

ROLE OF GEOINFORMATICS IN ANIMAL HUSBANDRY

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ABSTRACT

Geoinformatics is integrated technology for collection, transformation and generation of information from integrated spatial and non-spatial data bases. Geographical Information System (GIS), remote sensing and Global Positioning Systems (GPS) are some of its important ingredients. The epidemiology of animal diseases could be understood in a better way by using advancement of mapping locations of farms and other facilities for livestock. GIS is useful in the veterinary surveillance, record and reporting disease information. GIS can be used to produce maps of disease incidence, prevalence, mortality, morbidity on farm region. GIS is an important tool to locate the farm or place outbreak and identification of areas at risk if an infectious disease occurs. The GIS provide excellent tool to identify the location specific to case farm along with those at risk within particular area of outbreak. Buffer zone can be designed so the farms that are at risk can receive notification of outbreak within short period of time. Global positioning system is satellite based navigation aid which provides accurate information on possible velocity and time of an object or a platform at any moment, anywhere on the globe. Uses of GPS are Habitat usage, seasonal migratory patterns and distribution patterns, enhanced early warning systems to detect poaching activities, lessen animal-human conflict and relocated animals can be observed and tracked using the GPS collar till they get accustomed to new environment. Geoinformatics has evolved as an essential for required almost every field. Its application in veterinary is undertaken at grassroots level and research management level. Livestock disease reporting, epidemiological mapping and disease management is prime objective of every veterinary health system.

Keywords : *geoinformatics, animal husbandary*

INTRODUCTION

Geo-informatics is integrated technology for collection, transformation and generation of information from integrated spatial and non-spatial data bases. Remote sensing, Geographical Information Sciences (GIS), Global Positioning Systems (GPS) are some of its important ingredients. It is a powerful tool for assessment, monitoring, planning and management of agricultural research and development. (Narayanan, 2012)

Three types of Geoinformatics

- (1) Geographic information system (GIS)
- (2) Remote sensing (RS)
- (3) Global positioning system (GPS).

GEOGRAPHIC INFORMATION SYSTEM (GIS)

Geographic or spatial data refers to any data whose location on earth is known. When we refer any data as Geo-referenced, it means that its location is known in term of latitude and longitude. Geographic information system

(GIS) is computer base technology and methodology to collect, store, manipulate, retrieve and analyze spatial and georeferenced data .(Elangovam, 2006).

Application of gis in veterinary

(a) Disease epidemiology

The epidemiology of animal diseases could be understood in a better way by using advancement of mapping locations of farms and other facilities for livestock. In case of a disease outbreak it could make the management of the situation efficient and easier and also provide a tool to evaluate different strategies in preventing the spread of infectious diseases.

GIS is useful in the veterinary surveillance, record and reporting disease information. GIS can be used to produce maps of disease incidence, prevalence, mortality, morbidity on farm region (Amin *et al.*, 2012).

GIS is an important tool to locate the farm or outbreak place and identification of areas at risk if an infectious disease occurs (Musekene and Tessema, 2009).

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The GIS provide excellent tool to identify the location specific to case farm along with those at risk within particular area of outbreak. Buffer zone can be designed so the farm that are at risk can get receive notification of outbreak within short period of time (Sanson *et al.*, 1994).

Model disease spread simulation models using programs packages can be integrated within a GIS. Model include farm information like number of animals, type of animals, spatial factor like source of outbreak, population density, climate condition (Dhama *et al.*, 2013).

The neighborhood analysis function can be used to identify all adjacent farms to an infected farm. This could provide insight into possibility of transmission of infectious disease between herds. GIS help in identifying areas at high or low risk for any disease based on geographical factor (Amin *et al.*, 2012).

(b) Disaster management

Disaster planning, response, mitigation, and recovery all become more efficient through the use of GIS (Suresh *et al.*, 2005).

Geographic Information System (GIS) is a tool that can assist flood plan managers in identifying flood prone areas in their community. By overlaying or intersecting different geographical layers, flood prone areas can be identified and targeted for mitigation or strict flood plan management practices after all of the information has been collected and organized in a GIS database (Abbas *et al.*, 2008).

(c) Use by GCMMF

GCMMF is using Geographical Information System (GIS) at its Head Office and key Marketing Offices. They are in position to plot zone/depot boundary as well as pointer for zone, depot & distributor locations, which are superimposed by product-wise sales data.

The same is being used for sales, distribution planning and review. GIS is being used for business planning activity at milk centers and it covers animal census data. This has helped them to know average milk production and productivity of cows and buffaloes in Gujarat and track the animals and trend analysis (Bowonder *et al.*, 2005).

(d) GIS in pasture selection

Remote Sensing and Geographical Information System (GIS) combined with conventional pasture mapping method provide a methodology to make a cost effective and reliable inventory of large areas.

GIS Provide accurate data about the quality and

quantity of pastures and also about the amount of natural forage resources promotes a sustainable use of pastures (Price *et al.*, 2001).

Advantages of GIS

- Digital maps
- Support data from various sources
- Updating possible
- Easy transfer of data
- Support analysis
- Attractive outputs

(B) Remote Sensing (RS)

Remote sensing in its broader sense refers to activities of recording, observing, perceiving, object or event at far away place.

Remote sensing is the art and science of obtaining information from a distance about object or phenomena without being physical contact with them. It is earth's observation

Application in veterinary

Remote sensing can increase the knowledge of vector habitats at the regional and national levels. Remote sensing should promote the optimum location and delivery of control activities in relation to livestock and vector distributions and abundance (Hugh Johns, 1991).

Animal-attached remote sensing or Bio-logging refers to the deployment of autonomous recording tags on free-living animals, so that multiple variables can be monitored at rates of many times per second, thereby generating millions of data points over periods ranging from hours to years.

Rapid advances in technology are allowing scientists to use data-recording units to acquire huge, quantitative datasets of behavior from animals moving freely in their natural environment.

These complex maps are generally utilized for visual search and retrieval by the interpreter but when the same data are digitized, these can be best handled by GIS (Sahu and Solanki, 2008)

(C) Global positioning system (GPS)

Global positioning system is satellite based navigation aid which provides accurate information on possible velocity and time of an object or a platform at any moment, anywhere on the globe.

GPS help to obtain latitude, longitude and altitude of location on earth. Main purpose of GPS is to help in navigation and positioning of remote sensing satellite. GPS work in any weather condition, anywhere in the world, 24hours a day.

First use of GPS is carried out by U.S. Department of defense, but later the government made system available for all civilian use (Narayanan, 2012)

Future use of GPS on cows on Dairy farm

- Lameness detection.
- Grazing preferences for each paddock.
- Alert for when cows break out.
- Alert for a problematic calving.
- Alert for cow in bush or drain.
- Virtual fencing.

In wild animal tracking

GPS Collar

This product is a remotely programmable, battery operated.

Wild animal tracking GPS collar have lifetime of 18-24 months which can give work even under dense foliage and communicates to the base station using GSM and GPRS.

- Habitat usage
- Seasonal migratory patterns and distribution patterns
- Enhanced early warning systems to detect poaching activities
- Lessen animal-human conflict
- Relocated animals can be observed and tracked using the collar till they get accustomed to new environment (<http://www.aanemane.org/index.php>)

LIMITATIONS OF GEOINFORMATICS

- Underdeveloped niche for GIS in health applications
- Expensive software
- The earth is round and geographic error is increased as you get into a larger scale
- There is the failure to initiate or sustain the additional effort to fully implement GIS, however large the anticipated benefits might be
- Constant need for updating of information

- Inadequate training and support for users of GIS (<http://ptran-infotech.blogspot.in>)

CONCLUSION

Geoinformatics has evolved as an essential for required almost every field. Its application in veterinary is undertaken at grassroots level. GIS helps in livestock disease reporting, epidemiological mapping and disease management.

It is vary important in vector born disease like malaria, trypanosomiasis can be controlled by it.

GIS gives us rapid communication of information so rehabilitation can be done effectively. We can save life of people during emergency.

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