The Role of Unmanned Aircraft and the Environment

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GEOG 270: Introduction to sUAS

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Today, we have a lot to worry about: Biodiversity loss, rising sea temperatures, rising water levels, melting ice caps, degradation of our forest plains, and desertification of both. Even today, amid climate change and the significant degradation of our planet, humans are making technological advances. One of those marvelous technological advancements is the UAV/Unmanned aerial vehicle/Drone. The UAV has helped propel humanity in quite a few ways because, unlike the traditional airplane, this aircraft is, first and foremost, uncrewed. This means that while it does require a pilot of some sort, the pilot doesn't need to be directly in the aircraft itself. Second, it doesn't require traditional fuels such as gasoline; it can be charged from a wall outlet because UAVs are electric/Hybrid vehicles and have an incredible endurance for long-distance travel. This makes them ideal for survey missions, which can help us tackle issues like climate change.

One of the many ways that drones help us tackle climate change is the allowance to go where humans cannot travel by foot. Things like dense forests, arctic tundra, and many other places around the globe that would have previously been hard to reach are now more easily accessible due to UAV technologies. Because of this fact, we can take measurements in more places. Previously, human measurements were either taken on foot with field equipment or by satellite, while advantages in their ways are limited in scope and movement.

UAVs, however, can help fight climate change in other ways. First, they can monitor and map the Earth's surface, atmosphere, and oceans with high precision and resolution. This can provide valuable data on the state of the environment, such as temperature, humidity, air quality, vegetation cover, water resources, and wildlife habitats. This data can be used to create accurate models of climate change and its impacts and develop effective mitigation and adaptation

strategies. UAVs can be used to support renewable energy production and distribution. For example, they can inspect and maintain solar panels, wind turbines, and power lines in remote or hazardous locations. They can also transport equipment and supplies to renewable energy sites, reducing the need for fossil fuel-powered vehicles. UAVs can be used to support sustainable agriculture and forestry practices. For example, they can monitor crop health and growth patterns, detect pests and diseases, optimize irrigation and fertilization, and assess soil quality. They can also map forest cover and biodiversity, detect illegal logging and poaching activities, and support reforestation efforts.

Additionally, uncrewed aerial vehicles (UAVs) have revolutionized farmers' management of their crops and livestock. UAVs can be used for a wide range of applications in agriculture, from crop monitoring and mapping to pesticide spraying and livestock tracking. They offer several advantages over traditional methods, such as higher accuracy, faster data collection, and lower costs. One of the primary uses of UAVs in agriculture is crop monitoring and mapping. UAVs can be equipped with various sensors, such as multispectral cameras, thermal cameras, and LiDAR scanners, that can capture high-resolution images of crops from different angles and wavelengths.

This data can then create detailed maps of crop health, growth patterns, and yield potential and detect pests, diseases, and nutrient deficiencies. Farmers can use this information to optimize their irrigation, fertilization, and pest control strategies and predict crop yields and market prices. Another use of UAVs in agriculture is pesticide spraying. UAVs can be equipped with specialized nozzles that can spray pesticides or herbicides precisely on crops or weeds without affecting other plants or the environment. This reduces the chemicals needed for pest control and

minimizes the risk of human exposure to toxic substances. In some cases, UAVs can also be used for seed planting, soil analysis, and crop harvesting. Finally, UAVs can be used for livestock tracking and management. UAVs can be equipped with GPS trackers or RFID tags to monitor livestock's location, health, and behavior in real-time. This data can be used to optimize feeding schedules, breeding programs, and disease control measures. UAVs can detect illegal hunting or poaching activities in wildlife reserves or national parks. UAVs can help tackle conservation as well as wildlife monitoring and protection. UAVs can be equipped with various sensors, such as thermal cameras, LiDAR scanners, and GPS trackers, that can detect and track animals in real-time. This data can be used to estimate population sizes, migration patterns, and habitat preferences of endangered species and detect poaching activities and illegal hunting. UAVs can also deliver vaccines or food to wildlife in remote or inaccessible areas.

Another use of UAVs in conservation is forest monitoring and protection. UAVs can map forest cover, detect deforestation activities, and assess the health of trees and other vegetation. This data can be used to identify areas that need protection or restoration and to monitor the effectiveness of conservation policies or interventions. UAVs can also deliver seeds or saplings to degraded areas or plant trees in areas affected by wildfires or natural disasters. UAVs can be used for marine conservation and protection. UAVs, such as whales, dolphins, or sea turtles, can have cameras or sonars that detect marine life. This data can be used to estimate population sizes, migration patterns, and breeding habits of marine species, as well as to detect illegal fishing activities or oil spills. UAVs can also deliver buoys or sensors that monitor water quality or ocean currents.

All of this can be done because of our progress within aerospace and the technological advancements with drones. This brings hope to humanity because, with each passing year, our technological advancements bring us a little closer to obtaining the solutions we need to be able to tackle some of the world's most significant problems and the threats to us as a species as well as our planet and the millions of other animals that live here.

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