Drones In Agriculture, Wildlife Management and Livestock

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GEOG 270

Introduction to Small Uncrewed Aircraft Systems

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During the past few years with the expansion of UAS in the civilian world, drones are being used more frequently in agriculture, wildlife management, and livestock tracking. Drones can help farmers monitor crop health, track yield, and make decisions to improve productivity. Farmers are also able to save time and money by tracking and monitoring their livestock using drones. By using technology such as thermal cameras, drones can cover more ground and access areas people are not, tracking and finding wildlife that could be lost by hunters.

In agriculture, farmers can monitor their crops to make sure they are growing in correct patterns and also see the physical health of the plant and even the soil (Sullivan, 2023). With information from drones about soil health from aerial pictures and scans, it becomes much easier to know which crops grow better in specific areas and what is needed for crops to produce better. For example, if a farmer grows corn in a field that may have better production with a different crop, a soil health scan from a drone can be used to make decisions. Drones are now able to detect diseases and mitigate some of them to help crops survive better. Not only can the drones now detect moisture levels in the ground, but they can give yield estimations on how many bushels to the acre the crop will produce (UAS Uses and Benefits, 2023).

The state of North Dakota has started using drones for precision farming. According to the website released by North Dakota Commerce (UAS Uses and Benefits, 2023), there are several applications using drones. Some examples directly related to agriculture include spraying pesticides, tracking livestock, and monitoring crops. Although many of these examples seem like they could be done with an airplane or helicopter, drones are cheaper to buy, operate, and service. Drones can also get into areas that planes and helicopters cannot.

Since 2016 a nationwide project, Using Drones in Agriculture and Natural Resources (2023) has been following how drones can improve agriculture. The funding came from a land

grant which allows researchers to go into states and gather information from farmers and the land. This information gives researchers ideas for how the crops will be planted, grown, and harvested. The land grant had partnered with several different colleges around the nation to set up research projects using drones and their different tools. For example, The University of Clemson is working on identifying plants with infestations and being able to put out the correct pesticide to solve the issue (2023). Clemson is also working on identifying water stress in plants to determine which areas need more or less moisture. The development of smart artificial intelligence has helped the agriculture business identify the areas that are major yield-robbing pests such as insects, weeds, and diseases (Savage, 2023).

These are not the only objectives for drones in agriculture. Researchers are also implementing new ways to solve waste in the agriculture world. Using drones in agriculture will help lower the excess use of chemicals and pollution from tractors (Is Drone Farming the Future of Agriculture, 2023). For example, if a field is 100 acres and only one acre needs pesticide then the farmer can use a drone to spray that exact acre. This eliminates driving a tractor or a sprayer running on diesel fuel to that field. This also reduces the waste of chemicals since drones can identify areas of need and apply the necessary chemicals with precision and accuracy.

The growth in drone use in agriculture is projected to almost quadruple in size from 2019 to 2024 (Drone Technology in Agriculture). According to Drone Technology in Agriculture, this can help farmers increase their crop yield by up to 5% which is a very large amount to gain. When looking at 2000 acres, this means 100 acres becomes more viable for the farmer. If a farmer is planting a cash crop like corn, it is upwards of $70,000 gain for 100 acres. Not only can drones help monitor and increase the yield of plants but they can also plant new seeds into the

ground. According to Drone Technology in Agriculture (2023), 10 drones and the operators being motivated can plant 400,000 tree seeds in a day.

In the past the world's population was big, but it didn't have a major impact on food supply like it does today. When looking at how many people are on earth and how long people are expected to live, farming is going to need to become much more efficient. It is difficult to use more land when farming because it is either land where people live, or it is forests which means these options for farmlands are not available for use (Daly, 2023) Farmers need to be able to produce more food from each acre of land. Farmers can use drones and AI to identify ways to help their crops produce better. The types of help can be anything from increasing the amount of fertilizer or water on a crop or the application of pesticides. With artificial intelligence, drones can identify plants that need help and relay that information back to the computer or drone crew. This will help farmers decide if they need to dispatch another drone or if the farmer needs to move or change their irrigation systems (Daly, 2023).

According to Drone Technology in Agriculture (2023), the use of AI and drones has become a more viable option for farmers. As it becomes more cost-effective and efficient to use, farmers can use drone technology in many different ways from mapping land to identifying issues with crops (2023). It can be expensive and can require a change in thinking that can be challenging for some farmers to understand. But farmers often share information word of mouth so when they are having coffee with their friends, the conversation may turn to drone technology. Having a drone pilot in the community allows these farmers to see firsthand the ways a drone can be used to help them gather information about their land. This also allows the drone pilot to make a contribution to the farming community and show the many ways drones can be a benefit in agriculture.

In addition to using drones for agriculture, drones can also be used in a variety of situations involving the management of wildlife. For example, the state of Ohio is using drones to find deer that have been shot and have not recovered (Drone Deer Recovery, 2023). Using thermal cameras, drones can search areas with a high density of trees or grass that would be hard for people to search through by themselves. On the opening weekend of deer hunting in Wisconsin, a hunter lost a deer and called in a drone pilot who was able to find the deer within an hour of flying (Drone Deer Recovery, 2023). The hunter paid a small fee to get the drone pilot and he was able to find the deer that would otherwise have been lost. Drone Deer Recovery (2023) uses drones that are small in size and have both night vision and thermal cameras. Drone Deer Recovery carries a few drones with them so if it takes some time to find the deer they can come back and dispatch another one quickly. These drones fly at 400 feet and can zoom in and spot deer and other animals from far enough away that it doesn't disturb the other wildlife in the area.

In addition to wildlife management, drones can be used to find animals or livestock that have been lost after natural disasters and return them to their homes. For example, ASSERT (2023) is a non-profit company that uses drones to find lost animals. With this technology, people can also track their livestock and other animals that are lost with drones. By putting tags on the animals, the farmer can track if the cattle or other livestock are in the pasture they are put in or if they got out (ASSERT, 2023).

Radio-telemetry Systems (2023) revealed different companies are starting to figure out that drones cover more land than people. Drone technology can help farmers check larger herds of animals more quickly. This would benefit farmers in making sure cows are in the correct pastures and allow farmers to quickly check their animals during calving season. Is Drone

Farming the Future of Agriculture? (2022) shows drones are helping farmers move quickly and check all their animals at once. In the past, a farmer would have to drive out and check their livestock. Now they can fly a drone over and check on their livestock much faster.

During the past few years, it has been shown that drones aren't just toys or things people can fly for fun. Drones are a helping hand in many areas of agriculture and wildlife management and are slowly becoming more accessible to everyone (Savage, 2023). Drones have very real applications that can change how people do their jobs, from helping to increase crop yield to spotting a deer from the sky across the river to helping a farmer find lost cattle. The use of drones in agriculture, wildlife management, and livestock tracking has helped increase efficiency and make informed decisions to benefit productivity, which will benefit all of us.

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