RECENT STUDIES ON USE OF GIS IN LIVESTOCK MANAGEMENT

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Abstract: GIS is a user friendly software which is developing day by day rapidly. This field is being actively used all over the globe. In GIS, the information is stored in the grid –based format of data and is captured as information of each quadratic cell in a screen and could be looked at as a photo of the area. The maps display the updated situation in a region together with farm information, which is helpful for data performance, improving livestock grazing distribution, disease management, site selection, migration in goats and livestock management etc.

Introduction: A Geographic Information System (GIS) is a computer based tool for mapping and analyzing spatial data. GIS technology integrates common database operations such as query and statistical analysis with the unique visualization and geographic analysis benefits offered by maps. These abilities distinguish GIS from information system and make it valuable to be a wide range of public and private enterprise for explaining events, predicting outcomes, and planning strategies. GIS is considered to be one of the important new technologies with the potential to revolutionize many aspects of society through increased ability to make decisions and solve problems.

Now-a-days, there are many different types of user-friendly softwares. As compared to earlier days, the systems have been developing rapidly increasing the number of new software day by day and the need to use these software in veterinary field was urged during last decade with many disease reporting systems and livestock management projects related to this field are being actively carried out all over globe. The systems and possible applications of GIS in the field of veterinary medicine, is yet to be explored (Sanson 1991). The potential of GIS is much large, there are reviews in the field of environment and human health (Briggs &Elliot 1995), and in the field of animal health (Sharma 1994).GIS has been included in decision support system for control of infectious diseases in animals (Sanson 1994). The grid-based format of data is captured as information of each quadratic cell in a screen and could be looked at as a photo of the area. The attributed data of the object with a geographical connection is stored in tables which can be joined with the geographical data through a common identifier (ID).The farm scan is visualized using points, and region such as veterinary districts, municipalities or counties are stored as a polygons. Another way to describe the incidences of disease in a defined area can be to create density maps by using the density function. The density maps are divided to provide a map that shows the incidence of the particular disease in each area unit at the time unit chosen.

Maps displaying the updated situation in a region, together with farm information are important tools for field personnel. It is attempted to present the technology and possibilities of GIS with regard to management tools, disease management, migratory route in goats, site selection for housing, recording of data performance and improving livestock grazing distribution, etc.

How GIS works: It is a simple but extremely powerful and versatile concept which has proven invaluable for solving real world problems. It stores information about the world as a collection of thematic layers where geographic information contains either an explicit geographic reference such as a latitude and longitude or national grid coordinate, or an implicit reference such as an address or postal code, census tract name. These geographic references can be used to locate features such as forest stand, routes of migration in different animals, disease outbreak, etc..

Improving grazing distribution: GPS have revolutionized the grains industry and has been one of the key drivers behind the adoption of site specific land management. It is suggested that GPS tracking livestock can provide grazers with data which, when fully developed, may enable them to understand spatial variability in pasture utilized by their livestock and potentially implements site specific management to account for nutrient removal and distribution .

The trial site was located at Newstead, a property 40 km east of Inverell on the Northern Tablelands of New South Wales. The paddock consisted of gently undulating hills predominantly sown to tall fescue (Festuca Arundinaca var Fletcher) with several gullies and isolated timbered areas dominated by native grass species, GPS tracking collars were deployed on six steers in a herd of 220 animals for a period of 10 days during February and March of 2008. The location of the six animals was logged every five minutes. The graphs to identify the time of peak

grazing, and then mapped as a livestock hours index (hours of grazing /animal unit /hectare / day) on fifty meter grid.

Disease management: Geographic Information System (GIS) is a computer based tool for mapping and analyzing spatial data. The advantages of mapping in veterinary field have wide   importance for location of farm. During outbreaks, it is helpful in managing disease, developing prevention strategies & knowing the prevalence of disease.

In the planning of eradication of diseases, GIS has the possibility to perform overlay analysis to find high or low risk areas for diseases which depend on geographical features or conditions related to the geography. Studies of trypanosomiasis (Rogers 1991) and theileriosis (Perry *et al.*1991,Lessard *et al.*1990) are just some examples of usefulness of GIS in planning eradication of disease depending on habitats of vectors or wild animal population.

GIS in site selection: Safe site selection involves measuring the need of a proposed facility against the merits of potential locations (Vahidnia *et al.*2008). It involves the selection of a piece of land for any building in accordance with prevailing safety codes. The inclusion of safety in site selection is recognized as imperative for sustainability. It is suggested that the best way to enhance the sustainability of buildings is to consider site safety from inception. This approach is a step toward drawing the maximum benefits of project objectives in terms of time, cost, quality and safety (Rajendran *et al,* 2006). Several studies indicate that minimum research and knowledge exist in safe site selection (Bennui *et al,* 2007).

In the last three decades, various techniques to solve site selection problems have been developed.Depending upon the complexity of the location problem, selection techniques vary from heuristic methods (Vahidnia *et al,* 2008). Prescribed standards, handbooks and other defined practices by CPWD (2014) and NHAI (2006), among others, are also adapted in developing countries, such as India. In site selection, two dimensional maps, plans, and sketches are widely used. To represent the ideas of architects or engineers, solid three dimensional models and CAD-based 3D models are also used (Waly *et al,* 2002). CAD based 3D modeling focuses mainly on the visualizations. However, site selection requires other capabilities of geospatial analysis where CAD- based systems are lacking.

GIS-based spatial decision promotes spatial navigation in support of sustainable planning. Suggesting that GIS-based evaluation, being simple and flexible, can be used to analyze potential sites (Chang *et al.*2014). GIS is a useful tool for construction professionals and researchers involved in sustainable planning (Wang *et al.*, 2014). Use of GIS for retrieving information from a database can assist architects or engineers in decision making (Bansal *et al.*2011).

Migration in goat: Migratory pastoralist is very common in Himalayas and numbers of nomadic communities practice this (Misri 1998). *Gaddi* the distinct tribe of nomadic pastoralist of Himachal Pradesh, Himalayan state of India wearing a characteristic and striking costume is involved in migratory goat and sheep husbandry. Breeding and proper management are two important aspects which can be focused on to contribute significantly for improving production efficiency (Mandal 2014). Gaddis follow alpwirtschaft type of strategy, associated with movement of people and animals in versatile space, communal control of pastures, combined with individual control of plots/hay fields and social institution that schedule the complex movement in space and time (Bhasin 2013). Objectives to analyse the characteristics and trends in migratory goat and sheep husbandry, identify the constraints of migratory system and to assess the effect of improved management practices in adopted flock en route.

Livestock management: The information system in India and other developing countries are unable to gather the information required for effective decision-making due to range of constraints. Key weaknesses include their inability to provide unbiased, reliable estimates of the level of diseases in the population, and problems in the management of disease information.

This calls for time-to-time reviews of existing livestock census and inventory vis-a-vis the need and plan for futuristic development. The basic need to achieve above task is to have sound database on livestock, poultry, fisheries and agricultural implements in digital form and in geographical domain. Geoinformatics technology, which is synergy of multiple disciplines namely Geographical Information System(GIS), Remote Sensing, Image Processing , Global Positioning System, Cartography, Database, Statistics, has proven very useful solution for above mentioned problems . This would in turn result into better and informed decision and action plan for effective management of livestock in India.

Conclusions: GIS has evolved as an essential tool required almost everywhere in field. Its application in veterinary science is undertaken at grassroots level and at research and management levels. Improving grazing distribution, Disease management, site selection for housing, Migration in goat, Livestock management is a prime objective of veterinary field. Livestock management has become easier and precise with this technology. Overlaid themes provide quick analysis and help decision making within shortest possible time. So there is need to divert focus on

research to identify those technologies which have potential for improvement along with good chance of adoption by farmers.

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