# Land Change Detection system for agriculture activities using GIS-GPS Technology (G-LCDS)

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**ABSTRACT** *In today's era of Science &Technology and modernization, effective use of ICT is vital tomeet the constantlyrising expectations of citizens and businesses. From simple automation,e-Governance is continuously evolving to provide access, equity & empowerment to masses.The dynamic nature of IT requires periodic revisiting of the on-going policies andstrategies. In particular, a need has been felt to unite to implement the GIS-GPS technology for better implementation of e-governance in Vegetation & Farming.Nowadays environment protection is more and more in focus. This tendency canbe observed in case of agriculture because the direct or indirect human healthy foodconsumption is especially emphasized. The question of economy is also important.This paper defines the best practice to implement the GIS-GPS for better E-governance. Thegeographic information system (GIS) created by computing background makes possible togenerate complex view about our fields and to make valid agro technological decisions. Our goal is to implement the GIS-GPS in the E-Governance particularly for various agriculture linked activities, it mainly focus on the land change detection system.*

## 1. Introduction

This paper is concept paper which describes the best practice which helps to implement Global Positioning System/ Geographic Information System in E-Governance for better utilization of technology resources. At the present time land change detection plays vital role for understanding dynamic changing territory. As the dynamic nature of economics and barrier of land use, territory is suffering from much unexpected mismanagement. Because studies have shown that there remains very few to prevent land from over exploitation and illegal use. we have proposed model using GIS-GPS Technique that will help to monitor the use of land. We have also proposed Network Based GIS system integrated with the G-LCDS.

## 2. Land Change Detection system for agriculture activities using GIS-GPS Technology. (G-LCDS)

Urban growth, in population has been a major factor which has altered natural vegetation cover, due to anthropogenic activities. The results of these have left significant effects on local weather and climate. The use of GIS-GPS data in recent times has been of immense help in monitoring the changing pattern of vegetation. Change detection as defined by Hoffer (1978) is temporal effects as Variation in spectral response involves situations where the spectral characteristics of the vegetation or other cover type in a given location change over time. Singh (1989) described change detection as a process that observes the differences of an object or phenomenon at different times [1]. The aim of this study is to identify the land use and land cover of defined area of the region in order to discover the changes that have taken place in the region. It also helps in decision making and analysis about the changes that might take place over a period of time. The proposed model main objectives:

1. To create taxonomy of land cover.
2. To evaluate financial viability of predicted change.
3. To determine the future consumption of land cover regarding that particular region.
4. To determine the nature of land cover, type of vegetation we can cultivate on that land cover etc.
5. Using proposed model we can also analyze the how much land is cover and how much land is use.
6. To identify illegal exploitation of land cover.

**The course of action to implement the proposed land change detection is as follows**

In first phase of the model cache images of the system are used to detect the land change. It will compare the previous cache images and current images at defined time period of system. If any variations are detect by the system than it will directly send that report to our G-LCDS and simultaneously it will also send that report to automated investigator agent and coordinator of local government and of that defined land. Here finally in this process result will be image with report will be generated and the report contains taxonomy of land cover before /after, it also determines the nature of land. We can also identify the illegal land use by comparing that with land legal certificate. There are roughly 500 local government agencies involved in the data retrieval process, along with the field investigations, it is necessary to establish a real time and effective G-LCDS to facilitate the process, and establish a smooth flow of data sharing between different departments [4].

In the second phase network based Geographic Information System is an effective method to understand and analyze land change information on the network based system. The GIS network based system will integrate with G-LCDS system. It will integrate with the virtual private network establish between both the system. In short GIS network based system will work as a receiver of G-LCDS system. The GIS network based system is divided into units. Each unit performs certain task and sends the output of the task to next unit. The different unit is as follows First investigation unit will identify the change between the

both the cache image and it will generate the final differential image with precise latitude and altitude. Secondly it will also generate report regarding that in the form of graph and also generate the taxonomy of change land cover and its effect. All the task can see by the investigator of the Network based GIS system. Investigator can also control the entire task through Graphical user Interface, and can also download the data. The Functionality of Network based GIS system are as follows;

**Announcement/Warning Agent System:** Announcement and warning system is an automated controlled system integrated with G-LCDS system it will notify the investigator when land changes are detected. And AW Agent will also notify the investigator through e-mail through virtual private network.

**Management Information System:** it's a data distribution platform, it will take input from Network based GIS system and generate the report ,verify and download different cache G-LCDS image, maps, satellite images, land cover report etc..

**Role Assignment System:** The investigator can also particular role for particular function of the system and can also assign different types of privileges to different role and can control the level of access to that particular role. Investigator can also create routine task that can be maintained by every role.

**Illegal development of Land Tracking:** Network based GIS system is capable to identify the illegal development of the land through the database provided by the local government of that region.

### 3. Components of Network Based GIS System.
There are various Components integrated with network based system. They are as follow

**Virtual private network:** A VPN is designed to provide a secure, encrypted tunnel in which to transmit the data between the remote user system and the source network. The information transmitted between the two locations via the encrypted tunnel cannot be read by anyone else because the system contains several elements to secure both the company's private network and the outside network through which the remote user connects through.

**Freebase geo database:** Freebase is a large collaborative knowledge base consisting of data; it is an online collection of structured data harvested from many sources, including individual, user-submitted wiki contributions. Freebase aims to create a global resource which allows people (and machines) to access common information more effectively [5].We have used freebase to retrieve the geographic information about land cover and land use.

**Automated investigator Agent:** Automated investigator Agent works as mediator between GLCDS system and geo-freebase database. The main work of automated investigator is to identify and analyze the change between previous and current cache image based on the algorithm.

### 5. Proposed Architecture Result
In the past, land change detection is very tedious task and time consuming as it requires many manual work to carry out the task. Because there are many calculations which requires the precise calculation and manually perfection related to calculate large amount of dynamic data is difficult and for that officers need to fill various different types of forms related to different task so at point of time it becomes laborious process and that result in blurred result image regarding land change.
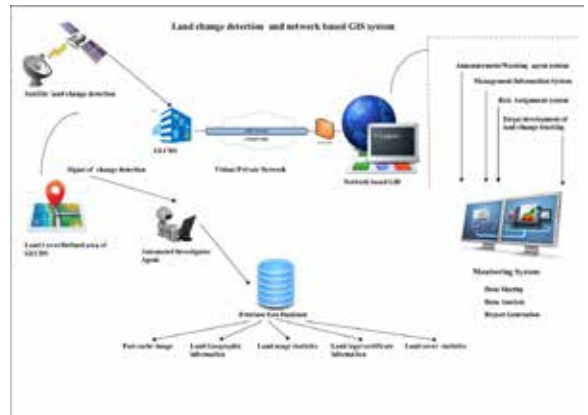


**Figure 1: Land change detection and network based GIS system**

Figure 1 shows how the G-LCDS converts the premature report into a more useful process. Investigator can directly analyze, identify any possible land change, which are automatically announced by the network based GIS system and it also prevent illegal exploitation. The G-LCDS provides a real-time data sharing and data analytics interface for the field investigators to study related land information at anywhere or anytime through virtual private network. That provide the security between the receiver and sender signals and it also improve the overall accuracy of the system. The final result output contains:

1. Time period
2. Overall land cover
3. Overall land usage
4. Change identify mark
5. Overall percentage of change identification
6. Legal change spot etc….
7. Change identification mark before /after comparison etc…

### Conclusion:
The purpose of this research is to demonstrate a influential Network base GIS-- the LCDS, virtual private network approach. LCDS benefits from virtual private network as it provides high security, availability

For the functions that are carried out by the system. Moreover, it also provides the many advance function that is capable of fault tolerance functionality too. It is reliable change detection technique for private as well public area network. Furthermore, it also improves the decision-making processes for administrators.

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