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Research Article

APPLICATION OF DRONE TECHNOLOGY IN POST-DISASTER RECOVERY IN INDIA

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ABSTRACT

Natural disasters results in severe loss of life, property and economic disruptions. India is vulnerable, in varying degrees, to a large number of disasters. To manage such post-disaster crisis situation, new technologies are required to accurately compile information. Based on sound information, rescue teams can be guided to provide recovery and relief in affected region. Drone is an emerging technology which can effectively capture images of disaster affected remote place. This paper analyze role of drones in disaster management in India.

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INTRODUCTION

Disaster is a broad term that can include rapid-onset natural hazards such as cyclones and earthquakes, or slower 'creeping crisis' such as drought, famine, or disease (De Paratesi, 1989). Natural disaster is considered as "serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources" (ISDR, 2009). India is vulnerable, in varying degrees, to a large number of disasters. In India, more than 58.6 per cent of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares (12%) of its land is prone to floods and river erosion; close to 5,700 kms, out of the 7,516 kms long coastline is prone to cyclones and tsunamis; 68% of its cultivable area is vulnerable to droughts; and, its hilly areas are at risk from landslides and avalanches (NDMA, 2017). Changing demographics and socio-economic conditions, unplanned urbanization, development within high-risk zones, environmental degradation, climate change, geological hazards, epidemics and pandemics further increase vulnerability of disasters in India.

Disaster management is comprehensive step-wise process to deal with natural calamities. Disaster management is done by the process of planning, mitigation, preparedness, response and recovery. First step of planning include identifying any possible disaster and its likely consequences on society.

Mitigation step includes long-term strategies which are designed to reduce effects of unavoidable natural disaster. Next step is preparedness phase, which include plans developed by government and organizations to save lives and minimize disaster damage. Response is the step which is followed after disaster to stabilize the situation by providing emergency assistance. Recovery is planned short-term and long-term initiatives to restore life to normal in the affected area. Planning of disaster management steps requires comprehensive information.

Need for accurate information is especially required during post-disaster recovery step of disaster management. Rescue teams could be guided to affected area based on correct information of surviving persons, critical zones, and access to refugee camps. Drones are emerging new technology for assisting rescue team in post-disaster management.

Drones

Drones or UAV (Unmanned Aerial Vehicle) are remotely controlled flying machines which are used for surveillance purposes and to collect information. In last few years, drones have become very popular because of their availability and range of applications attached to Micro Air Vehicles (MAV) - especially quadcopters (Apvrille *et al.*, 2014). Aerial drones are one of the emerging technologies to improve disaster response and relief operations. Drones could ensure that the post-disaster recovery operations be conducted in a safer, faster and efficient

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manner. Usage of drone-based remote sensing systems after a disaster, combined with high-resolution 'before disaster' maps, could assist disaster relief groups in obtaining information for accurate risk assessment (Antonino, 2016). Moreover, drones could provide unique viewing angles at low altitudes which is not possible from manned aircraft (Antonino, 2016).

During disaster, drones can help in generating high-resolution maps of the area and the autonomous search for victims (Tanzi *et al.*, 2016). Disasters may alter landscape of the affected place, which may void previous maps completely. Drones can be used to capture images with 3D cameras to make relief maps of the region. These maps can be used to understand the impact of the disaster over the region. They can also act as source of information for decision makers, for example, to decide which roads need to be closed, which are the best paths to reach the most damaged areas or even help in the planning of the relief supplies delivery. Drones can also play important role in the search and rescue operations by infrared scan of the region, the use of ground penetration radars and in the systematic search of mobile phones by the detection of their specific radiation. Drones can also work as temporary mobile access points for extending the coverage in affected areas. For example, after hurricane Katrina, at New Orleans, the public network was out of service due to damage caused by disaster. Verizon, the local provider, granted to the first responders the right to use their frequencies. Drones can also be done for transporting medical help to disaster struck areas.

Drones have been used for disaster management in various countries. Video footages from UAVs, along with 3D model construction technique called SfM (Structurefrom-Motion), were used to depict the damage situation of affected buildings in Bologna, Italy (Fernandez *et al.* 2015) and that of affected urban areas due the 2015 Gorkha, Nepal earthquake (Yamazaki *et al.* 2015). Another example of drone usage in disaster is the senseFly UAV (Ackerman, 2013). It was used during the aftermath of 2010 Haiti earthquake to map the region. Such maps enabled authorities to quickly to send the rescue teams to affected area.

CONCLUSION

The most significant factor in post-disaster recovery is the accessibility to the disaster affected area, availability of efficient project teams and timely information to make informed decision. Drones are important tool to access the affected areas, to monitor and capture data to make well informed decisions.

This paper highlights potential application of drones for enhancing prompt and effective sustainable disaster management. Timely access and information will support a better and more efficient system for sustainable disaster management. Hence, the study is crucial to highlight need of improving drone technology and its use in emergency response and sustainable disaster management strategies.

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