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Responsible drone use in biodiversity conservation
Guidelines for environmental and conservation organisations

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Drone technology has greatly expanded the possibilities for monitoring and protecting biodiversity and threatened landscapes. However, the potential capture of human data, and deployment in wildlife-rich and inhabited areas, can result in unforeseen social and ecological impacts.

New best practice recommendations aim to minimise these risks and promote the benefits of drones for biodiversity conservation.

Drones are relatively inexpensive, enable visual data capture of, and across, vast and inaccessible places, and their small size and remote nature can facilitate less intrusive monitoring.

Drones can also empower new conservation actors, including Indigenous and local communities, who can use them to survey and protect their territories and ways of life.

However, awareness is needed of the potential problems of drone use, from disturbing local people and wildlife, capturing and circulating illegal activity leading to potential conflict, to ensuring the safety and security of drone operators.
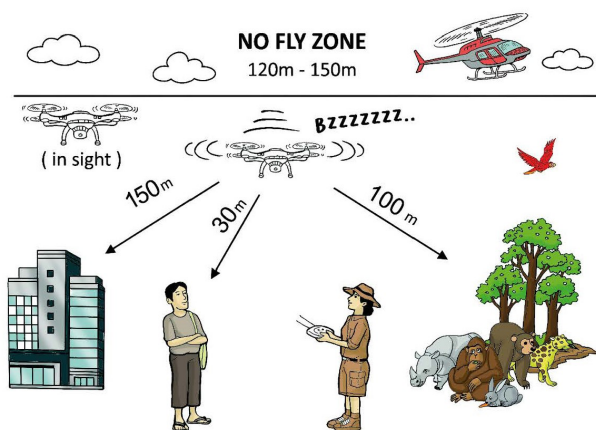

Image credit: Komarudin

Best practice recommendations:

Before you fly:
- Consult, engage and/or collaborate with local communities.
- Train and brief any sub-contracted operators.
- Plan missions with awareness and to minimize disturbance.
- Understand the capabilities and limitations of your equipment and systems.

During flight:
- Avoid capturing images of humans where features are identifiable unless that is the intention.
- Make yourself and your drone identifiable.
- Observe animal reactions and abort the mission if animals react negatively.
- Take off at good distance from animals' sight or hearing and fly at the highest altitude possible.
- Avoid abrupt changes to the speed, altitude and direction.

After you fly:
- Take care with photographic and video data of people and culturally significant sites.
- Review permitted usage of footage and drone data with local communities.
- Dispose of hardware carefully to avoid environmental contamination.

Full guidelines and translations are available at:
Responsible drone use in biodiversity conservation: Guidelines for environmental and conservation organisations who use drones
https://www.cifor.org/knowledge/publications/

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Considerations for human communities

Drones can enable and empower local populations and are increasingly used by and for communities to inform effective conservation, and to defend rights to land. However, drone footage often contains images of humans which introduces the potential for surveillance and control.

The presence of drones can prompt a range of reactions from anxiety to excitement, as well as provoking concerns about privacy, security, and noise.

Image credit: Komarudin

Drone use also raises concerns around consent and cultural sensitivity and it is important to be aware of local norms, customs and sites.

Sharing drone data that could implicate individuals in criminal activities or lead to repercussions, is a further consideration. Even where monitoring illegal activities or law enforcement is the focus of drone use, the wider social implications should be considered.

Responsible drone use should involve early and ongoing engagement with local communities, recognise local knowledge and ensure collaborative development of plans for flights and data collection. All persons involved, including any subcontractors, should be briefed on site-specific information, including customs and sensitivities.

Considerations for wildlife

While drone data can inform effective conservation, their use can also disturb wildlife. Animal reactions to drones are mostly anti-predatory responses, and vary from: curiosity, vigilance, and alert, to alarm, fleeing responses and aggressive behaviour, as well as non-visible responses like increase in heart rate.

Birds are more likely affected than other zoological groups, as they inhabit aerial spaces. However, animals with particularly high hearing capabilities, such as elephants, have also been recorded fleeing from drones. Nesting birds in their colonies, marine animals such as whales, and terrestrial animals can also be affected by low-altitude drone flights.

Drones flown directly towards animals, including those intending to film specific targets, elicit more disturbance than the "lawn mower patterns" conducted at consistent altitudes and commonly performed for mapping or wildlife monitoring.

Systematic exposure over time may lastingly affect animal behaviours. It is therefore important to understand the potential risks and to design drone interventions minimising adverse impacts on wildlife.

Image credit: Komarudin

Further information

- UAViators Humanitarian UAV Network, http://uaviators.org/docs
- Mulero-Pázmány et al. (2017). Unmanned aircraft systems as a new source of disturbance for wildlife: A systematic review. PloS one 12, 1. https://doi.org/10.1371/journal.pone.0178448
- Sandbrook et al. (2021). Principles for the socially responsible use of conservation monitoring technology and data. Conservation Science and Practice, 3(5), e374. https://doi.org/10.1111/csp2.374
- Wich & Koh, (2018). Conservation drones: mapping and monitoring biodiversity. Oxford University Press.

Contact the Researchers

The full best practice guidelines were developed by an international team of ecologists, biologists & social scientists.
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