Research Activity Report
Supported by "Leading Graduate Program in Primatology and Wildlife Science"
(Please be sure to submit this report after the trip that supported by PWS.)

	2023. 11, 29
Affiliation/Position	Wildlife Research Center/M1
Name	Fadel Abdurrahman Azhari

1. Country/location of visit

Japan - 985-1, Nishikawarada, Takeori, Takenami-cho, Ena-shi, Gifu 509-7122

2. Research project

Basic Training for Fieldwork

3. Date (departing from/returning to Japan)

2023. 11. 07 – 2023. 11. 09 (3 days)

4. Main host researcher and affiliation

Dr. Satoru Sugita, Professor at International Digital Earth Applied Science Research Center, Chubu University

5. Progress and results of your research/activity (You can attach extra pages if needed)

Please insert one or more pictures (to be publicly released). Below each picture, please provide a brief description.

During this visit, I conducted training on drone usage and application.
I used this opportunity to gain hands-on experience in drone operation and data processing of aerial photography. I also was drilled with the essential knowledge of drone regulation.
Through this experience, I have broadened my vision of how drones can be utilised in many fields of research. Before this trip, I did not imagine how drones could be applied to research other than disaster-related fields such as geology or urban planning. However, now I understand that it is an excellent tool for wildlife research, including conservation biology.

To concisely elaborate on the main points of this course, I would like to write it into 3 different points:

1. Regulations regarding Unmanned Aerial Vehicles (UAV)

   On day 1, Satoru Sensei thoroughly explained the regulations regarding UAVs. While it was arduous to start the course by cramming up rules and regulations, it was a very important part before we did a hands-on with the drones. By the end of the 1st day, I understood the restrictions and allowances regarding UAVs; some of them are:

   1. Max altitude of 150 meters above the ground
   2. Prohibition of flying it beyond visual line of sight
   3. Prohibition of flying at night
   4. Prohibition of flying at flight restriction zones → Aerial Restriction map https://maps.gsi.go.jp/#8/35.556250/139.731674/&base=std&ls=std%7Cdid2020%7Ckokuarea&blend=0&disp=111&lcd=kokuarea&vs=c1g1j0h0k0l0u0t0z0r0s0m0f1&d=m

   The critical takeaway from day 1 is that researchers should request a permit from the Ministry of Land, Infrastructure, Transport, and Tourism to fly beyond the strict restrictions to give flexibility in operation during fieldwork.

2. Drone Operation

   On day 2, we operated the drones. First, Satoru Sensei explained the parts of drones, such as collision sensors, gimbals, GPS, and more. After that, we went into the simulator provided by DJI software to get a sense of flying the drones safely. A fun part of the indoor training was the small first-person view (FPV) drones that we got to experience. The drones were lighter than 100 grams, making them immune to drone regulations, and thus, we could experiment with them inside the room. In the afternoon, we finally went to the field, set up the Mavic 2's propellers and controller, and flew it into the sky as high as 149 meters.

I was surprised that the "return-to-home" function of the drone worked impeccably, bringing it to its take-off pad with only centimetres of deviation visible.

Figure 1: photo taken by drone.

3. Aerial photogrammetry

After the hands-on experience, we returned to the classroom and learned the most important parts of the course: drone automation and aerial photogrammetry. The teacher guided us through the applications where we can make waypoints or a "mission set" for a drone to conduct by itself, complete with the intervals, angle of camera, height, speed, and much more. Using the waypoints we created, we returned to the field and flew the drone again, this time in autopilot mode. My team drew "WRC" as the drone's waypoints, and we witnessed it drawing the line invisibly in the air as it flew. After the autopilot demonstration, we practised image processing, where we generated a 3d Ortho mosaic map from drone photos using Metashape software. This is where everything was new for most of the students. I am happy to have learnt this know-how of aerial photogrammetry.

Figure 2 The teacher instructing how to create a mission plan for autopilot.

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Lectures on Drones x Wildlife

On day 3, 3 lecturers gave lectures on the usage of drones to study wildlife, from the development of the Asuka drone and its applications for cetacean research to the use of drones, ortho-mosaic maps, and machine learning to study the ecology of collective animal behaviour, such as monkey's hierarchical behaviour in eating and population estimation of gulls. This session opened our horizons to the many different ways in which drones can be applied to study wildlife. For instance, I thought of using drones to calculate the number of white-tailed eagles' nests across seasons by photogrammetry as a viable research plan in the future.

*Please have your mentor check your report before submitting it to [report@pws.wrc.kyoto-u.ac.jp].

6. Others