PUBLIC WORKS DEPARTMENT

3.6 Implementation of the Well Census Project

Highlights

The Well Census Project was conceived to create a consolidated database of all the existing wells in the State to cater to the Tamil Nadu Ground Water (Development and Management) Act, 2003 for protection of the ground water resources in the State. However, the time for proper planning, conducting feasibility study, ensuring the correctness and completeness of the software for data capture, etc. was inadequate. The application software developed was devoid of controls to ensure completeness and correctness of data. This critically impaired the attainment of the objective of Well Census Project.

- **The project could not be completed in the initially allotted period of four and half months and the extension allowed for the project also could not be beneficially utilised.**

(Paragraph 3.6.5)

- **Creation of a geo-data base could not be taken up due to lack of data and shortage of Global Positioning Systems. Expenditure of Rs 28.80 lakh spent on purchase of related equipment and software thus was rendered infructuous.**

(Paragraph 3.6.6)

- **Internet server was lying idle and the envisaged website was yet to be created.**

(Paragraph 3.6.7)

- **Absence of validation controls in the software that was developed coupled with non-observance of input controls resulted in compilation of incorrect data.**

(Paragraph 3.6.10)

- **Data in respect of wells in 846 out of the total of 17,014 villages in the State was not collected/compiled.**

(Paragraph 3.6.13)

3.6.1 Introduction

The Tamil Nadu Ground Water (Development and Management) Act, 2003 was enacted in March 2003 to protect the ground water resources in the State from its indiscriminate exploitation and for its systematic management. The date from which this Act will come into force is still to be notified (July 2006).

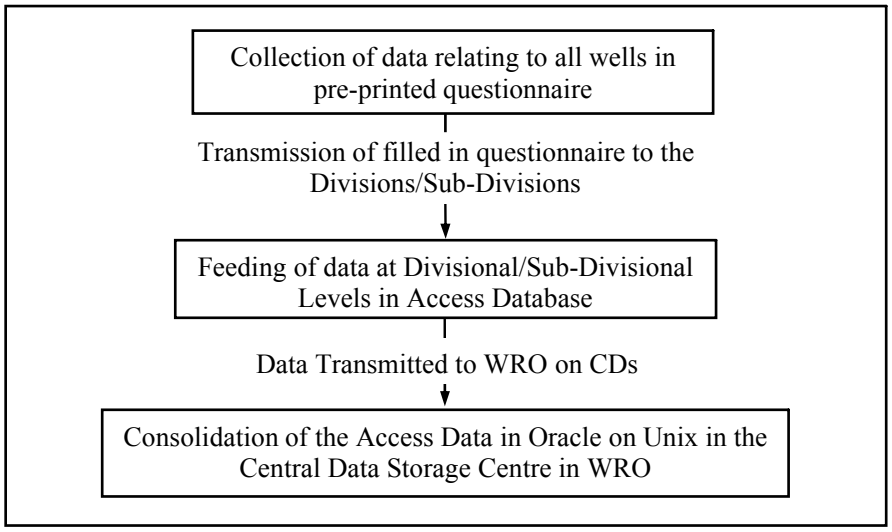
As an essential pre-requisite for the implementation of the Act, a Well Census Project (Project) was taken up to create a consolidated database of all the existing wells in the State. The Project was approved under the Tamil Nadu Water Resources Consolidation Project (WRCP) implemented by the Water Resources Organisation (WRO) in Public Works Department (PWD) with assistance from the World Bank.

Government of Tamil Nadu sanctioned (November 2003) Rs 5 crore for the implementation of the Project. The sanction required that a Pilot Study be taken up in 15 selected blocks and later extended to all other blocks. Data relating to all categories of wells (domestic, agricultural, industrial and commercial) was to be collected to create a database by 31 March 2004 to synchronize with the closure of the WRCP. Consequent on the extension of WRCP period to 30 September 2004 by the World Bank, the Project also got a corresponding extension.

3.6.2 Scope of the Project

The Project involved collection and consolidation of information on an estimated 37 lakh wells (July 2006) from approximately 17,000 villages, scattered across the State, using the services of around 2,000 field staff temporarily recruited for the purpose. The data was then to be captured in the Divisions/Sub-Divisions using temporary data entry operators recruited for the purpose. Information on 34 parameters was to be collected in respect of each well and captured in 71 fields in a data table. The data was then to be got vetted by the competent revenue officials and got approved by the 'Grama Sabha' concerned and sent to WRO for consolidation. The Well Census data was then to be linked with map data obtained from the Tamil Nadu Water Supply and Drainage (TWAD) Board using the Geographic Information System (GIS) software and a Geo-database was to be created. Outputs from the Project included information required by the districts/blocks in text and graphical formats for implementation of the Act.

A flow chart indicating various steps involved in the implementation of the Project is given below:



The task of collecting and capturing of data was declared completed by September 2004. The Well Census data contained details of 36.91 lakh wells spread across 16,447 villages in the State with the related database being of the order of 2 GB[1].

During the period between December 2003 and March 2005, an expenditure of Rs 3.61 crore was incurred on the Project as tabulated below:

Sl.No.	Item of Expenditure	Amount (Rupees in lakh)
1	50 Hand Held GPS Systems	10.23
2	Application Software	1.31
3	Three Server class computers	14.07
4	Colour Laser printer	3.40
5	Printing of Forms, Data Collection and Data feeding	314.73
6	GIS Software	16.48
7	Training	1.08
	Total	**361.30**

3.6.3 Audit objectives and methodology

The main Audit objectives were to assess:

- effectiveness of planning undertaken for this project and for the implementation of the objectives of the project and
- whether software that was developed contained validation and input controls and integrity, completeness and correctness of data that was collected was ensured.

An examination of the records, the application program used for the capture of data and the interrogation of the compiled data using Computer Aided Audit Techniques were carried out during March 2005 and the report updated in July 2006. Deficiencies noticed are discussed in succeeding paragraphs.

3.6.4 Deficiencies in Project planning and implementation

Due to critical time constraints the well census project could neither be planned properly nor fully implemented as contemplated, as brought out in the following paragraphs.

[1] Giga Byte.

3.6.5 Incompleteness of data capture

A database of 37 lakh wells was planned to be completed in just four and a half months. The planned pilot study could not be completed before taking up the project proper.

The project, approved by the Empowered Committee and the World Bank in July 2003, was sanctioned by Government in November 2003. As the WRCP was originally to conclude in March 2004, the Project was also to conclude by that date. The scope of the Project and the area to be covered were too large to be completed in the initially planned period of four and a half months available before the closure of the scheme. A pilot study, essential in such projects, though planned, could not be done due to time constraint. Even though the Project period was extended by six months, the extended period could not be effectively utilised as the order for extension was communicated to WRO and PWD, only on the last working day of the original period. As such, the Department initially tried to rush through the Project, so as to complete it within the short period available. As per the original estimate, data was to be collected in respect of an estimated 33 lakh wells in 17,014 villages. However, data in respect of 36.91 lakh wells has been collected in 16,168 villages, though 846 villages were yet to be covered (July 2006). Further, the quality and completeness of the data collected left a lot to be desired.

3.6.6 Non-preparation of a Geo-database – infructuous expenditure

Geo-database not prepared for want of data. Proposal since shelved. Purchase of hardware and software at Rs 28.80 lakh for this was thus rendered infructuous.

The Project included the creation of a geo-database (GIS[2]) with the objective of generating outputs in a graphical form. For this, 50 hand-held Global Positioning Systems (GPS), a HP Server and GIS Software were procured at a cost of Rs 28.80 lakh. The Geo-database was to be created by plotting the position of wells using its latitude and longitude in the shape data, furnishing the outline of the villages obtained from TWAD Board. Since the hand-held GPS system could be operated only by the technical staff of the Department and only 50 such systems were available, the latitude and longitude positions were recorded and captured only in respect of 39,049 wells which is only 1.06 *per cent* of total number of wells surveyed (36,91,265). The creation of the geo-database has since been shelved rendering the expenditure incurred thereon, infructuous.

3.6.7 Unjustified Procurement of HP Internet Server

Internet server purchased was lying idle and the envisaged Internet website was yet to be created.

A server class computer costing Rs 3.76 lakh was procured (September 2004) for the sole purpose of sharing the well data with users on the web. However, even after the lapse of over 20 months, it had not been put into active use, as the well census data was not corrected/completed and made fit to be published on the net. Further, no time bound proposals were underway to create the necessary infrastructure to host an Internet website and bring the server to use. In the circumstances, the Internet Server was lying idle and there was no scope for making an Internet site operational in the immediate future.

[2] GIS – Geographical Information System.

The Department acknowledged (May 2005) that the Internet server could not be effectively utilised in the present scenario and only after completion of the validation and the consolidation of the data, the same could be hosted on the web.

3.6.8 Defective collection of data

Deficiency in collection of information at the field.

Data in respect of 36.91 lakh wells were gathered by temporary field organisers (casual workers) with very little technical background within a limited time. There was inadequate input and validation control on the data captured into the system. This resulted in the data collected having several deficiencies as elucidated in this report. Such deficiencies make the database undependable and unfit for deriving any meaningful conclusions.

3.6.9 Absence of check on completeness and correctness of data

The data collected was grossly deficient and incomplete on account of the following reasons.

Incapacity of the well owner combined with that of the data collector, resulted in erroneous and defective data collection.

- Most well owners could not provide information like depth of the bore well, sub-soil details, etc.
- Ambiguity of the information called for, like quality of water judged by one's individual opinion, date and cost of digging of an ancestral well, area of wet crops and dry crops covered by the well, which is a continually varying factor, etc.
- The data collectors appeared to be rather confused over the unit of measurement to be adopted in respect of various categories of numeric data.

The data collected in the face of these shortcomings, contained information like one km deep wells, hundreds of 19th century bore wells etc. The Department acknowledged (May 2005) that the incapacity of the well owners in furnishing information and that of the data collectors in gathering the information has been reflected in the database. However, there was no check by the Department either on the completeness or on the correctness of the data collected at the field level.

3.6.10 Absence of Input/validation Control

Software lacked validation controls.

Information collected at the field was captured in the computer system at the Sub-Divisional and Divisional levels. For this purpose, an application software was developed with Visual Basic (VB) as front-end-tool and MS Access as back end database, at a cost of Rs 1.30 lakh in January 2004. The software was accepted without proper testing for availability of necessary controls to ensure correctness and completeness of data. A detailed examination revealed that due to lack of input/validation controls the resultant database was incomplete/erroneous as detailed below. The Department agreed (May 2005) that it should not have accepted the software devoid of such essential controls.

Sl.No.	Information Captured	Type of error	Number of records
1.	Type of Well	Blank	17,263
2.	Status of use	Blank	28,527
3.	Purpose of well	Blank	1,18,656
4.	Water quality	Blank	1,12,479
5.	Depth of Wells	Blank	10,26,031
		Depth less than 2 metres*	8,04,684
		Depth more than 500 metres	1,077
6.	Level of water in the well	Zero	36,64,806
		Negative	5,121
7.	Area irrigated by each well	Blank	4,20,032
8.	Soil Type	Blank	23,791
		Meaningless information	75,105
9.	Mode of lifting water	Blank	1,11,494
		Manual lifting of water from tube wells	3,76,834
		Regular pumping of water from wells not in use	42,648
		Lifting of water by manual or by bullocks reported in spite of availability of mechanical or electrical pump	1,16,570
		Electricity Board Connection number left blank	23,98,200
		Power of motor not furnished	4,38,724
10.	Cost of construction	Blank	2,28,231
		In excess of Rs 10 lakh@	1,471
11.	Cost of maintenance	Blank	7,14,754
		In excess of Rs 10 lakh@	42

* The Department replied that the abnormal values were due to an error in the software that swapped the data relating to diameter and depth in respect of circular wells. An examination of the data disclosed that error is not consistent and there were 9 lakh instances of correct data as well.

@ The Department instead of ascertaining the actual values in respect of these parameters resorted to reducing such values to zero. Such types of corrections are neither complete nor sustainable and are not good database are not recommended practise for maintenance of good database.

3.6.11 Defects in codification of wells

Data was captured from serially numbered formats called "Well Census Forms" with separate serials for each village. The wells were thus to be uniquely identified by a combination of the District, Taluk, Village and the serial number. However for want of an input control for ensuring unique identity of a well, there were several duplications in the allotment of such codes. A total number of 5,20,801 wells shared only 1,81,650 serial numbers as the same serial numbers were assigned to more than one well in the same village. As a result, identification of individual wells was not possible in the database. The Department replied (September 2005) that they were planning to introduce unique identification numbers for each well but the exercise has not been taken up till date (July 2006).

3.6.12 Deficiency in storing the field identities of wells

Names and addresses of the owners of many domestic wells and the survey number in respect of many irrigation wells not furnished.

While, in the database, a well is identified by its code, the physical identity of a domestic well is established by the name and address of its owner and that of irrigation well by the survey number where it is located. Without these identities, the data cannot be physically linked to a well. However, it was observed that out of 13,58,569 domestic wells, the names of the owners of wells were not furnished in respect of 14,311 wells and the address of the owner remained blank for 2,58,003 wells. Similarly, out of 19,70,760 irrigation wells, the survey number remained blank or contained irrelevant information in 3,50,034 wells.

Thus in absence of codification of the wells and absence of various details the identification of the wells was not possible.

3.6.13 Incomplete coverage of the Well Census

Data on wells in Chennai city yet to be incorporated.

The well census was to cover all the wells in the State. Data in respect of Chennai City was proposed to be obtained from Chennai Metropolitan Water Supply and Sewerage Board and incorporated in the well census data. Even after the lapse of a year and 10 months after the completion of the Project, this data is yet to be obtained/incorporated (July 2006).

Information in respect of wells in 846 villages yet to be collected/compiled in well census.

The compiled data after completion of census revealed that the exercise was incomplete to the extent of five *per cent* of villages (846 out of 17,014 villages) as listed in **Appendix XXIX**. Despite this shortfall, the Department has already intimated the State Government/World Bank (October 2004) that the collection and storage of data was complete. There was also no system to ensure that the well census covered all the wells within a village since the Revenue officials and the Gram Sabha certified only the correctness of the collected data. In the circumstances, audit could not ensure the extent of coverage of all the wells in each village. The Department accepted (May 2005) that the process of validating and consolidating the well census database was still incomplete.

3.6.14 Conclusions

A database estimated to cover about 33 lakh wells in the State was to be created under the Project by obtaining information from the remote corners of the State, in just over four months. The time for proper planning, conducting feasibility study, ensuring the correctness and completeness of the software for data capture, etc., was inadequate. An extension of six months was allowed. However, the same was also not gainfully utilised. The application software developed was devoid of controls to ensure completeness and correctness of data. Data in respect of five *per cent* of the villages was yet to be compiled. The geo-database (GIS) with the objective of generating outputs in a graphical form also was not created. The incomplete/erroneous database critically impaired the attainment of the objective of Well Census.

Thus even after incurring an expenditure of Rs 3.61 crore on the Well Census Project, the resultant database created was still unusable.

3.6.15 Recommendations

- Existing database must be checked for correctness in order to make it useful.
- Efforts should be made to complete the database by acquiring information in respect of left over wells.
- Suitable input controls should be incorporated in the Data Capture Program to guard against capture of erroneous data.