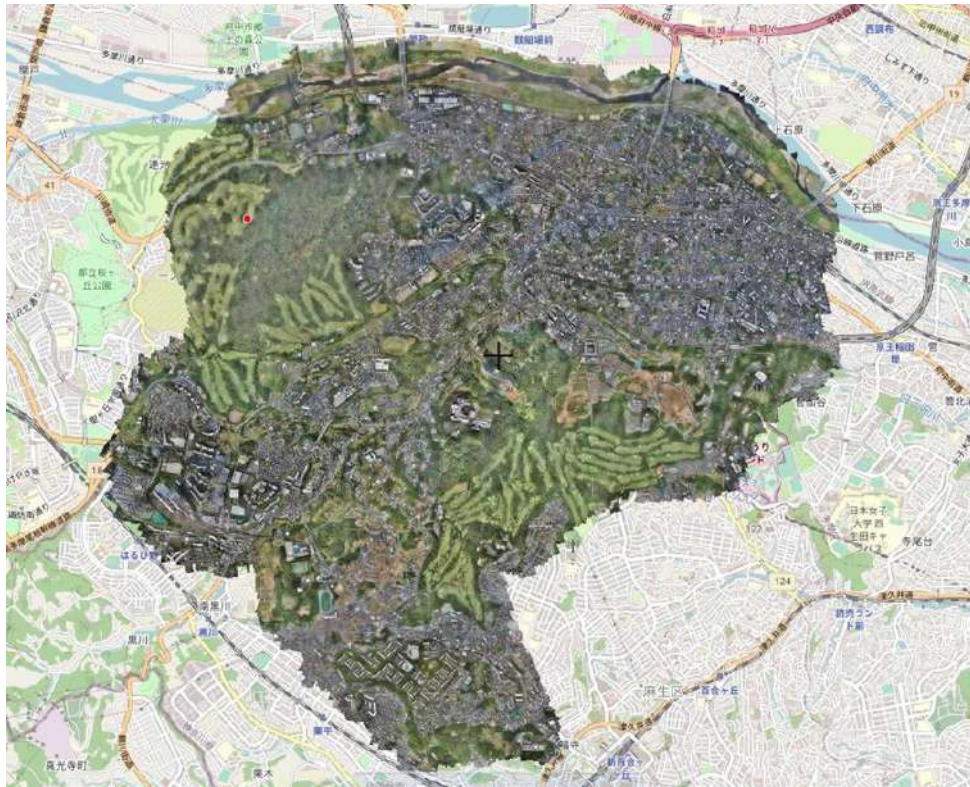


## Preserving Inagi, the green city in the suburbs of Tokyo



*The resulting from the drone flights*



*Team of Japan Flying Labs conducting field operations*

OVERVIEW	
<b>Flying Labs</b>	Japan Flying Labs
<b>Geographic area</b>	Inagi City, Tokyo, Japan
<b>Date range</b>	September - October 2021
<b>Sector program</b>	EcoRobotics
<b>Main SDGs</b>	<a href="#">GOAL 11: Sustainable Cities and Communities</a> <a href="#">GOAL 13: Climate Action</a>

SCOPE	
<b>Project stakeholders</b>	Inagi municipal office, Tokyo
<b>People impacted</b>	Citizens in Inagi city
<b>Number of people impacted</b>	About 93,000 citizens of Inagi city (population 92,898 as of Nov 2021)
<b>Challenge</b>	In 2009, 56.7% of Inagi city was covered with vegetation. The city is within a 25 km radius from central Tokyo and this ratio of green coverage is unique in such an urban environment. However, recent urban developments were undergone in neighbouring cities and as a result, the green coverage started shrinking.
<b>Scope</b>	Inagi city aims to preserve and increase the green coverage. In 2012, Inagi municipal office established a green basic plan to achieve the vegetation coverage of about 50% of the city area by 2021. In order to assess and quantify the coverage, the city has worked with an aerial survey company to obtain aerial images by helicopter or plane. Recently, the city office became interested in drone technology to reduce the cost of otherwise expensive aerial surveys.
<b>Outcome</b>	<p>An orthomosaic was handed over to a company which analyzes the data. The city wants to know not only the percentage of green coverage in the city, but also the amount of carbon dioxide absorbed by the vegetation.</p> <p>One of the learnings resulting from this project concerned the timing of drone operations. The drone flights were conducted in autumn, so the trees already lost their foliage, making data analysis more challenging.</p>
<b>Impact</b>	Inagi city can obtain aerial images with drones “on-demand” and will be able to assess the change of green coverage at reasonable cost. Moreover, when a disaster happens, the latest orthomosaic can be used in the disaster relief operations, increasing the level of disaster preparedness in the area.
<b>Next steps</b>	We want to propose a seasonal drone flight to check change.

COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT	
<b>Consent for data acquisition</b>	The Inagi municipal officials obtained consent from communities and authorities, such as the police.

	We were asked to fly over public bathhouses which have outdoor baths before their business hours start (9 AM) to protect privacy.
<b>Activities to engage with the community</b>	Because of the new coronavirus outbreak, email exchanges with the municipal officials were the main form of communication and community engagement
<b>Community groups engaged with</b>	Mayor of Inagi and municipal officials
<b>Community attendance</b>	No
<b>Community feedback</b>	The company is still in the process of analysing data, so the results were not yet shared with the community
<b>Stakeholder support</b>	N/A

#### DATA ACQUISITION

<b>Size of area</b>	2280 ha (22.8 km <sup>2</sup> )
<b>Drone</b>	eBee X, Aerobo Wing (AS-VT01)
<b>Sensor(s)</b>	RGB
<b>Flight plan software</b>	eMotion (for eBee X) and Aerobo Wing dedicated software
<b>Flight height</b>	150 meters above ground level
<b>GSD (Accuracy)</b>	4 cm/pix
<b>Number of images acquired</b>	9827 images by eBee X 959 images by Aerobo Wing
<b>Number of flights</b>	10 flights by eBee X 3 flights by Aerobo Wing
<b>Time invested in data acquisition</b>	3 days
<b>Georeferencing</b>	Onboard GPS

#### DATA PROCESSING & ANALYSIS

<b>Processing software</b>	Agisoft Metashape
<b>Processing time</b>	18 hours 26 minutes 28 secs
<b>Data products</b>	Orthomosaic, 3D point cloud and Digital Elevation Model
<b>Analysis tools</b>	Analysis is conducted by an external company
<b>Analysis outputs</b>	N/A
<b>Final outputs shared with stakeholders</b>	Raw data, orthomosaic, 3D point cloud and Digital Elevation Model
<b>Data sharing</b>	Google Drive, email, SD card