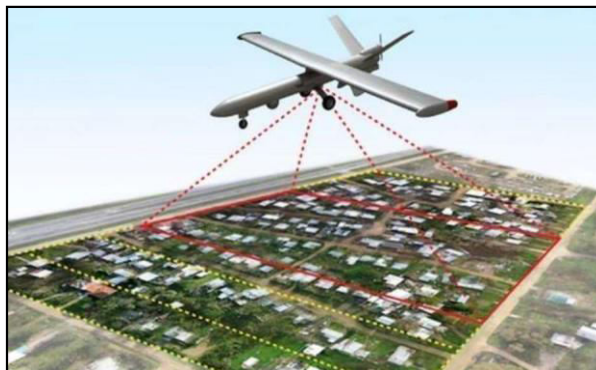


Unmanned aerial vehicles for GIS integration

Summary:

Formulation of Geographical Information System (GIS) based Master/Development Plans is one of the important reforms under AMRUT. The objective of this reform is to develop common digital geo-referenced base maps and land use maps using GIS and master plan formulation for all cities under AMRUT scheme. However, small and medium towns have limited capacity for formulating master plans by using conventional GIS technology and therefore Ministry wanted to explore Unmanned Aerial Vehicle (UAV) technology for formulation of GIS based masterplan these towns. In this endeavour, a committee for framing Design & Standards for application of UAV Technology for formulation of GIS based Master Plans for small and medium towns was constituted under the Chairmanship of Surveyor General of India (vide order no. K-14031/5/2016-AMRUT(CB)-Part(2) dated 26 September 2018).



: <https://www.droneblog.com/2015/01/03/gis-mapping-service-and-significance-of-gis-services/> accessed on Aug 18th)

Objective and rationale:

The objective of current UAS survey is to prepare GIS based master plans for small and medium towns. To develop common digital geo-referenced base maps and land use maps using Geographical Information System (GIS) and Master Plan Formulation for 500 cities that are selected as AMRUT Cities.

Implementation strategy:

UAVs are increasingly being used for GIS integration and local area planning, especially in difficult terrains, owing to many advantages. A UAV, commonly known as a drone, is an aircraft without a human pilot onboard. It may operate either under remote control by an operator or autonomously by on board computers.

North Eastern Space Applications Centre has done more than 80 UAV surveys for different users in the North Eastern region. This UAV technology is not only used for formulating the GIS based master plan but also used in many other sectors such as construction of highways, railways, and power & utility projects, in agriculture, mining and in disaster management. Some of the examples of UAV technology are presented below.

- An autonomous agency of the Government of India, responsible for management of a network of National Highways has employed the use of drones for 3D digital mapping for Detailed Project Report (DPR) preparation of road widening for Raebareli–Allahabad Highway. Data collected is being utilized for calculation of compensation of landowners with property rights along the highway.
- National Railway System is planning to use drones to monitor the construction of its railway lines by 3-D mapping of dedicated freight corridor network of 3,360 Km project is envisioned (at bid planning stage). The entire corridor will be mapped using UAV technology.
- An Indian state-owned electric utilities company has obtained approval and started working towards implementing UAV for project monitoring in hilly terrains. The primary reason for PGCIL investing in deploying UAV is its cost efficiency
- An agency for coordinating response to natural or man-made disasters has deployed UAS for rescue and relief operations (locating of trapped citizens, providing relief packages etc)

Result/Impact:

Based on the specifications, UAVs can provide very high spatial resolution (up to 5-10cm/px) and help in 3D modelling. These operations are not affected by cloud coverage and are able to deliver high temporal resolution. The imagery obtained from UAVs can immensely support in many applications ranging from large-scale land mapping, urban modelling to vegetation structure mapping along with real time assessment and project monitoring activities under various applications. Furthermore, the technology is affordable and can be customized based on project requirements against few limitations.

Lessons learnt:

AMRUT has recognized the importance of application of advanced technology such as UAVs for GIS integration for formulating land use-based plan in small and medium towns. This advanced technology along with proactive government decision for adopting the technology and formulation of standard guideline for preparing master plan by using UAVs are major success factors for achieving the objective of reforms under AMRUT scheme.

Replicability and sustainability:

UAVs are being widely used for various purposes including spatial mapping at a large scale. With improving technology and design of UAVs, their replication across even more functions is expected in the near future.

Source: (AMRUT, 2016), (Formulation of GIS based Master Plans for Small and Medium Towns, 2020)

[https://www.ey.com/Publication/vwLUAssets/ey-make-in-india-for-unmanned-aircraft-systems/\\$File/ey-make-in-india-for-unmanned-aircraft-systems.pdf](https://www.ey.com/Publication/vwLUAssets/ey-make-in-india-for-unmanned-aircraft-systems/$File/ey-make-in-india-for-unmanned-aircraft-systems.pdf),

<https://nesac.gov.in/uav-applications/>, [http://amrut.gov.in/upload/uploadfiles/files/designandStandards_AMRUT\(3\).pdf](http://amrut.gov.in/upload/uploadfiles/files/designandStandards_AMRUT(3).pdf),

<http://www.tcpo.gov.in/sites/default/files/newfile/dron-min.pdf>