

# E - Governance Practices -GIS Applications in Tamil Nadu Forest Department

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## ABSTRACT

Forestry involves vast database on human resource development, land based information, project related activities, products and services, legal issues, public grievances, research and extension. The Tamil Nadu Forest Department has capitalized the potentials of Information Technology in crossing the digital divide and putting the forest development onto a new platform of e-governance. The use of Information Technology has come to play a vital role in planning, management and monitoring in forestry sector. In this direction the department has taken several initiatives such as computerization at lowest administrative level, human resources development, establishment of Radio Frequency Link (RF Link), establishment of Geomatics Centre, development of customized software, development of website etc. The GIS is emerging as an effective tool in efficient forest management. It is useful in the study of forest extent, status, composition, deforestation and degradation and monitoring the wildlife habitat and success of Afforestation programmes. In this direction the department has established a state-of-the-art Geomatics Centre. It is a self-sufficient unit with trained department personnel engaged in creating and analyzing spatial and non-spatial digital database pertaining to forestry using modern techniques of Remote Sensing, Geographic Information System (GIS), Global Positioning system (GPS) etc. The data produced in the Geomatics centre is used by the field officers in the districts. The paper gives a case study of e-governance initiatives and its roadmap in Forest Department and also gives an insight to the action plan for computerization and digitization of spatial and attribute databases in a government department. It may also help in replicating the initiatives in other government departments.

## INTRODUCTION

The Global Information Technology Report brought out by the World Economic Forum indicates that India has been emerging as one of the leading nations of information and communications technology development.

A study on e-readiness assessment of the states and union territories was done through World Bank - *infoDev*. The team of the department of information and technology along with National Council of Applied Economic Research (NCAER) and Indian Research Market Bureau (IMRB) conducted the study based on the broad parameters namely network access, network learning, network society, network economy, network policy and e-governance. This study has rated Tamil Nadu as leader in e-readiness.

The forest department realized the importance of Information and Communication Technology initiatives in sharing of information at low cost and lightening speed and assuring the users, transparency. Over the last couple of years the department has taken several IT initiatives in forestry sector. This was set in motion with the help of funds received by the department from **Japan Bank of International Co-operation**

## (JBIC) under Tamil Nadu Afforestation Project (TAP).

Steps have been taken to use information technology as an effective tool in enhancing transparency and efficiency. The earnest efforts have been made by the department to upgrade the quality of life for the citizens through e-governance and IT applications in forestry. Human Resources Development has been given a lot of importance and appropriate training on computers have been provided to the officials of the department at all levels. With the successful completion of computerization project, networking, development of GIS & establishment of Geomatics Centre, development of MIS, development of website and use of modern technologies such as digital image processing of satellite data (remote sensing), Geographic Information System (GIS), Global Positioning System (GPS) and Differential GPS, the forest department of Tamil Nadu is undoubtedly the front runner in e-governance practices.

## APPROACH

Generally, it is seen in many government departments that in such specific computerization projects, costly equipments are purchased, consultants are engaged and the work is outsourced to private agencies or professionals outside the

department. And after the exit of consultants and professionals from the scene the systems/equipments are seen lying idle thus making the project a failure in many cases. It is also seen in government departments that the officers and staff who undergo trainings (overseas and inland) under the project are not posted at appropriate places for the desired period.

But this has not happened in the case of forest department. The systems were procured after carefully assessing the workload and requirement of the department. The state of the art Geomatics Centre was established in forest department after visiting and studying the similar facilities available in different institutions in Tamil Nadu and in other states as well. Only the interested and willing persons were trained. After training they were posted for the same job for which they have been trained. The work was not outsourced to any outside agency. The entire work was done by the trained departmental staff thus ensuring the sustained utilization of the systems (hardware and software) procured.

## **E- READINESS AND E- GOVERNANCE IN FOREST DEPARTMENT**

In the department the people are comfortable with the new technologies. Significant infrastructure has already been created and judicious mix of general and specific initiatives are taken up to enhance the e-readiness of the department and taking up specific projects such as preparation of district forest atlases, forest cover change analysis, development of customized software, providing internet Kiosk to the village forest council (VFC). These steps have helped reducing the digital divide. Rapid technology evolution and innovative applications of remote sensing, GIS, website and internet have contributed to the benefit of forestry sector and the technology is gradually reaching large sections of the population leading to better quality of life.

## **COMPUTERIZATION OF THE DEPARTMENT**

The assessment of requirement of the department was done by the panel of experts and subsequently the computers were purchased through **Electronic Corporation of Tamil Nadu** (ELCOT). The computers have been provided at all levels namely state, circle, division and range levels. Thus it has reached the smallest unit of administration. Exhaustive training has been imparted to all the personnel handling computers. The training on **office automation** and **Internet** was conducted at NIC (**National Informatics Centre**) at Chennai. E-mail facilities have been provided up to district level. There

has been significant increase in the use of e-mail for transmission of information within and outside the department. A full-fledged computer centre has been established at headquarters at Chennai. A radio frequency link (**Radio Frequency link**) has been established between the main server of forest department and the server at NIC. It is also catering to the needs of other departments in the building. All the officers at headquarters have been provided with the computer and all the computers here have been networked by **Local Area Networking** (LAN). Thus steps were taken to ensure Internet affordability, strengthening information infrastructure and procurement of required hardware and software. This along with the e-services and good infrastructure speaks of the preparedness of the department for e-governance.

## **HUMAN RESOURCES DEVELOPMENT**

Training has been given utmost importance. The training on office automation and internet has been imparted to all the officials handling computers at **National Informatics Centre** (NIC) at Chennai. For the establishment of **Geomatics centre** the trainings were started even before the equipments were actually procured. Training was imparted in reputed institutions in **The Netherlands and United Kingdom** to the interested and willing persons. Inland training was also imparted in reputed institutions such as NRSA (**National Remote Sensing Agency**), **Indian Institute of Remote Sensing** (IIRS) etc. **Pilot studies** are being conducted in collaboration with NRSA as **on the job training**. To make full use of the modern technologies it should be exposed to all the field level officials of the department. Therefore training is going to be the regular feature in the department. The Geomatics centre has also imparted preliminary **training to field level officers**.

## **DEVELOPMENT OF GEOGRAPHIC INFORMATION SYSTEM (GIS) AND ESTABLISHMENT OF STATE-OF-THE-ART GEOMATICS CENTRE**

A state-of-the-art **Remote Sensing** and **GIS** centre was established after meticulous planning and after visiting and studying the facilities available in other institutions in Tamil Nadu and in other states as well. **National Remote Sensing Agency** (NRSA), a premier agency of the **Department of Space, Government of India** was engaged as consultant. Exhaustive tour of the entire state along with the scientists of NRSA and assessment of workload of the department was done in consultation with the field officers. Based on the

assessment of workload the requirement of disk space of the system was finalized. Thereafter the systems were procured through the **Electronic Corporation of Tamil Nadu (ELCOT)** as per the implementation report of NRSA.

The core members for the centre were identified within the department and were imparted training both inland and overseas in reputed institutions as has been mentioned under the heading " Human Resources Development" in preceding paragraph. Pilot study in a small area was done in collaboration of NRSA as hands on training using their equipments. The trainings were planned in such a manner that by the time the hardware and software was actually procured the core team was ready to work on it. Necessary infrastructure was built in advance to house the equipment.

The Hon'ble Chief Minister of Tamil Nadu Selvi J Jayalalitha has formally inaugurated the Geomatics Centre. It has several units such as analysis, cartography, production, map library, image library, training units etc. It is equipped with most modern systems five **UNIX workstations**, two **Windows workstations**, **A0 plotter**, **A0 scanner**, **laser printers**, **image processing software** and **GIS software**. All the equipments available in the Geomatics Centre are connected by the **Local Area Network (LAN)**. There is capacity utilization of the systems by the departmental staff. The work was not outsourced to private agencies and since the **trained departmental staff** are doing the work, the sustained use of the systems have been ensured. The work done in the centre in a short period is outstanding by any standards. The following works have been done in record time:

- The **digitization of Reserved Forest boundaries on 1:50000** scale for the entire state
- The **digitization of forest administrative boundaries** such as beats, ranges, divisions and districts on 1: 50000 scale for entire state
- Creation of **seamless digital data base** for the above layers on 1: 50000 scale for entire Tamil Nadu
- Preliminary **digital image processing** using satellite imagery has been completed for all the districts of Tamil Nadu and the ground truth verification is going on. The forest cover and the trees outside forest areas are classified in different density classes such as dense forest, open forest, dense tree cover, sparse tree cover, rocky area, barren area, scrub etc.

- A pilot project on **forest cover change analysis** is going on for Coimbatore and Dharmapuri districts in collaboration with NRSA using satellite remote sensing.
- The methodology has been standardized for **documentation** of the works done in all the programme villages taken up under Tamil Nadu Afforestation Project (TAP) in a district in GIS platform.
- The **district forest atlases** for seven districts namely Thiruvallur, Kanchipuram, Dharmapuri, Salem, Erode, Tirunelveli and Namakkal have been prepared and for other districts they are nearing completion. These atlases will be very useful in planning and managing forestry resources in the divisions.

In the process of collecting data from the divisions for digitization almost all the draughtsmen of the department have been trained in cartography.

Raw **LISS III** (resolution 23.5 meters) and **PAN** (resolution 5.8 meters) satellite data of **Indian Remote Sensing Satellite (IRS)** are procured from NRSA .The **geometric correction** of the data is done in geomatics centre. After rectification of the image classification is done. The classification is the judicious mix of **visual interpretation**, **unsupervised** and **supervised** classification and **NDVI** (Normalized Density Vegetation Index). The classified layer is overlaid on the vector layers prepared in GIS centre (reserved forest, beat, range, division and district boundaries) and other vector layers procured from **Survey of India** (drainage, contour, roads etc) after obtaining necessary security clearance from the **Ministry of Defence, Government of India**. On doing such overlay operations enormous amount of data is obtained which is very useful for planning and management of forest resources at district level. It will also enable the planners to do further analysis and modeling of the data using GIS software which in turn will help them in decision making.

To make full use of the modern technology like remote sensing and GIS it is necessary that it reaches field level officers. To use the technology to its full potential it is necessary that the data so processed in geomatics centre is **used by the field officers**. Hence all the district forest offices are being provided with the GIS software with proper training so that the classified digital data is used by the field officers, which will help them in **better planning, management, monitoring and execution** of works.

The Geomatics Centre will be using very high resolution satellite data like **IKONOS** (one metre resolution) shortly and special projects like **forest fire monitoring, encroachment studies, consolidation of forest boundaries etc.** will be done using **Global Positioning System (GPS)** and **Differential GPS**. The Geomatics Centre is being visited by the representatives of funding agency, officers of other organizations and from other states. Some of the comments made by the dignitaries who visited the centre are as follows:

1. *"Thank you very much for showing me the excellent efforts made by GIS Cell. It will give a lot of improvement in prioritization and monitoring of afforestation activities. I hope these new technologies would make the lives of villagers changed better. All the luck"*.
  - Tanoko KOIKE, Japan Bank of International Co-operation  
Dated : 21.01.2002.
2. *"Visiting GIS was a very instructive experience. It is a good initiative by inspired officers and will go a long way in assisting the state of T.N. in the development efforts. The staff was highly motivated and very clear about the objectives. I wish the centre all the success and hope that it will become an example to follow in the near future"*.
  - D.M. MULAY, Director, Ministry of Finance, Government of India, New Delhi.  
Dated: 28.01.2002
3. *"If you need to see the 'Silent Revolution' - this is the place. Congratulations and I hope that together we will see it happening through out T.N. and then become a National model for India. All the best"*.
  - VIVEK HARINARAIN, IAS., Secretary, Information Technology, Government of Tamilnadu.  
Dated: 14.08.02
4. *" I had a brief visit to this Geomatic Centre. I was impressed by the work (e.g. District Atlas) they have accomplished so far and plan to do in future. The officers and staff are skilled, motivated and dedicated to apply advanced tools of IT and GIS for scientific management of forests in Tamilnadu. My best wishes to them"*.

- J.K. RAWAT, Director, FSI, Dehradun.  
Dated: 18.08.2002

5. *"Amazing advanced facility surprised me a lot. Further, your effort and skill development / accumulation was admirable, please keep up the pace, and hope to come back to see the development. Thank you"*.

- RYOICHI ABE, JBIC, Dated 27.05. 2003

## **MANAGEMENT INFORMATION SYSTEM - DEVELOPMENT OF CUSTOMIZED SOFTWARE**

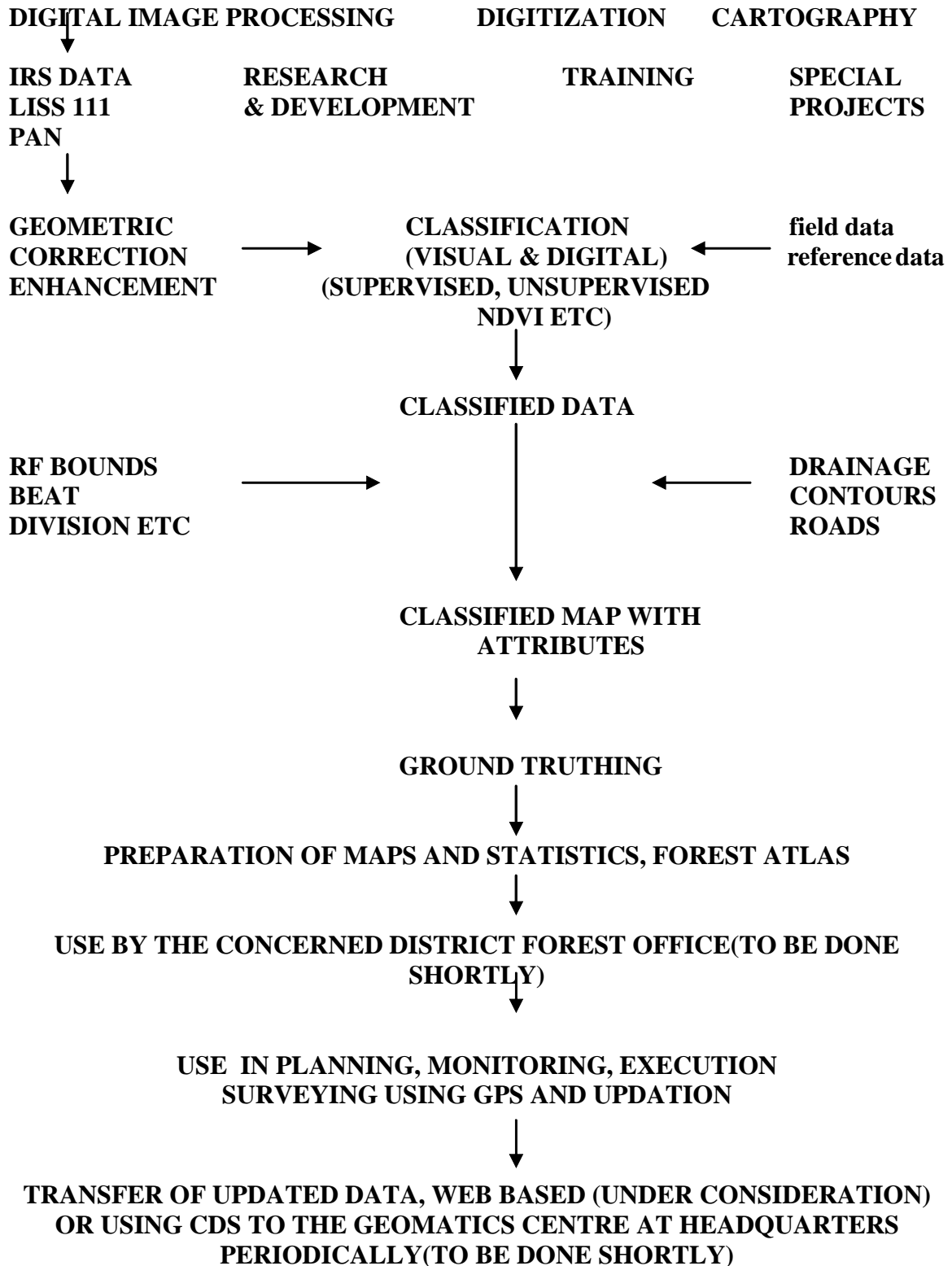
A customized software for the department is being developed through the Electronics Corporation of Tamil Nadu (ELCOT). This involves computerization of departmental activities in range, division, circle and state headquarters of Tamil Nadu Forest Department covering various issues such as administration, implementation, management, scientific management of protected areas and future strategy planning. The software package, which will be developed, will have features for entering data, retrieving, viewing, or modifying information and perform calculations wherever necessary, to access the master database maintained in a central server and transmission between offices in remote locations and the central server. It will have different modules such as personal management system, court case management, budget and accounts, protection and miscellaneous modules. The data transfer will be through the departmental website or the web server.

## **INTERNET KIOSK**

Forest Department has taken a new initiative in providing Internet facility in one of the programme villages of Tamil Nadu Afforestation Project (TAP) namely Valacheripatti in Melur Social Forestry Range. The Internet to Valacheripatti village was provided in collaboration with a private company n-logue Communication (P) Ltd. which has a transmission antenna. Internet connections are provided through wireless (local loop) to others without the phone connection. The facility provides access to information in the field of education, health, marketing, social welfare, job opportunities, e-governance etc. to the rural poor at their doorsteps. Training was imparted to a lady **VFC** (Village Forest Council) member by the Forest Department to equip the VFC member with the required technical skills to operate the Internet kiosk.

Now it has started functioning on commercial basis. The people have started using this facility for examination results,

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training, survey of land records, browsing, passport verification etc.

### **DEVELOPMENT OF WEBSITE - INTERFACE WITH PUBLIC**

A comprehensive, informative and illustrative website of forest department ([www.forests.tn.nic.in](http://www.forests.tn.nic.in)) was launched recently by the Hon'ble Chief Minister of Tamil Nadu Selvi J Jayalalitha. It has been designed and developed in Geomatics Centre keeping the requirements of general public in view with broad features such as **about us, public utilities, wildlife tourism, frequently asked questions, contact us, links to other relevant sites, photo gallery and site map.**

The website has plethora of information on the department's mission, citizen's charter, policy note, corporations, joint forest management, research, extension and training. It also gives a detailed account of activities taken up under Tamil Nadu Afforestation Project (TAP) assisted by the Japan Bank of International Cooperation (JBIC). It gives fairly good amount of information about wildlife tourism like when a particular place should be visited, best season, the important features of the place, who to contact etc. It has almost all the rules and legislations such as forest act, sandalwood rules, timber transit rules, sandalwood transit rules, wildlife act and rules, conservation act and rules, export import policy with regard to forest and wildlife and many more rules and legislations.

The website also contain a beautiful photo gallery with hundreds of photographs of forest, wildlife, mangrove, corals, sea animals etc.

### **CONCLUSION**

The Tamil Nadu Forest Department has taken lot of initiatives towards e-governance. The department's preparedness, special efforts taken namely establishment of Geomatics Centre, radio frequency link, development of customized software etc, huge infrastructre with modern hardware and software, trained personnel and Internet affordability show that it has capitalized the potentials of modern technologies. After the development of customized software shortly and after the implementation of web based transfer of data the department will strengthen further in this direction. Tamil Nadu leads in IT enabled Forest management.

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### **REFERENCES**

- Tamil Nadu Afforestation Project (TAP) document, Tamil Nadu Forest Department, Chennai.
- India: E-Readiness Assessment Report 2003 of Department of Information Technology, Ministry of Information Technology, Government of India.
- IT Policy of Tamil Nadu-2002
- The **district forest atlases** prepared by the Geomatics Centre, Tamil Nadu Forest Department, Chennai
- TN leads IT- enabled forest management, The New Indian Express dated 16.06.2003