessary to train park rangers to be able to make geo-reference records. This in turn reinforced SMART, because although many park rangers were using this equipment, they were making mistakes because many did not known how to properly configure the equipment. We also found it necessary to train protected area staff on reading maps as an alternative to using GPS, as many protected areas do not have this equipment or have broken devices. Although the use of maps instead of GPS decreases the accuracy of the record location, it provides a reference for the location of the event when no other accurate method is available. Because of this, we strongly suggest that all control posts use maps as a backup for the development of patrols.

PROPER MANAGEMENT OF EQUIPMENT
Each protected area should establish protocols for equipment management. At the beginning of our work implementing SMART in Peruvian protected areas, we found that the majority of equipment in control posts were infected by computer viruses, which also affected GPS devices and led to losses in the recorded information. During the SMART implementation process, PA staff has recognized both the value of the generated information and the effort on obtaining it, which in turn has led to a decrease in the incidence of computer viruses. However, it is still necessary to develop guidelines for the use of equipment to avoid these unpleasant incidents.

TRAINING AND TECHNICAL ADVICE IN THE INITIAL PHASE OF SMART IMPLEMENTATION
SMART contains a series of modules, allowing training to be carried out progressively, although basic functionality of all modules should be communicated at the beginning. To begin SMART implementation it is convenient to organize trainings for PA staff based on the level of involvement they will have in the process. Therefore, trainings for park rangers should include mainly the patrol module, including entry of coordinates, routes, and entry of observations; and the map editing module.
Further, we have seen that training by itself is not enough to ensure the proper use of SMART. It is necessary to give technical advice to protected area staff at the beginning of the process to implement SMART, particularly during the data entry process, since this allows for the identification of major problems in data quality and solutions to improve the quality of the SMART records.

SKILLS-BASED CAPACITY BUILDING
It is important that protected areas identify staff who is able to go more in depth into the use of SMART, since not all staff have the same skills in computers and applications such as SMART. For the successful use of SMART, SMART knowledge could be a criterion for the rotation of staff between control posts, with the goal to have a park ranger at every control post who can teach SMART to colleagues. It is also necessary to identify staff that for different reasons cannot use SMART, so training for these people should focus on the correct recording of field data that another staff member can later record in SMART.

IMPROVEMENTS

NEEDED FOR THE USE OF SMART

PATROLS RECORDED IN SMART MUST COMBINE DIFFERENT MEANS OF TRANSPORTATION
In many Peruvian protected areas, patrols are carried out using a combination of different means of transportation. For example, in many Amazonian protected areas it is common to start off with an aquatic patrol (traveling by boat), and then continue on land by foot. However, SMART does not currently allow this combination of transportation options; it is only possible to change the type of transport within the same type of patrol. For example, if the patrol is terrestrial, the application allows a change from "truck" to "on foot," but not from "terrestrial" to "aquatic." In these cases, field staff should record different tracks for each part of the patrol; one for the aquatic portion of the patrol and another for the terrestrial; then they must also register in the comments section the actual sequence of transport.

THE USER ENTERING DATA SHOULD HAVE THE OPTION TO GENERATE REPORTS FOR EACH PATROL
In Peru, park rangers are asked to submit to PA headquarters both a physical patrol report and the SMART file that contains data of every patrol carried out, as SERNANP requires both to ensure proper backup. Park rangers consider this a double effort, since they have to enter the same data in two different formats. This double effort could be solved through the generation of a report that incorporates the template for the physical patrol report. However, the "data entry" user (the type of user permit that park rangers are given) does not have the option to generate reports in SMART.

QUERIES SHOULD GENERATE MAPS THAT DIFFERENTIATE OBSERVATIONS BY COLOR
The "query" module in SMART allows different types of consultations, including the spatial query, which shows on a map the frequency of the records entered. However, it does not allow for differentiation of the type of observation registered, which limits rapid spatial analysis. For example, it is possible to observe on a map the frequency of records of human activities, but it is not possible to differentiate the type of activity (for example, illegal mining, illegal logging, or wildlife extraction). While these differences can be displayed in the Reports module, this requires more advanced knowledge of SMART than most PA staff have.

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