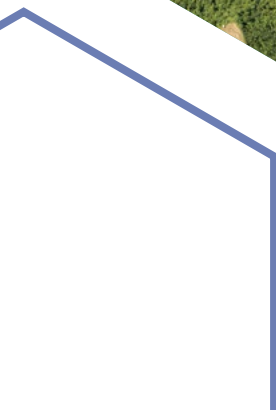


SkyEye

UAV SERVICES

UAVs for a better quality of life

<http://www.skyeyeph.com>



About SkyEye

HISTORY

SkyEye Analytics, Inc. started as a university research project in August 2009 when a group of multidisciplinary students taking their Master's and Bachelor's degree got together to explore the use of unmanned aerial vehicles (UAVs) in the Philippines. It was born out of necessity, as satellite images were hard and expensive to procure.

Six years later, the company now caters to both the public and private sectors. From land surveying to disaster mitigation and from precision agriculture to forest protection, **SkyEye** believes in the power of drones for good.

Now more than ever before, we are committed to procuring, processing, and analyzing data to help you make better decisions.



First draft of Kiwi, the SkyEye Mascot



One of our locally developed drones: Single and Dual Camera Configurations for Near-Infrared Mapping (NIR), catapult launched.

CLIENTELE & REFERENCES

Press Releases



How drones can be a force for progress

MANILA, Philippines – Drones can evoke images of death and destruction. Some people associate them with the predator variety, the kind used by the US military to target terrorists.

Others may think of them as the tools used to create stunning panorama videos.

Five-year-old startup Skyeye Incorporated, however, wants to add another description to popular perception. They want people to see drones as a force for genuine economic change.



Drones for better roads: Pointers from the Philippines

Making road financing requests more transparent and systemic should see local governments not only document individual projects, but provide a comprehensive and open, digital picture of their road networks and investment priorities. **Working with four pilot localities**, the Bank combined a challenge for comprehensive community-based mapping on OpenStreetMap with drone documentation of priority road projects. This galvanized interest in mapping more broadly, and had the local governments work effectively with local start-up organizations such as **Map The Philippines** and **Skyeye, Inc.** to identify local connectivity priorities.



'Where's Waldo' ... but for science

Meier: Yes, "Where's Waldo" with a purpose. Incidentally, one of our next pilots will likely be later this year in the Philippines. A local UAV partner, called **SkyEye**, is doing some great work around the use of UAVs for disaster response.

Drones take on increasingly important role in land, infrastructure, and property development

"The name of the game in the drone industry right now is not necessarily drone itself, but how to apply it," said Matthew Cua, founder and chief executive of SkyEye Analytics, a Filipino start-up providing drone mapping and surveying services.

SkyEye's drones – three metres wide on average and loaded with miniaturised cameras – are able to survey 10 hectares of tropical terrain in just four hours, compared with 30 days by traditional methods, and produce maps with much richer detail and data, said Cua.

South China Morning Post

ALSO FEATURED IN:



Partners:



Clients:



Awards:



Winner of ImpactHub's Innovation in Mobility Challenge



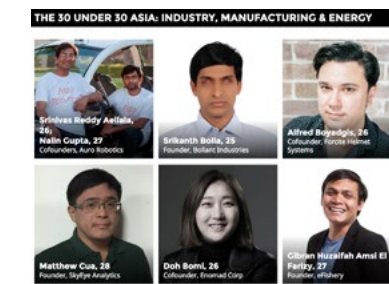
Winner for PLDT and Rappler's #BeTheBoss Awards for Innovative Solutions



Start-up of the Year from Rice Bowl Awards 2016 - Philippines



National Winner for World StartUp Cup Philippines



Forbes' 30 Under 30



Top 10 Finalist for Tectonic - Manila Tech Convention 2017



OUR MISSION

*To be the leader in drone applications
that will bring value to the lives of
consumers and organizations.*

PROJECT CASES

UAVs for a better quality of life.

When SkyEye started in 2009, drones were primarily used either for military purposes (especially due to the War on Terror) or for aerial photography. It was unclear whether drones would have any use outside this realm. But we were sure that drones can be a catalyst for change in the daily lives of people.

Over the years we have explored many things, and this project book showcases what we have worked on during those times. We believe that drones can help communities get better, and now we have the portfolio to show it.

Drones, Aquacultures, and Water Quality Management

Background

The Philippines is known to have the 5th longest coastline in the world. It also has 94 freshwater lakes, covering over 208,000 hectares of water area. This water resource is responsible for the health, livelihood, and culture of millions of Filipinos.

Lake Palakpakin is one of the seven crater lakes in the city of San Pablo, Laguna. It is the largest but shallowest (with only 7 meters maximum depth). Unfortunately, due to this shallowness, uncontrolled human and aquaculture activities severely and negatively impacts the ecosystem of the lake, causing livelihood threatening fishkills.

The SkyEye team was actually born in this lake under the Ateneo Innovation Center. We used drones in order to get the local fishing community together with the local government and researchers to understand and properly manage the lake. A fully featured decision support system centered around drone technology was created.



Left: Local fishfolk Fernando Pando Espallardo and the aerial map donated to him by the team.

Right: Aerial image of Palakpakin with various data overlaid.

Project

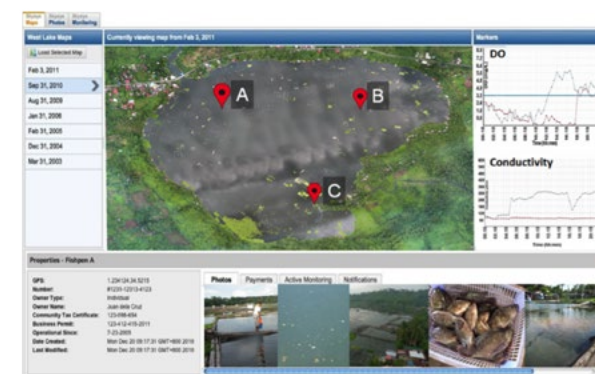
The team deployed an aerial imagery campaign to monitor the lake on a quarterly basis that is still on going today. The imagery detects **turbidity, algal blooms, formation of flow blockages like water hyacinths, and fishpen layouts.**

We reinforced the aerial data with a ground truthing sensor system.



Aerial maps provided by SkyEye for the project

Top: Lake Palakpakin. Bottom left to right: Lake Kalibat, Lake Sampaloc, and Lake Yambo with Lake Pandin (twin lakes)



This is a screenshot on the decision support web application designed for the different stakeholders.

Aftermath

The power of drones has been proven in this lake community. Upon seeing the undeniable dying state of the lake through high resolution drone imagery, the local fisherfolk themselves decided to manage and eliminate fishpens in order to save the ecosystem.

You may watch a video regarding the project at <http://bit.do/SkyEyedrones>

Drones and Flood Control Analysis

Background

The Aklan River, part of the Aklan River Forest reserve, is home to virgin forests, agricultural lands, and ecological biodiversity. In 2008, Typhoon Fengshen (known locally as Typhoon Frank) caused a landslide and created a temporary dam. The **total damage to infrastructure and agriculture was estimated to be 765 million pesos** and rehabilitation cost was set at 2.6 billion pesos.

This prompted the creation of several flood control systems, and SkyEye was contracted to study the status, impact, and effect of these systems. This project was done under the UAV Aerial Imaging Consortium (which SkyEye was part of), was funded by DOST-PCIEERD under the leadership of Dr. Guevara, and managed by Ateneo de Manila University under the leadership of Dr. Libatique.



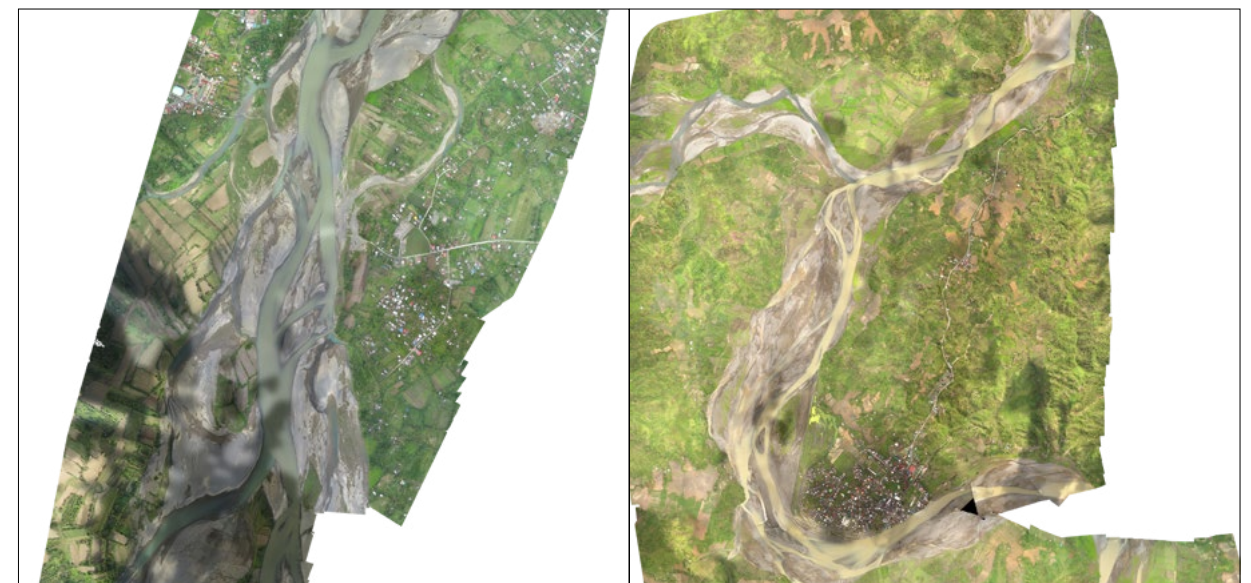
Aklan River. Damage to flood control infrastructure in Libacoo (left). Riprap near Mobo Bridge (right).

Project

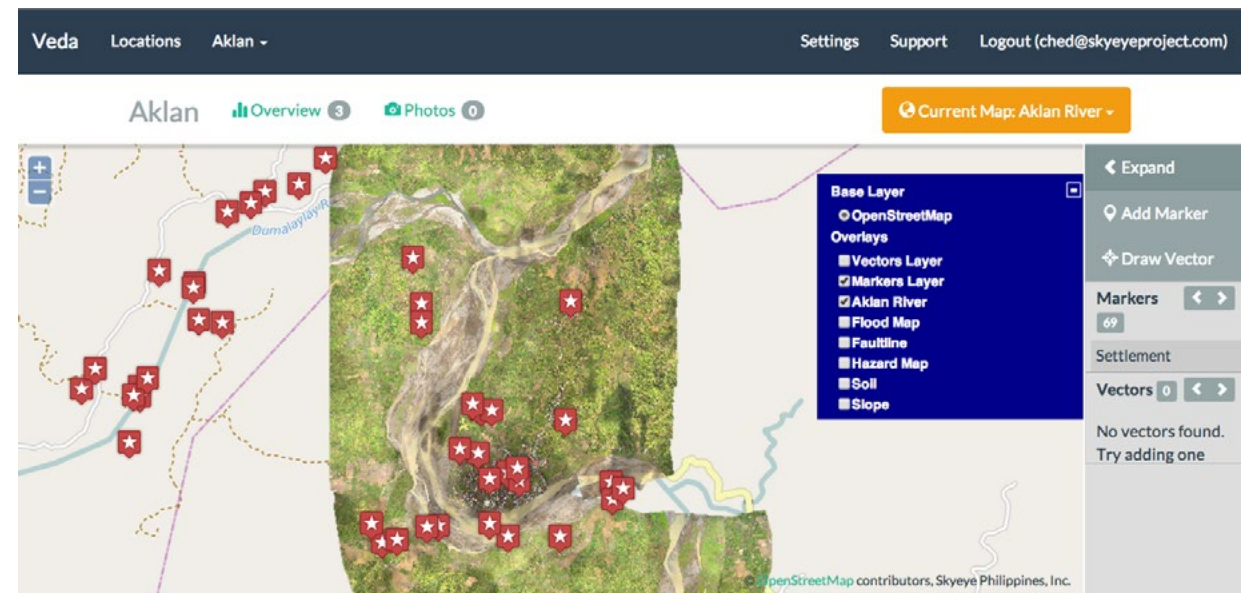
An analysis of the critical infrastructure using aerial imagery revealed a significant number of damaged or collapsed control structures in several municipalities.

The project also prompted and supported a baseline soil and river analysis with partner scientists from Aklan State University. Aerial images were obtained to better understand the erosion and river sedimentation and to provide insight on the hydro-physio-chemical characteristics of the river system for future interventions.

The project was also integrated to our in-house online decision-support system and online GIS platform, VEDA (Very Easy Data Access). This integration allowed easy access both for stakeholders and researchers.



Baseline maps of the two different rivers in Aklan.

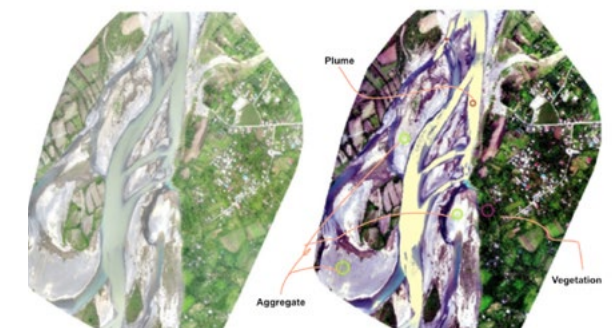


VEDA is our proprietary system which makes for effortless viewing and manipulation of gathered information.

Additional layers were also added, such as a hazard map, a flood map, and fault lines. This can be used for determining how many homes may be at risk in case of flooding, as well as a guideline for creating zoning and infrastructure policies.

Aftermath

Drones have proven themselves as a powerful tool to manage entire watersheds that span various municipalities by providing a baseline and common tool all parties can use to coordinate, discuss, and decide on the next steps of the community.



Sediment plume classification along a portion of Aklan River. On the left, the original orthomosaic photo. Contrast enhancement and supervised classification was used in the analysis, with the result on the right.

Drones and Precision Agriculture

Background

In October 2015, SkyEye, together with the Ateneo Innovation Center (AIC), agreed with the World Wildlife Fund (WWF) to work together on using the newly developed low-cost Near-Infrared (NIR) System by SkyEye-AIC for a precision agriculture case study of rice and corn in Region II, Northern Luzon.

Through the use of NDVI (Normalized Difference Vegetation Index) Mapping, the joint SkyEye-AIC team plans to provide a new tool for farmers and farmer-support organizations for increasing productivity.

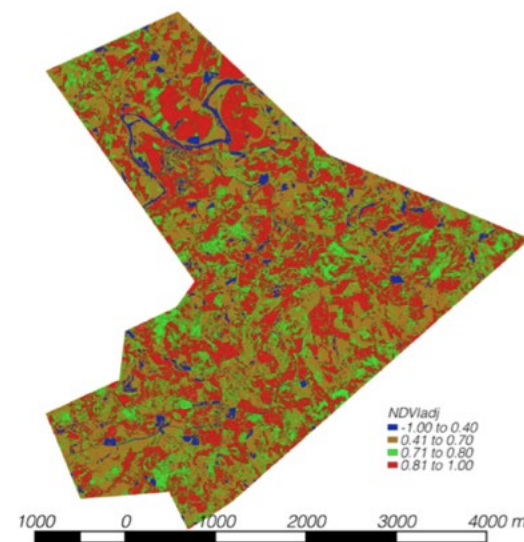


Left: The project's two target sites by WWF in Isabela, Region 2. Site A is composed of rice elds while Site B is composed of corn elds.

Project

WWF provided ground NDVI measurements in order to calibrate the newly developed low cost NIR system that the SkyEye UAV was carrying.

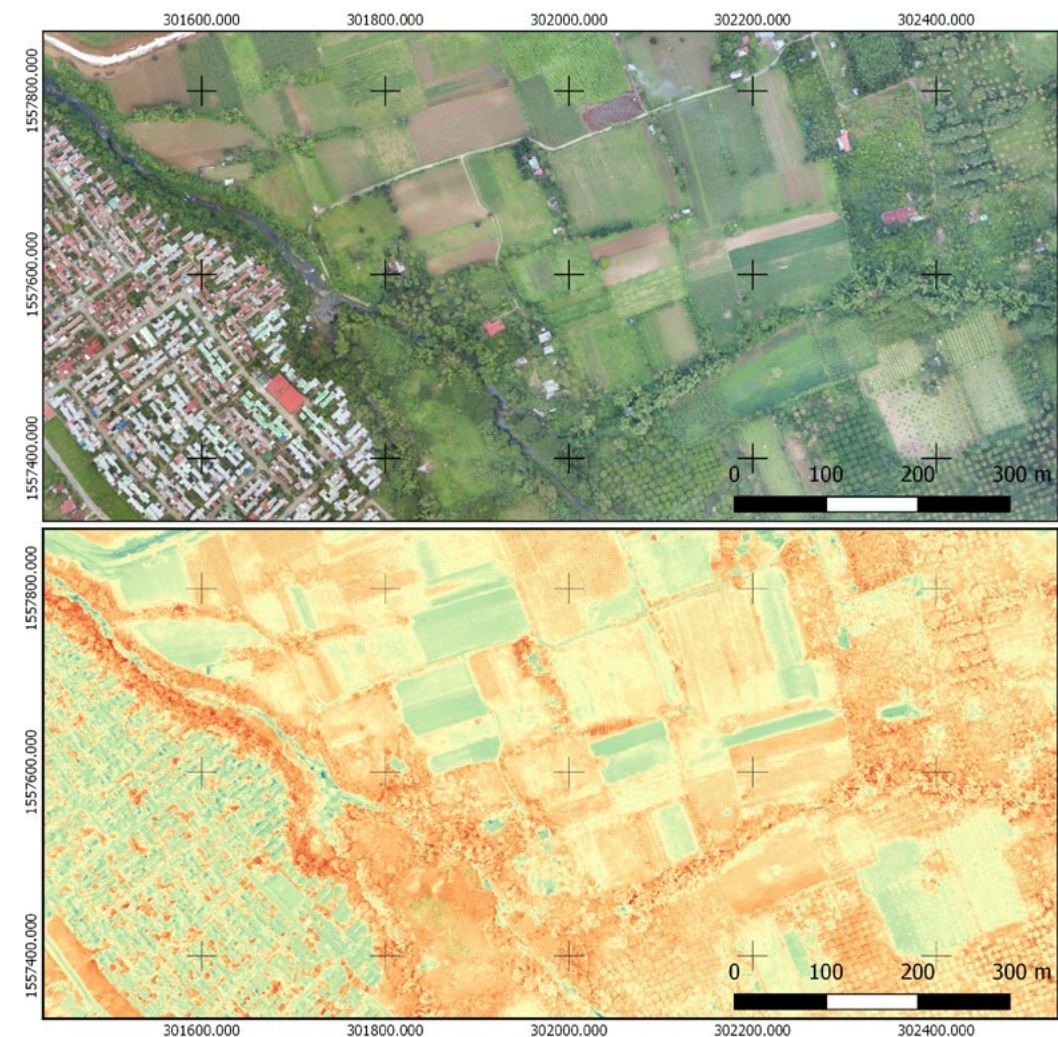
On the next page is an NDVI raster of Site B as generated from the UAV-borne imaging sensor with dual visible and IR bands. Each pixel in the image is corrected through the ground truth sensor data collected by WWF.



NDVI raster of site B as aforementioned.

NDVI is useful for monitoring the rice and corn yields. The NDVI heat map index describes objects that reflect near infrared strongly, but absorb other kinds of light as well, normally indicative of photosynthetic activity in plants. This is represented with a high positive pixel value (more red).

Other objects are represented with a low pixel value (more blue). These are often artificial or man-made objects and matter that do not reflect near infrared well, like soil and water.



The end product, sample NVDI map.

Aftermath

Although the project is still on-going, SkyEye-AIC, together with WWF, have proven through a prototype that SkyEye's operational excellence in flying drones, together with the low cost NIR System, can provide these communities with a cost-efficient management tool for monitoring fields over their growth cycle.

This tool hopes to allow more efficient interventions that will raise productivity among hundreds of farmers through thousands of hectares.

Drones and Coconut Assessment Damage

Background

The coconut industry is a major contributor to the Philippine economy and is an important backbone of the country's agricultural sector. Protecting and understanding this industry is essential to the agricultural economic success of the country.

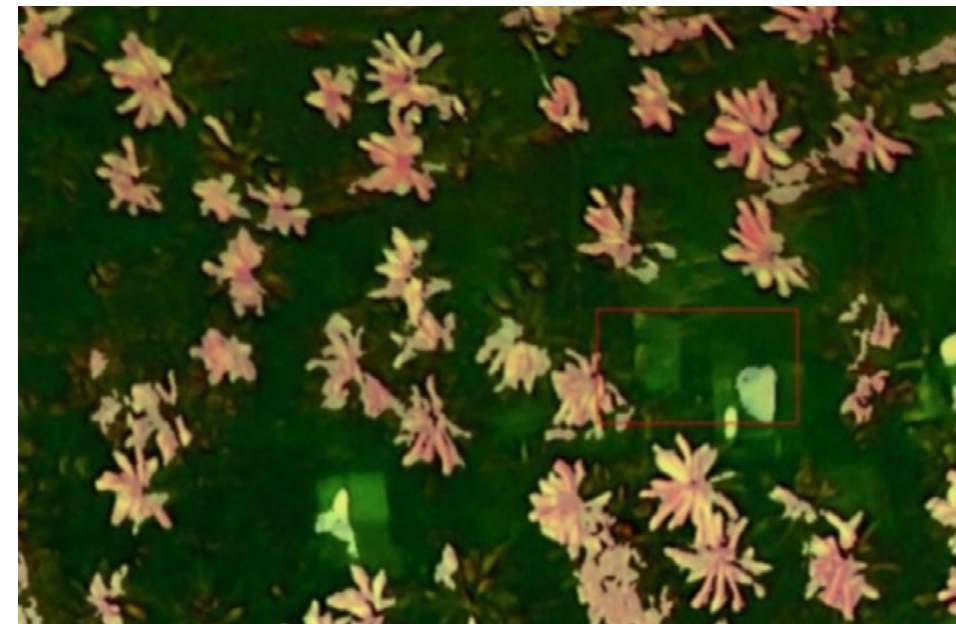
SkyEye was active during and post Typhoon Haiyan (Yolanda). We were on the ground in Aklan when the typhoon hit the country. SkyEye was thus effectively formed by the destruction wrought by Typhoon Haiyan, shaping the culture and the mentality of the team.

One of the things that SkyEye provided was a rapid assessment of fallen coconut trees so that our partner, Visayas State University (VSU), could determine the scale of the recovery and rehabilitation efforts needed to restore this core industry on Leyte island.



Project

Working in a disaster torn location was tough and has made the SkyEye team tough. The aerial mapping done helped identify damaged, fallen and healthy trees on a one to one basis. Initially, the count was done manually on the orthomosaic map. But new tree counting algorithms were developed so that in the future, assessments will be much more rapid.

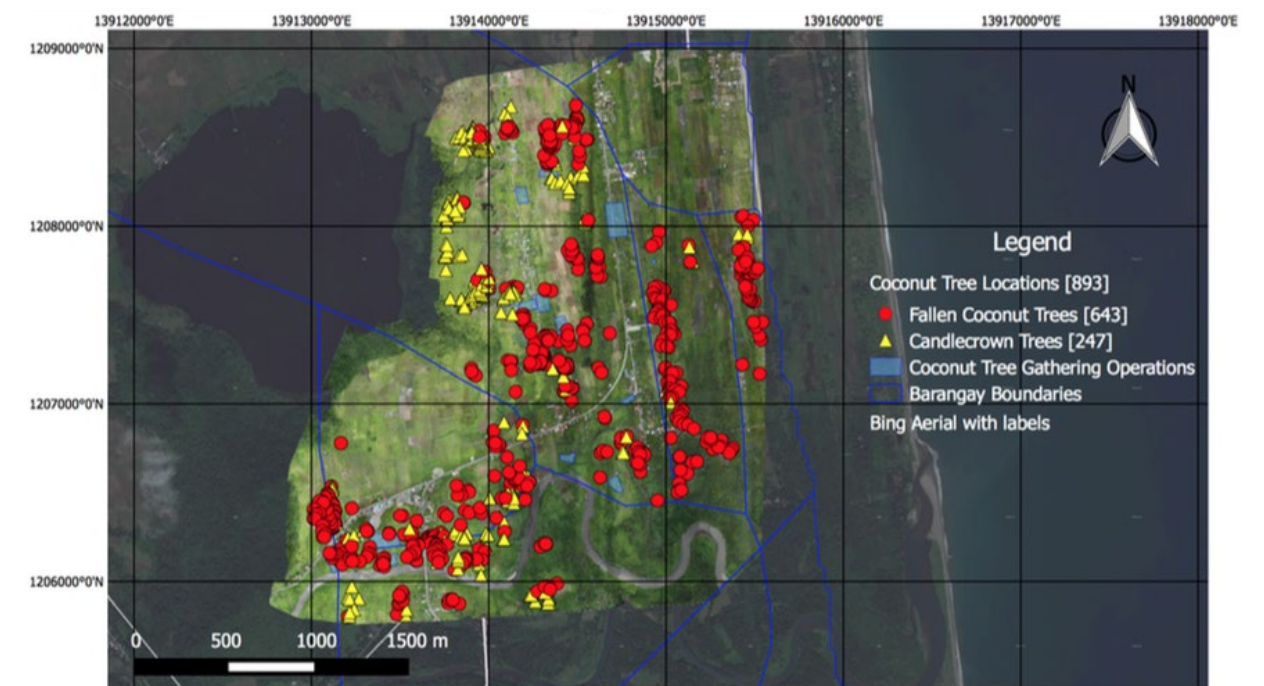


Left: Binary image of coconut segmentation overlaid with original aerial image. Bright-colored patches indicate coconut trees.

Below: Map of the coastal region of Javier, Leyte after Typhoon Haiyan. Red circles indicate fallen coconut trees while yellow triangles indicate candlecrown trees*.

*Candlecrown trees are coconut trees with a top sheered off by the wind, they end up looking like broken matchsticks

The binary photo above shows a target area for counting and markers indicating fallen or damaged coconut trees.



Aftermath

Automated segmentation and counting of coconut trees was first developed in this project and continues to be refined to this day. Machine learning relies on massive datasets, and as SkyEye continues to build its database, the smarter and better our counting algorithms will become.

Exotic algorithms that involves texture analysis are also being tested. This enables segmentation of a map image into coconut-tree and non-coconut-tree regions, making it a lot easier for machine learning algorithms to work.

As SkyEye grows and matures, new technologies are constantly being developed. Automated tree counting, as a tree is like a structure on a property, makes the technology more valuable.

Drones and Infrastructure Development

Background

Javier, Leyte is a 4th class municipality that is undergoing massive infrastructure development due to its forward-thinking and entrepreneurial Mayor Sandy Javier.

In a few short years, almost 100 kilometers of paved roads, 2 new bridges, a new police station, a municipal health clinic, flood control systems, and ginger processing plants were created. It is expected that these changes in infrastructure will spur economic growth for the municipality.

SkyEye had called Javier its second home during its early days, seeing the 4th class municipality develop from a backwater community to one that foreign ambassadors visit to see rural development done properly.



The first AIC-SkyEye UAV mission team with MP-Vision UAVs used to map Javier, Leyte.

Project

Funded privately by Mayor Sandy Javier, the team imaged the entire municipality for the local government to decide where to build roads and infrastructure that will have the most economic impact. The team monitored the construction of farm-to-market roads and bridges connecting barangays separated by a river.



Images taken over the course of a year in the development of a new road and bridge in the municipality of Javier, Leyte. Five months was the span between the two images. In that amount of time, hundreds of meters of road was constructed by the municipal government.

Aftermath

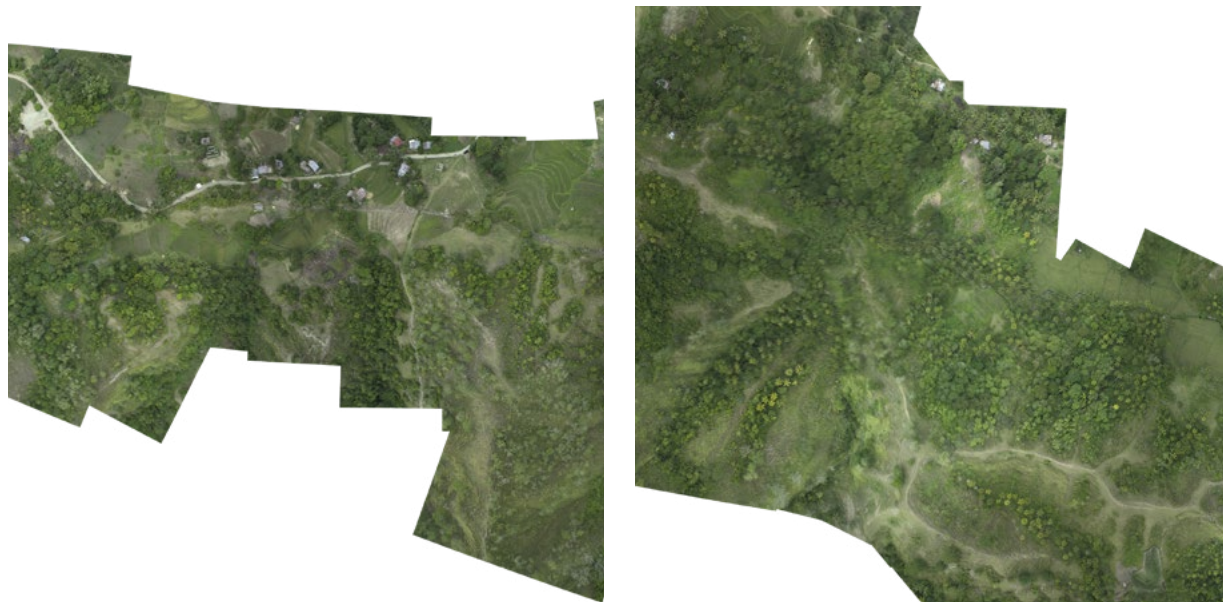
The work done in Javier has been publicized worldwide with interest from the Department of Budget and Management (DBM), funding agencies such as the Philippine Coconut Authority (PCA), National Economic Development Authority (NEDA), World Bank, Asian Development Bank (ADB), Department of Public Works and Highways (DPWH), and various Local Government Units (LGUs) on how high resolution maps can help infrastructure be built with impact, efficiency, and transparency.

Drones and Earthquake Damage Assessment

Background

On 15 October 2013, a 7.2 magnitude earthquake hit the island of Bohol. It resulted in surface rupture, strong ground shaking, liquefaction, and landslides. The PHIVOLCS (Philippine Institute of Volcanology and Seismology) Quick Response Team measured surface ruptures ranging from 0.10 meters to as much as 5 meters. It was generated by a new trending reverse fault.

On the ground, the most visible evidence of the new fault was an upthrust of ground surface.

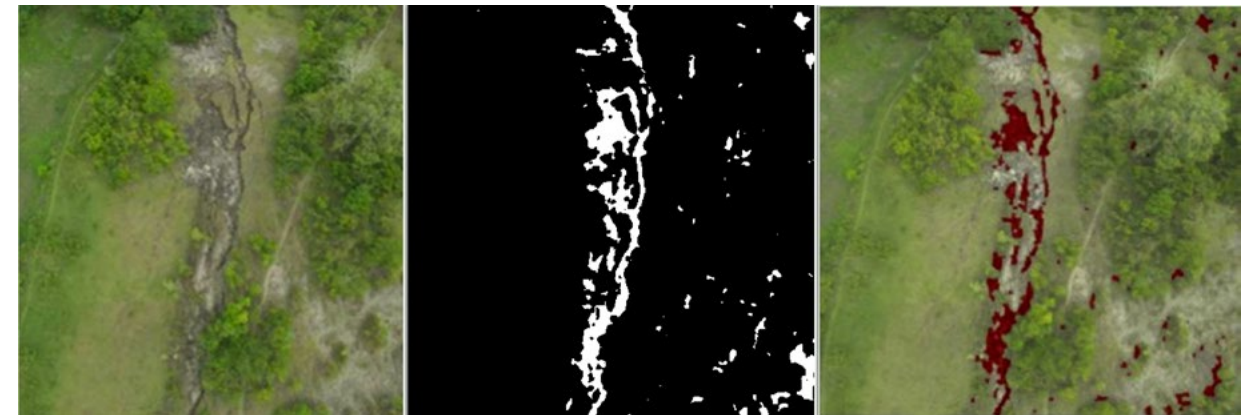


Sample aerial images taken from the mission.

Project

During the eight kilometer survey, the team initially followed three kilometers of what appeared to be a surface fracture. The height was around 3-4 meters, while the width was very small, which posed a challenge in determining the actual fault line.

The drone later revealed the continuation of the fracture, eight kilometers from the start. Due to this discovery, the ground team was able to make quick adjustments for deployments.



Aerial Image of a section of the fault line

Binary image segmenting fault line features from the rest of the image

Overlay of detected fault line (red) over original aerial image.



A makeshift evacuation center was set up in Loon, Bohol to help the affected residents. In it, medical personnel were treating residents with injuries from the disaster. Supplies donated were placed in a basketball court.

Aftermath

The project paved the way for interactive capabilities in seismic and geologic surveying. This also led to the promise for development of post-processing and image calculation workflows for automatic seismic fault feature detection and extraction.

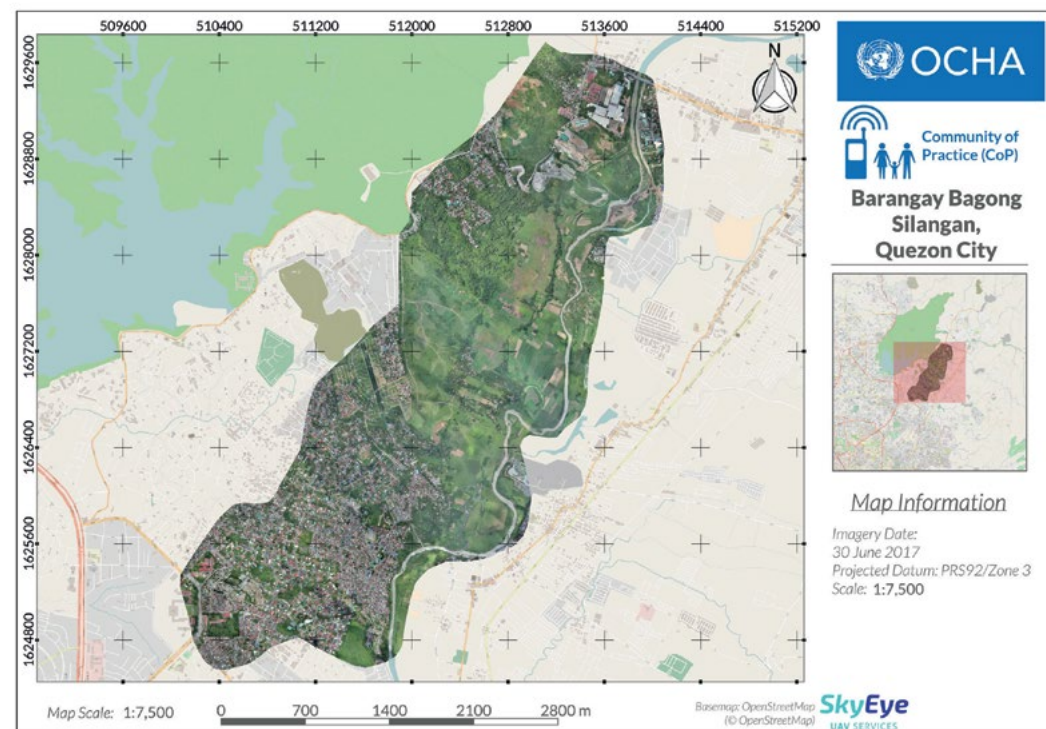
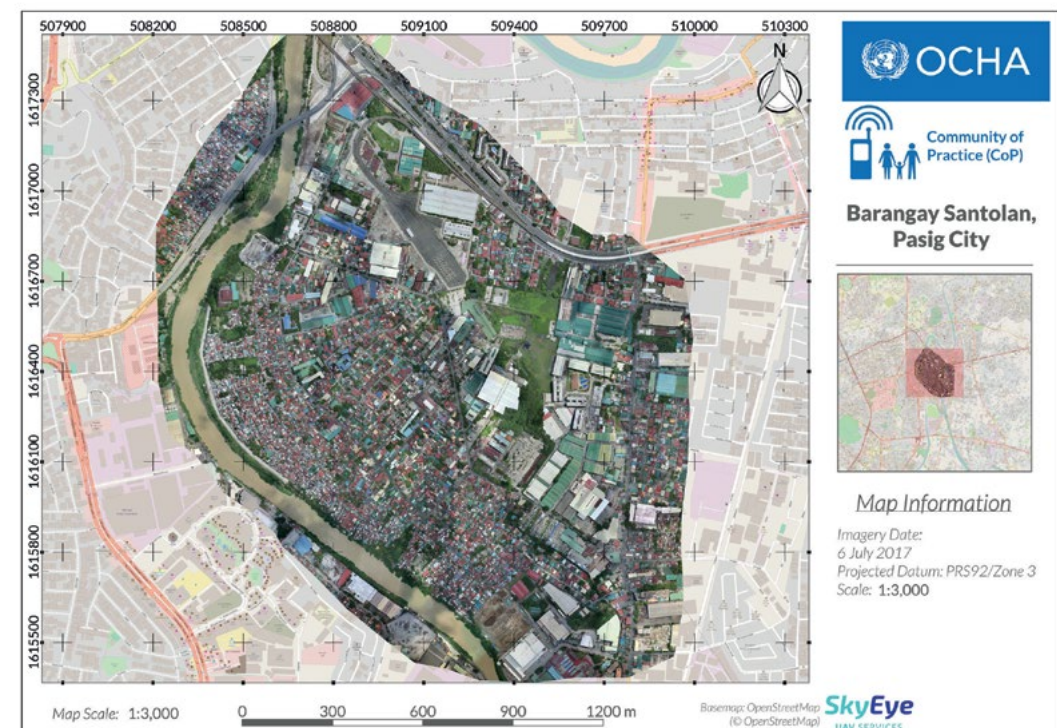
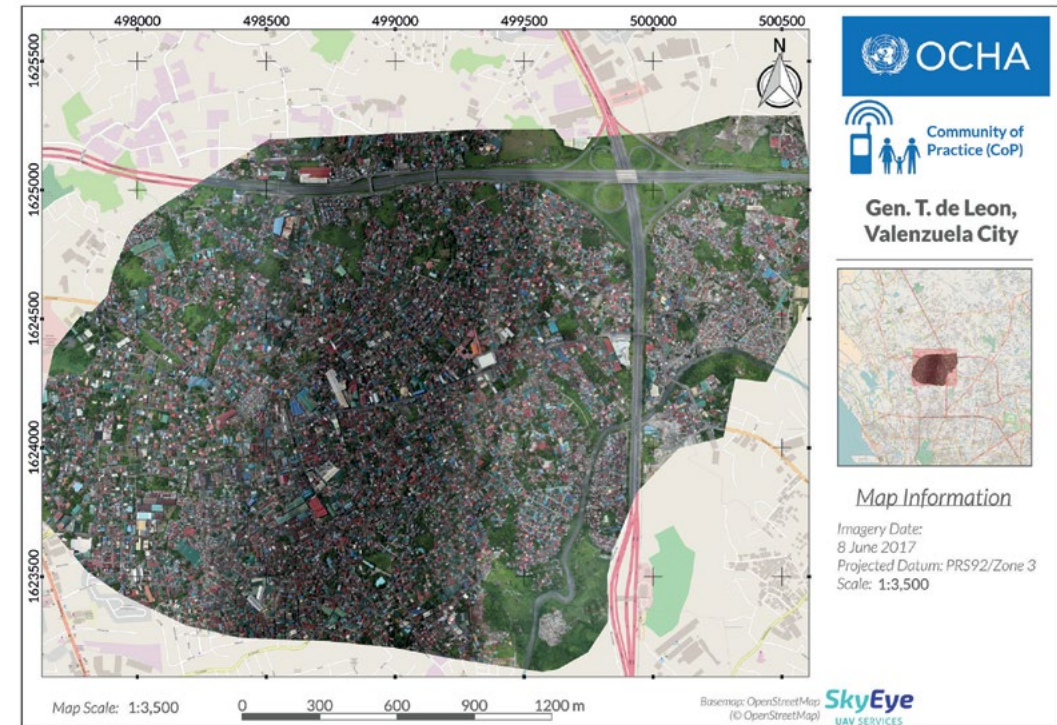
SkyEye would eventually form an official partnership with the Community of Practitioners (CoP) in efforts to further this project.

Drones and Pre-Disaster Preparation

Background

SkyEye's pioneer project with PHIVOLCS helped the team realize the potential of drones when it comes to disaster preparation. In support of the Humanitarian Country's Team (HCT) earthquake contingency plan, SkyEye was able to participate in the Community of Practitioners (CoP) Pre-Crisis Information Mapping and Survey Consultation last May to July 2017

The mapping survey selected ten Barangays to work with, coming from the different cities of Quezon, Valenzuela, Marikina, Pasig, Malabon, and Manila. The project aims to have a better understanding on the capacities and vulnerabilities a certain community may need once a 7.2 magnitude earthquake hits the Metro. This includes knowing the vulnerabilities and relief preferences.



Sample mapping outputs from the projects

Project

SkyEye's mapping services was also complimented by community aggregated baseline information like sex, age, and disabilities. Among the CoP members in the project include the International Federation of Red Cross and Red Crescent (IFRC), the Philippine Red Cross (PRC), Community and Family Services International (CFSI), World Vision, Caritas, Handicap International, and the United Nations Office for Coordination of Humanitarian Affairs (UN OCHA).

Aftermath

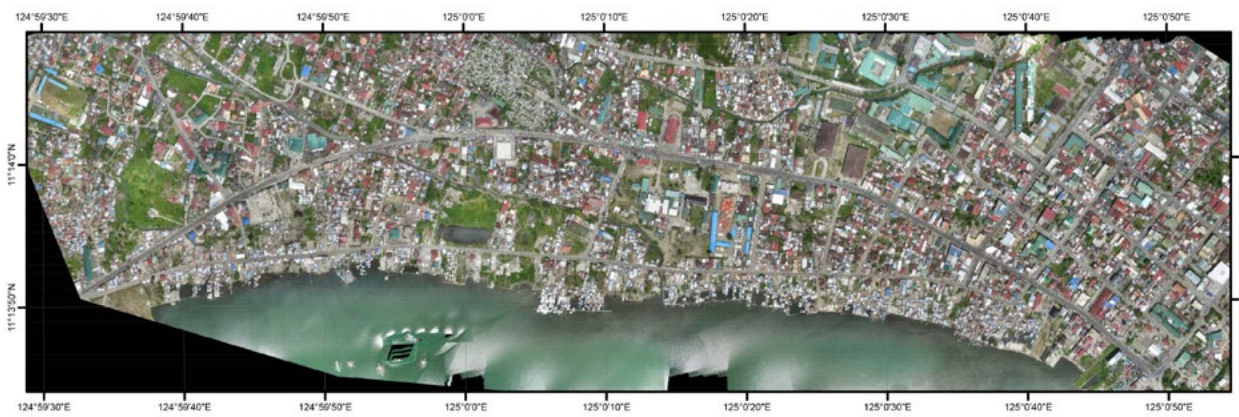
The circulation report, including the key findings and recommendations for every cluster of the community was then disseminated through the CoP as well as the ten pilot barangays involved in the survey. To this day, SkyEye continues to participate in efforts geared toward improving the country's pre-disaster planning

Drones and Post-Disaster Assessment

Background

Typhoon Haiyan (Yolanda), one of the most powerful typhoons ever recorded, caused massive damage to industries in Samar, Leyte, Bantayan, Aklan and Coron islands of the Philippines.

SkyEye responded to the need of providing maps in the disaster hit areas, including Tacloban City. The goal was to get an initial overview of the damages wrought by the typhoon and to identify where aid was needed. SkyEye continues to map the hard hit areas till this day.

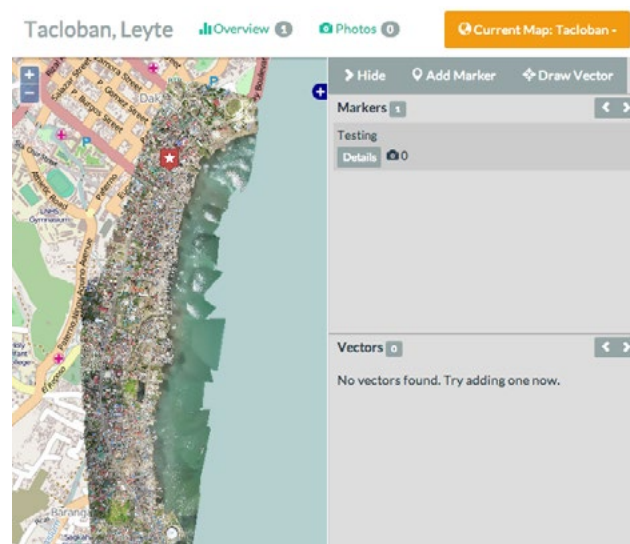


Orthomosaic image of the southern coast of Tacloban City, overlaid with GPS coordinates for positional reference. A total of two flights and 785 images were used to create the orthomosaic.

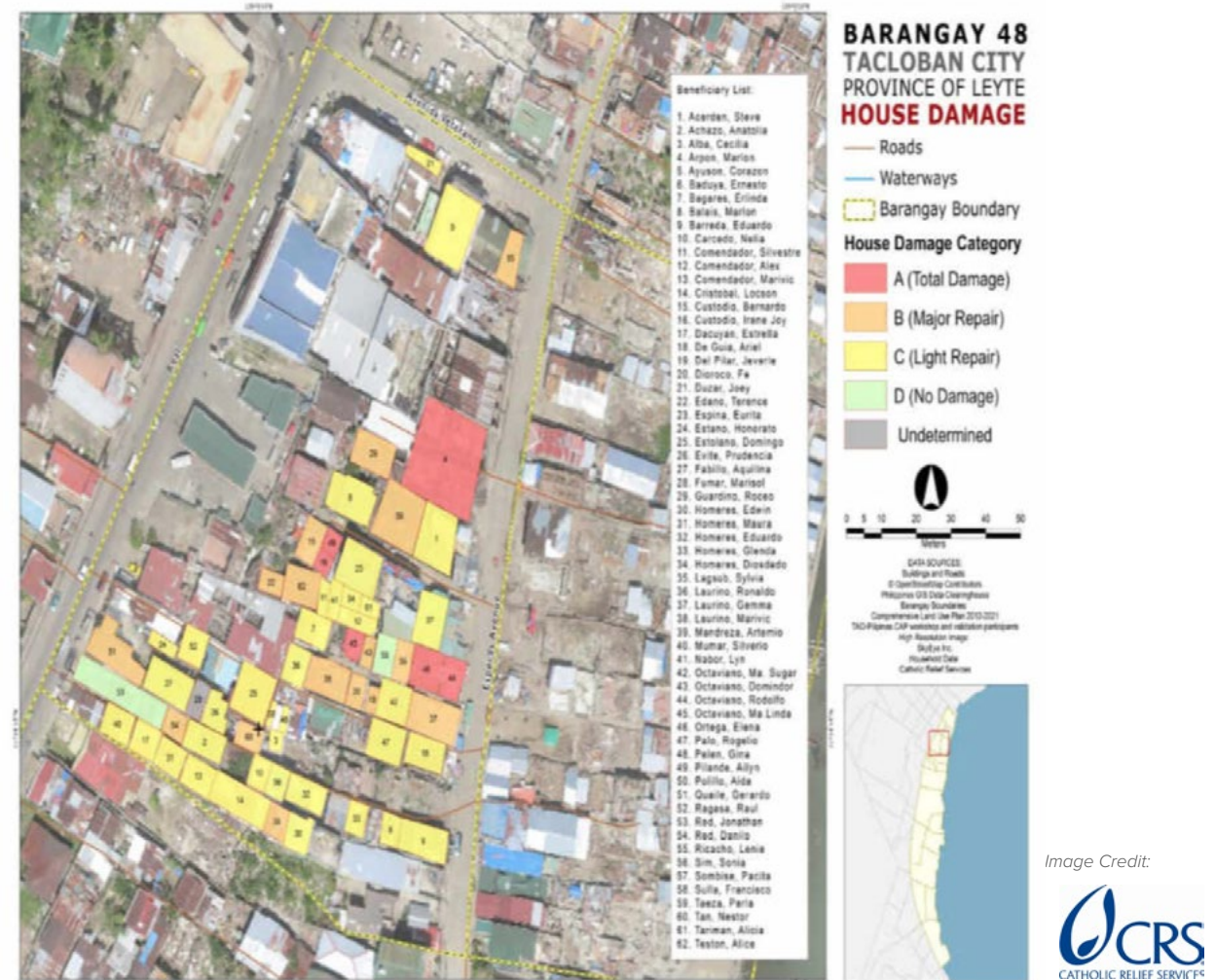
Project

Relief and response agencies such as Catholic Relief Services (CRS), Operation Compassion, United Nations OCHA, and UNDP as well as local institutions such as Aklan State University and Visayas State University used the aerial maps of SkyEye in order to plan out their disaster relief and rehabilitation efforts.

These institutions used SkyEye's maps to conduct community action planning workshops in order to perform more efficiently. Their work includes identifying survivors, rebuilding locations, and preparing a plan for long term recovery.



The VEDA webpage shows an orthomosaic of a coastal section of Tacloban City, Leyte overlaid on an OpenStreetMap14 base layer. Aside from viewing map layers, the VEDA platform allows users to add markers and vector drawings over the maps, attach photos to markers, maps and vectors.



GPS-tagged households and detailed damage report overlaid on UAV images. This high resolution map shows close-in detail of one of the 17 towns covered by the UAV imaging mission.

The maps also provided good baseline information for various use-cases such as beneficiary maps. Utilizing the UAV-generated maps (above), with overlaid metadata, each beneficiary can be linked to a specific household structure.

Aftermath

The efforts of SkyEye have shown the value of UAVs and UAV-derived high-resolution maps in disasters. Now, SkyEye is a proud member of the Community of Practice (CoP) and continues to respond to disasters with partner NGOs and government institutions.

SkyEye's efforts, although not immediately seen during the massive rehabilitation and response efforts during the disaster, have received international recognition. Whenever there is a disaster, the Philippines can count on SkyEye to provide an eye in the sky to help save lives and to help make sure we build back better.

Drones for UN OCHA

About

In October 18, Typhoon Koppu (locally known as Lando) made landfall as a category 3 typhoon over Casiguran, Aurora.

Our team, together with the Humanitarian Country Team's Community of Practice (HCT-CoP) on Community Engagement provided response support through the use of our UAV drones for assessment two days after the landfall. The results were then shared to the local government units. Both regional and provincial offices were supportive on the conduct of our assessment as it was proven to be proactive in terms of coordinating humanitarian response with people in the field.

Details of this project can also be found in the supporting UN OCHA website at <http://www.unocha.org/philippines>.

To this day, we continue to work with the Community of Practice in improving disaster response and rehabilitation.



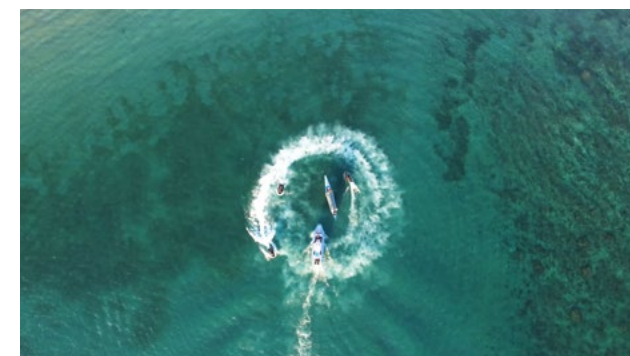
Left: Official UN OCHA Publication on Typhoon Koppu Operations; Right: Screenshots from the video taken after the storm

Drones and the PNP



About

SkyEye is also currently working with the Philippine National Police to explore various ways drones can be integrated in their operations. Through our knowledge in drone operations and maintenance, PNP Region 9 is testing prototypes regarding tactical deployment of assets.



Photos from the PNP Region 9 prototype testing.

Drones for Property Rights

Background

Technology for Property Rights is a project that aims to prototype the use of drones to address the need for faster, better, and cheaper land titling tools in the Philippines. There are over 24 million parcels of land in the Philippines, half of which are untitled. Without the proper documents, it is hard for one to use his land to borrow money or start a business. At the average rate of land titling in 2010, it would have taken a century to title all the untitled lands in the Philippines.

One of the core aspects of land titling is surveying the land in question. It is a major hurdle for Filipinos to title their land due to the cost and complexity of surveys.

In a study in Cordova, Cebu led by the Asia Foundation and the Foundation for Economic Freedom, UAV technology has proven itself to be sufficiently accurate. Partnering with the Land Management Bureau of the DENR (Department of Environment and Natural Resources), SkyEye is working on issuing an official policy allowing and encouraging the use of UAVs for surveying; this would pave the way for public and private geodetic engineering communities to help reduce transaction costs of land in the Philippines.



Left: the team in conjunction with the local government unit of Cordova as well as our different partners in this project.

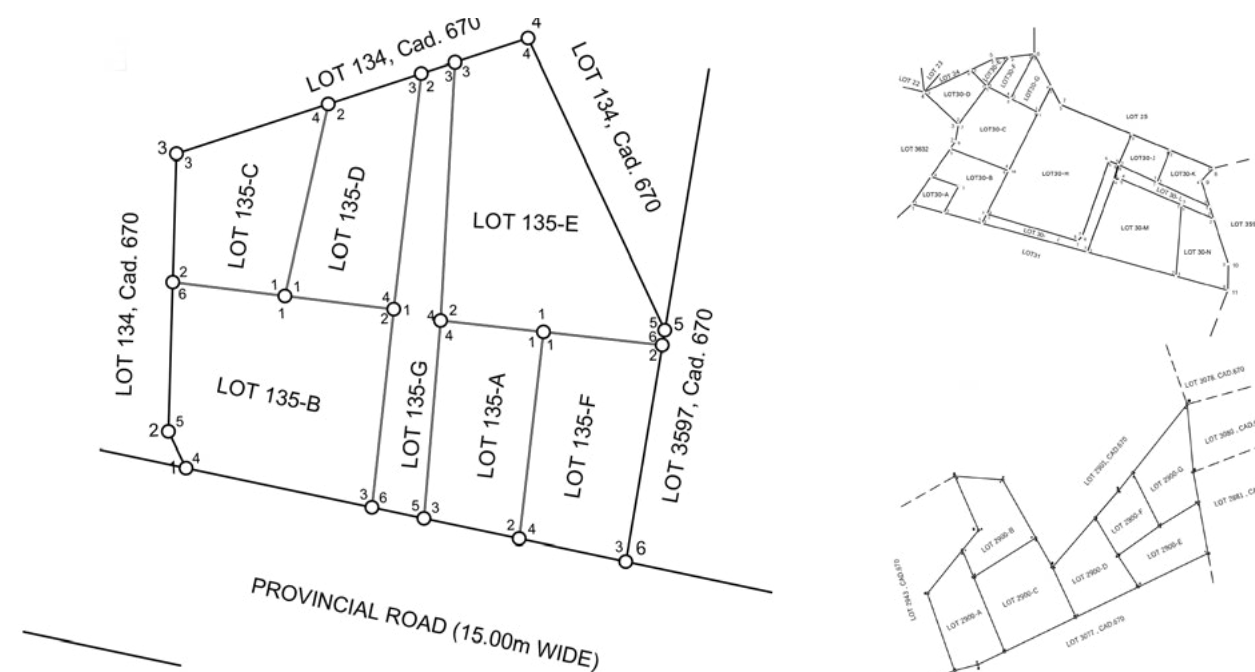
Project

The project site was in Cordova, Cebu. And in two weeks, SkyEye was able to map out seven lots for approximately twenty-seven families in Cordova.



Above: the team meeting with the community. It became easier to locate who owns what with the help of the aerial map.

By giving them a high-resolution aerial map as shown above, the families were able to identify their houses, pinpoint lot boundaries and decide among themselves how to properly delineate and subdivide their property.



The three subdivision plans plotted by the team.

Aftermath

With the success in Cebu, and with more pilot projects such as in Caticlan, SkyEye together with the Asia Foundation and The Foundation for Economic Freedom and with the funding of Omidyar Network, have shown that UAVs can be used as an acceptable survey tool.

Clients and partners of SkyEye will benefit substantially from this application of UAV technology.

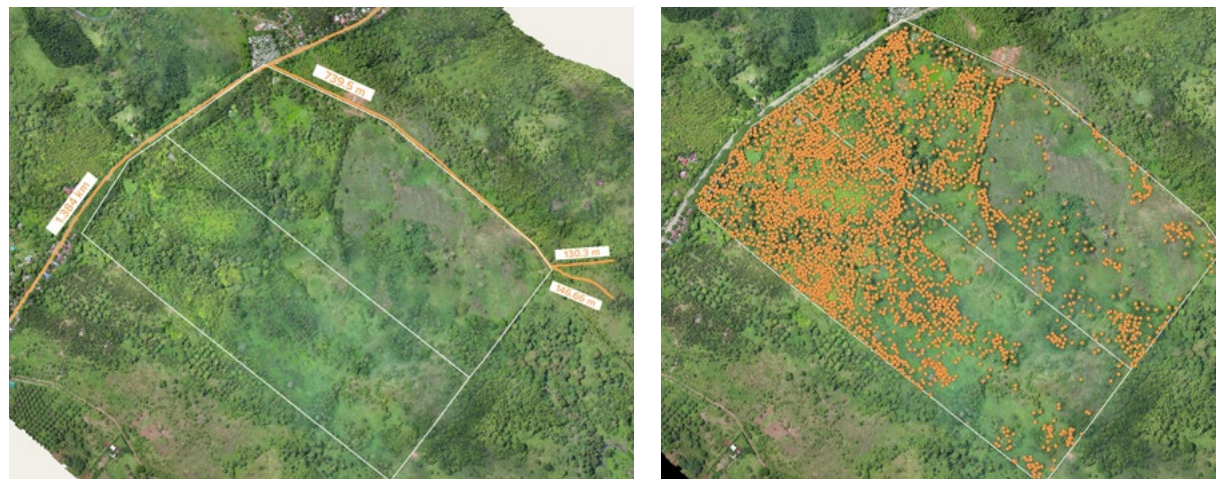
Drones and Land Surveying

About

Our primary projects focus on helping clients gain a better view over their land. We gather, process, and compile all the information in a secured USB.

Moreover, within 48 hours of data gathering, the client receives a pre-rendered aerial map of the targeted site via our proprietary online decision support application, giving decision makers an initial and crucial data point for time critical operations.

Post-Processing and Access

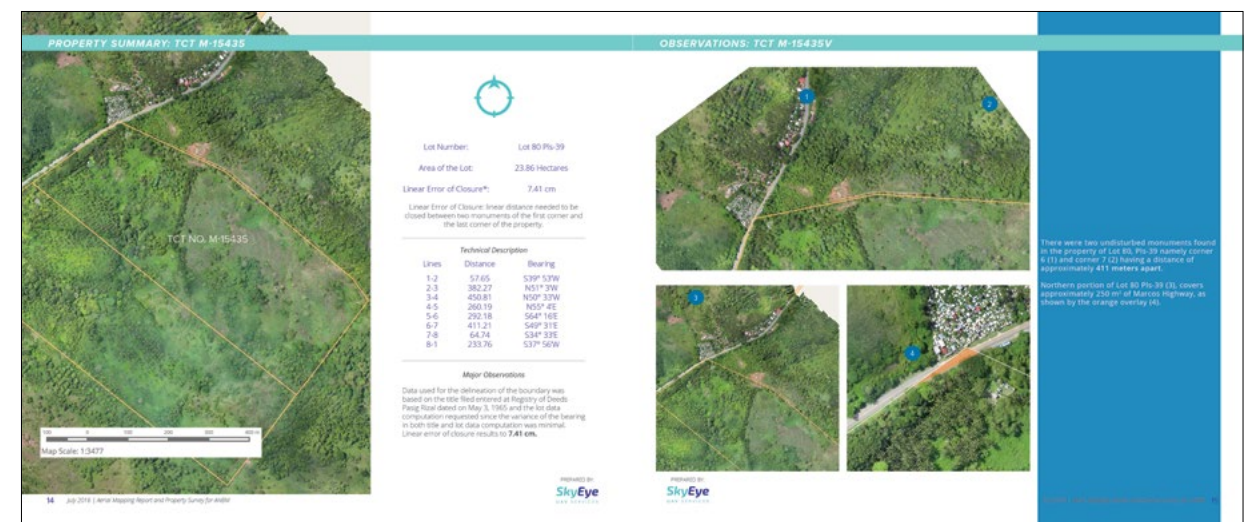
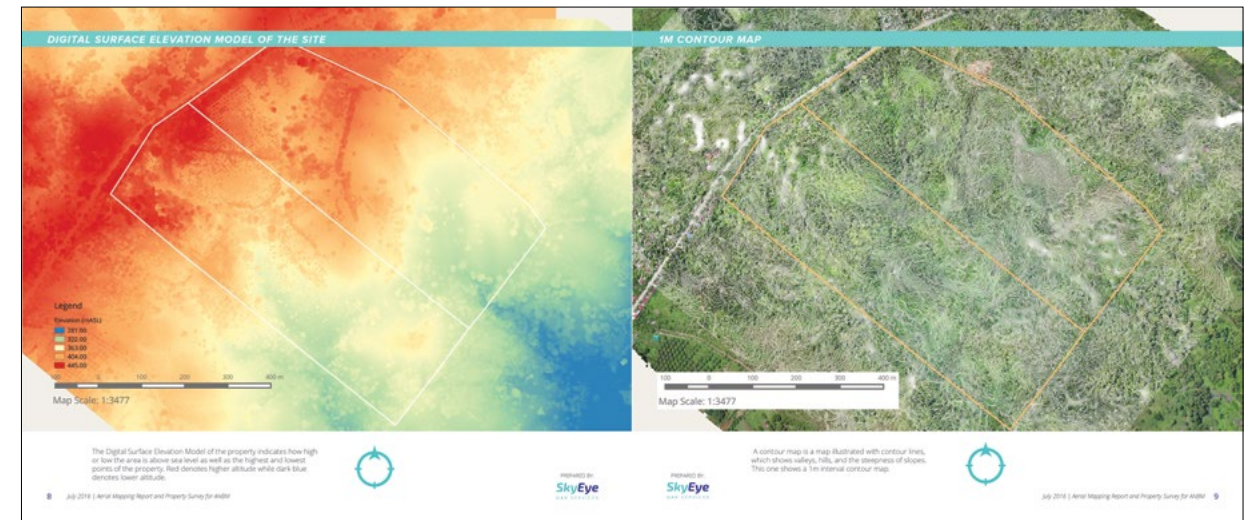


Sample post-processing of the images taken

We also develop 3D models of the area that can be used to understand the terrain and elevation of the land. This information can be showcased via contour maps or color gradient maps.

Our clients can also access their information through VEDA, our decision support application to enable hassle-free access to your data online using a phone, tablet, laptop or PC.

It is perfect for executives who know that every minute counts in planning and decision-making.



Spreads from the sample booklet



Photos from the 2017 DRS

DRONE RACE SERIES

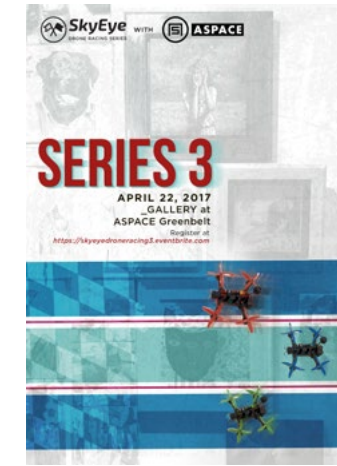
Mainstreaming drones for recreation and entertainment

The SkyEye Drone Race Series (SDS) was born in 2017 as a campaign effort to promote the existence of IoT (Internet of Things) and Robotics in the country. Not only affecting drone racers, but it also encourages more developers, programmers, and engineers to push Robotics and IoT further by competing against each other in a series of events that showcases their skills, talent, and innovation.

SDS was made up of four different legs with different themes across Metro Manila. This paved way for SkyEye to forge partnerships through the tech and telecommunications sectors.

“SkyEye’s roots came from playing with new technology and we are supporting drone race to promote and usher in the next wave of innovation.”

- Matthew Cua, CEO



Posters for the 4-legged race series

FPV (first-person view) is a term used for the method of controlling a device (in this case, a drone) through the pilot’s point of view. FPV drones allow the pilot to fly immersively than he can from looking at the drones from the ground. It also allows more precise flying through different obstacles.



Winning racers from the series



For more information on our past and upcoming races and events, visit www.facebook.com/SkyEyeDRS



One of our custom drones that can carry a PPK GPS, this means there is no need for ground control points.

Why SkyEye?

We build our own drones

Coming from university research background and having the capacity to build our own customized drones makes our drones built for the Philippine environment, weather, and economic realities.

Because of this we are able to keep our costs low and operations efficient.

We have strong operational capabilities

Since 2009, we have flown over 5000 flight hours through more than 100 projects nationwide.

We are considered as one of the most prolific private drone operators in the world aside from militaries and drone manufacturers.

We have a strong engineering and scientific background

In 2014, we were the lone representative for the Philippines and ASEAN (aside from Singapore) in one of the world's premier technical conferences, ICUAS.

With several MS degree holders funding and running the company, SkyEye holds a strong research and science culture that ensures high quality of work.

We also co-author several peer review journal papers for top tier publications such as IEEE.

CONTACT US

Make better decisions, starting today

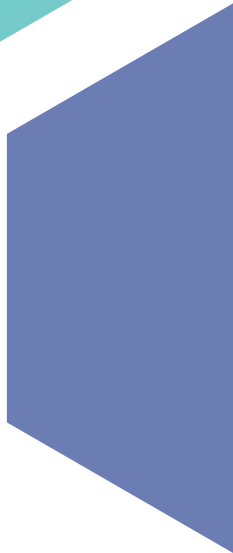
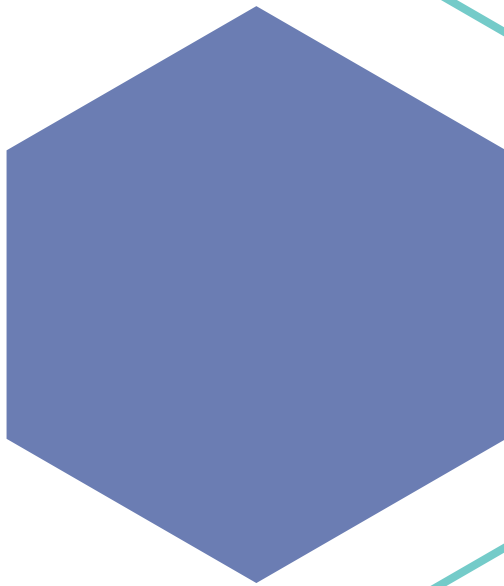
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