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## FROM PRACTICE

# Conservation and people: Towards an ethical code of conduct for the use of camera traps in wildlife research

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## Abstract

1. Camera trapping is a widely employed tool in wildlife research, used to estimate animal abundances, understand animal movement, assess species richness and understand animal behaviour. In addition to images of wild animals, research cameras often record human images, inadvertently capturing behaviours ranging from innocuous actions to potentially serious crimes.

2. With the increasing use of camera traps, there is an urgent need to reflect on how researchers should deal with human images caught on cameras. On the one hand, it is important to respect the privacy of individuals caught on cameras, while, on the other hand, there is a larger public duty to report illegal activity. This creates ethical dilemmas for researchers.

3. Here, based on our camera-trap research on snow leopards *Panthera uncia*, we outline a general code of conduct to help improve the practice of camera trap based research and help researchers better navigate the ethical-legal tightrope of this important research tool.

## KEYWORDS

camera trap, code of conduct, ethics, human rights, law, PARTNERS principles for community-based conservation, privacy, snow leopard

## 1 | INTRODUCTION

Camera traps have become important tools for researchers, conservationists, and wildlife managers and are being used to study wildlife and urban ecology (Anton, Hartley, Geldenhuis, & Wittmer, 2018; O'Connell, Nichols, & Karanth, 2011). Camera trapping is especially valuable when research or management involves elusive species living in difficult to access habitats (O'Connell et al., 2011). Camera traps are used to estimate animal abundances, understand animal movement (Borchers, Distiller, Foster, Harmsen, & Milazzo, 2014), assess species

richness (Tobler, Carrillo-Percegue, Leite Pitman, Mares, & Powell, 2008) and understand animal behaviour (Bridges, Fox, Olfenbittel, & Vaughan, 2004; Kikuchi, Zhumabai Uulu, Sharma, Soma, & Kinoshita, 2020). The number of research papers based on camera trap data published annually has increased substantially, from less than 50 per year between 1993 and 2003 to more than 200 per year in the following decade (Rovero & Zimmermann, 2016).

There are various kinds of camera traps, and a detailed review of these can be found elsewhere (e.g. (Burton et al., 2015; Meek et al., 2019; Rovero, Zimmermann, Berzi, & Meek, 2013)). The onset of digital

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photography has revolutionized camera trapping by allowing cameras to operate stealthily and for several days without having to replace film rolls. Some of the most popular and widely deployed digital camera traps work relatively silently and use infrared light that is nearly invisible to the human eye (Meek et al., 2014). High capacity batteries and memory cards allow cameras to function for several months at a time.

Typically, camera traps are currently unable to distinguish between humans and wild animals, even though new technological innovations are on their way. This allows camera traps to be used as tools for monitoring legal (Blake, Mosquera, Loiselle, Romo, & Swing, 2017; Fairfax, Dowling, & Neldner, 2014; Oberosler, Groff, Iemma, Pedrini, & Rovero, 2017) and illegal movements of people (Hossain et al., 2016; Pusparini et al., 2018). The infrared illuminated, motion and heat sensor equipped camera traps produce images that can raise serious ethical issues and can in some cases engender potential misuse. There have been instances, for example, where the use of human images captured in camera traps has become the subject of litigation (Butler & Meek, 2013).

Our teams and partners have been conducting camera trap based studies of snow leopards *Panthera uncia* in several countries such as Mongolia, India, China, Pakistan and the Kyrgyz Republic. In multiple instances, our cameras have, in addition to snow leopards and other animals, captured images of local community members, suspected poachers or trespassers. This has created ethical dilemmas for us in terms of whether or not and how such images recorded on camera traps could be used for assisting law enforcement and preventing poaching. Sandbrook, Luque-Lora, and Adams (2018) review the possible implications, ethical dilemmas and the need for guidelines to ensure ethically appropriate use of camera traps especially when dealing with images of people. Based on our experiences, we believe that this is a larger issue being faced by researchers. On the one hand, the images can serve as evidence for investigation and prosecution, but, on the other hand, it is important to consider the privacy of individuals caught on camera (Butler & Meek, 2013; Pebsworth & LaFleur, 2014). There are also legal issues involved regarding the breach of individual privacy, freedom of movement and personal autonomy under national and local laws (Butler & Meek, 2013) and the duties or obligations of the researcher.

Historically and in many parts of the world, conservation efforts have been coercive and imposed in a top-down manner, resulting in marginalization and injustices towards local people (Mishra 2016). If not managed appropriately, camera trap based research efforts have the potential to cause further injustices and risk overstepping ethical boundaries. It also risks jeopardizing delicate relationships built on trust and transparency between various societal groups, including conservationists, local communities and law enforcement agencies. Social implications of camera trapping mean that it is important for this technique to be used in an ethically appropriate and socially sensitive way (Sandbrook et al., 2018).

The Universal Declaration of Human Rights asserts that all human beings are born free and equal in dignity and rights (Article 2), and that no one shall be subjected to arbitrary arrest, detention or exile (Article 9) or arbitrary interference with privacy (Article 12) (U.N. General

Assembly, 1948). Standard advice to deal with camera trapping data for wildlife monitoring includes a general recommendation that any human pictures must be removed before sharing or analysing the dataset (e.g. Wearn & Glover-kapfer, 2017), unless the project explicitly aims at analysing human activity or the researcher is obligated to not remove any images by local laws. Researchers and managers, however, need to have detailed procedures agreed in advance to determine what to do with images containing people (Sandbrook et al., 2018). In addition to the ethical perspectives, where the researchers bear a legal liability in taking pictures of humans, it becomes important that they take basic precautions (Meek & Butler, 2014). While substantial guidance exists on how to report camera trapping research for the sake of replicability (Meek et al., 2014), we believe that an ethical code of conduct that balances fairness, dignity and compliance is much needed.

Here, we outline some basic concepts that should form the foundation for more comprehensive codes of conduct for researchers using camera traps. Our hope is to assist in improving the general practice of camera trap based research. In order to achieve this, we have relied on (i) the basic human values of liberty and protecting privacy, including dignity and autonomy (which are fundamental elements of community-based conservation), (ii) respecting the law and (iii) three of the eight PARTNERS principles (Presence, Aptness, Respect, Transparency, Negotiations, Empathy, Responsiveness and Strategic support) for community-based conservation: respect, transparency and empathy (Mishra, Young, Fiechter, Rutherford, & Redpath, 2017).

A breach of privacy can affect a person or community's reputation, interfere with acceptable social boundaries, allow a known or unknown entity get control over one's life and affect freedom of thought, speech, or social/political activities. The principle of respect underscores that local communities – in this case the ones likely to be affected by deployment of camera traps – are viewed as autonomous partners irrespective of land ownership or tenure (see below), and care undertaken such that camera trapping tries to ensure beneficence and non-maleficence. The principle of transparency in this context implies full disclosure regarding research goals and the purpose of camera trapping. For example, in some communities, our teams found that people were misinformed about camera traps. This included the belief that a camera set up on a distant ridgeline could record activity in their crop fields, below, or even inside their homes. Or that GPS sensors in camera traps could track down anyone who took the cameras away. Community members must be provided with opportunities to share their concerns and advice, and seek explanations regarding the camera-trapping effort. The principle of empathy requires that researchers or managers try to understand and address the nuances and sensitivities that local communities are likely to perceive in relation to camera-trapping research in any area.

## 2 | BASIC CONCEPTS FOR A CODE OF CONDUCT

We suggest that the following concepts, a blend of ethical and pragmatic good practices, should be applied while conducting camera trap-based research:

1. *Permission*: Camera trapping must be undertaken only after obtaining all necessary permissions. Authorities granting legal permission might vary depending on land tenure – appropriate government departments are the authority for public lands and protected areas. On lands where local communities have jurisdiction, their written permission must be obtained in addition to the necessary government departments.
2. *Purpose limitation*: The purpose of setting up camera traps, and what is intended with the data should be clearly identified in the project proposal, permission request letter and/or other documentation. The use of the images should be kept within the framework of this stated purpose, which may be kept broad to allow for exploring questions that emerge later. If, however, data reveal the opportunity to investigate specific research questions related to human images that are beyond the broad framework of the stated purpose, it may be done through additional approval.
3. *Disclosure*: Where local communities may use public lands or protected areas that are under the jurisdiction of governments, irrespective of the actual land tenure, they need to be made aware in advance that camera trapping is being conducted. The purpose of setting up camera traps should be communicated to the concerned local communities and other stakeholders, including the protected area staff. This can be achieved through consultations, meetings, presentations and engagement with members of local communities and other stakeholders. Use of signages indicating that camera trapping is being conducted in an area, distributing information leaflets if possible, and periodically sharing results can help maintain transparency. The times of installation and removal of cameras should be communicated to the communities clearly. Removal of camera traps by unauthorized or unknown people is a professional hazard that the researchers may need to be prepared for. Open communication with the local communities and authorities has helped us reduce the risk of unauthorized camera removal, but there might be situations where this risk may intensify. The risk can be reduced by not revealing the exact location of the cameras.
4. *Legality*: Researchers must make themselves aware of the applicable laws of the land, which vary considerably between regions, and ensure that the laws are respected while conducting camera trapping. Camera trap photos may be used against individuals engaged in illegal activities where it is mandated by prevailing laws or required by the permission granting authority, and steps have been undertaken for a priori disclosure of purpose (see points 1 and 2 above). The information in such cases may be used as means to support the enforcement agencies after careful consideration about the rule of law and likelihood of whether the accused are likely to receive fair treatment. This becomes particularly important in situations where vulnerable people are at greater risk of being persecuted due to inadequate disclosure as discussed in point 3. The images meant to augment law and enforcement should be handed over to the appropriate authority for further action.
5. *Privacy*: As a rule of thumb, the privacy of individuals inadvertently photographed by camera traps needs to be protected. Artificial intelligence based tools are increasingly available that can automatically locate and blur human faces, clothing and other identifiable features. Such tools may improve protection of individual privacy while still allowing the data on human activities to be used for research purposes. If the law or conditions laid down in research permits require that illegal activities captured on camera traps must be reported, such obligations must be declared a priori to the communities and other local stakeholders.
6. *Participation*: We recommend encouraging voluntary participation of stakeholders, especially representatives from local communities, in the process of camera trapping. Researchers could explore the possibility of co-creating research questions with local communities that may have common or complementing relevance (e.g. Westwood et al., 2020). The communities may be viewed as partners in the effort and knowledge of community members incorporated in research design. For the time invested in helping design or conduct camera trapping, community members may be compensated financially.
7. *Sharing*: The technology of camera trap functioning, and their capabilities and limitations should also be explained to local communities to address any misinformation they might carry. In line with concepts of transparency and participation, we also recommend sharing of wildlife images and credit with the concerned agencies that have jurisdiction over the land, be it government agencies or local communities, and voluntary sharing of images, irrespective of jurisdiction, with local communities.

### 3 | DISCUSSION

Underlying our proposed code of conduct framework is the ‘golden rule’ that one must treat others as one wants to be treated (Gensler 2013). Images of people engaged in innocuous activities that are inadvertently recorded in camera traps must be treated confidentially.

We do recognize that there are no simple solutions to the complex balance between the ethical and the legal aspects involved (Britain et al., 2020). For example, there may be situations where, because of not having followed purpose limitation or disclosure processes adequately, researchers may feel compelled to withhold information regarding an illegal activity caught on cameras. Yet, withholding or delaying any such information can lead to the researcher being blamed as abettor to a crime, or obstructing justice.

Therefore, the issue of proportionality becomes important to consider. There is general agreement that privacy is an important fundamental right, but not an absolute one. If a serious crime is committed and recorded on camera traps, taking into consideration public interest, it would be the duty of the researcher to report, even if this may be considered breach of individual privacy. In other words, the duty of the researcher to report the crime becomes stronger than the need to protect individual privacy. If a crime is to be reported, it must be done with sensitivity, and the data shared only with appropriate authorities with jurisdiction in the location where the activity occurred and with jurisdiction over the subject matter of the potential crime captured on camera. The decision and its rationale may need to be explained to the

**TABLE 1** Basic principles and a suggested checklist of action items that can be followed by researchers when planning a camera trap study

Principle	Do's	Don'ts
Permission	<ul style="list-style-type: none"> <li>Review and identify authorities with tenurial jurisdiction.</li> <li>Identify the local communities and other stakeholders.</li> <li>Seek written permission from the authorities and inform the other stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>Bypass steps in seeking permissions and informing stakeholders.</li> </ul>
Purpose limitation	<ul style="list-style-type: none"> <li>Identify and enlist the purpose of setting up the camera traps in advance.</li> <li>Clarify at the outset what will be done with human images.</li> </ul>	<ul style="list-style-type: none"> <li>Conceal or share partial information about what will be done with the data including human images.</li> </ul>
Disclosure	<ul style="list-style-type: none"> <li>Organize consultations, meetings, presentations and other means to engage with the members of local communities and stakeholders, informing them about the purpose of setting up camera traps.</li> <li>Deploy signages and/or distribute leaflets about camera traps being set up.</li> <li>Share information about the time of installation and removal of cameras with the authorities and the local communities.</li> <li>Inform the authorities and local communities about lost equipment, if any.</li> </ul>	<ul style="list-style-type: none"> <li>Withhold or amplify information about the capabilities or limitations of the equipment.</li> </ul>
Legality	<ul style="list-style-type: none"> <li>Review the applicable laws of the land.</li> <li>Ensure a priori disclosure of purpose with the authorities as well as local communities.</li> <li>Clearly state to the local communities and other stakeholders about the responsibilities mandated by laws or necessary permissions regarding use of photos.</li> </ul>	<ul style="list-style-type: none"> <li>Share personal information, details or photographs of people with the authorities without having informed local communities and other stakeholders in advance.</li> </ul>
Privacy	<ul style="list-style-type: none"> <li>Protect the privacy of individuals inadvertently photographed by camera traps.</li> <li>Use tools where possible to locate and blur human faces and other identifiable features.</li> <li>Ensure that legal obligations to report illegal activities are declared a priori to the communities and other local stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>Share photos of people publicly or with authorities without their prior consent.</li> </ul>
Participation	<ul style="list-style-type: none"> <li>Proactively engage stakeholders, especially representatives from local communities in the camera trapping exercise.</li> <li>Consider co-creating research questions with local communities that have common or complementing relevance.</li> <li>For the time invested, compensate community members financially.</li> </ul>	<ul style="list-style-type: none"> <li>Bring only external experts to assist with the exercise.</li> <li>Prevent members of the stakeholder groups from learning about the techniques.</li> </ul>
Sharing	<ul style="list-style-type: none"> <li>Explain the technology, along with its capabilities and limitations to the local communities.</li> <li>Share wildlife images and credit with the concerned authorities that have jurisdiction over the study area as well as with local communities.</li> </ul>	<ul style="list-style-type: none"> <li>Share images with media, public or scientific community without providing appropriate credits.</li> </ul>

relevant local community with sensitivity. At times, whether an activity recorded on cameras is considered a serious enough potential crime that should be reported may not always be obvious. Where one draws the line is a dilemma and something that may have to be decided on a case by case basis.

We recommend that while close attention should be paid to purpose limitation, it may be adequate to list the purposes in a broad manner rather than as very specific objectives, thus allowing the researcher flexibility to use the data for addressing unforeseen research questions that may emerge subsequently. Purpose limitation in this case is more important at the general level, where the researcher must clarify a pri-

ori whether scientific research is the sole purpose, or whether facilitating law enforcement is also a purpose or the sole purpose of the camera-trapping exercise. Accordingly, full disclosures must be made to the stakeholders before camera trapping is initiated.

Data sharing with stakeholders, while important, comes with potential pitfalls. For example, in certain situations, there is a risk of geo-referenced camera trap images being misused for poaching (Lindenmayer & Scheele, 2017). We propose that stakeholders, particularly local communities, not be viewed just as a bystander to modern scientific practice, but instead, be engaged in camera-trapping research. Whilst such a co-creation approach requires significant time

investment in terms of relationship building (Mishra et al., 2017), such relationship building and shared planning can help reduce the chances of data misuse. Where deemed necessary, geo-reference tags may be removed from the data before it is shared.

We recognize that there may be situations and nuances where our suggested concepts may need to be modified and adapted. We have tried to provide a set of basic concepts and suggested action items (Table 1) that researchers can adapt into contextually appropriate codes of conduct with inputs from knowledgeable field practitioners, local community members, philosophers, scholars of jurisprudence and others. Following such a code of conduct with diligence will improve the practice of ethical camera trap-based research and can also help researchers better navigate the ethical-legal tightrope.

## AUTHORS' CONTRIBUTIONS

CM, MF and KS conceived the idea. All authors contributed to the content and writing and gave final approval for publication.

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