3 ASSESSMENT OF EXISTING GIS

3.1 Existing Data and Information

Inventory of Existing Data and Information

The Study Team carried out a thorough inventory survey of data and information owned and utilized in various agencies to determine their applicability to the proposed IIMS which utilizes GIS. Survey items included: name or title of the existing data, year generated or compiled, data form, quality and condition, ownership, method of acquisition, method of maintenance, and type of media (paper, electronic file, etc.). In the case of electronic file or GIS data, the following items were added: data format, format of data exchange, and media of storage. Sources of such data and information are summarized in Table 3.1.

Table 3.1 Summary of Inventory of Existing Data and Information

Spatial Data Infrastructure	Organizations
1 Public facilities	DTGC-MET, DUA-MUH, ADM, DID-MEFP, Municipalities
2 Administrative boundaries	DAT-MEFP, DUA-MUH, DPS-MEFP, ADM
3 Utilities (electricity, water supply, sewage etc.)	SELELEC, SDE, ONAS, ADM
4 Road and railroad	DTGC-MET, DUA-MUH, DTP-MET
5 Vegetation	DTGC-MET, CSE
6 Water surface	DTGC-MET, DAT-MEFP
7 Topography	DTGC-MET
GIS Data	**Organizations**
1 Existing land use	DUA-MUH, CSE
2 Soil condition	DUA-MUH, DAT-MEFP, SGPRE-MH, DSA-MA, DGR-MH, IEF-MEPN, DEFCCS-MEPN, DEEC-MEPN, CSE
3 Land use plans	DUA-MUH, DAT-MEFP
4 Zoning plans	DUA-MUH
5 District plans	DUA-MUH
6 Population of each commune d'arrondissement	DUA-MUH, DAT-MEFP, DPS-MEFP, DAT-MEFP
7 Trends of urbanization	DUA-MUH
8 Disaster records	DUA-MUH, ADM, SGPR-MH, IEF-MEPN, DEFCCS-MEPN, DEEC-MEPN
9 Public facilities	DSA-MA ,CSE, DUA-MUH, DTP-MET, ADM, Municipalities
10 Distribution of illegal settlements	DUA-MUH, ADM
11 Others	DSS-MS, DE-MTE, DCES-MEN, others

Source: JICA Study Team

Current Situation of the Data Sources

(1) An overwhelming majority uses paper and blue prints for data media. Preservation of mylar originals is generally unsatisfactory.

(2) Data is kept in various agencies with little coordination, causing the Study Team to take an inordinate length of time to collect accurately updated information. For example, accurate data on new administrative boundaries and population are not available.

(3) Different agencies use different mapping coordinates, which makes it difficult to adjust different maps

(4) The extremely tight budget of each agency makes it difficult to update information on maps under their possession. Computerization of information management is an important theme.

(5) At present, data management for urban planning is done by paper media except for a few existing digitized GIS maps.

(6) Existing map files created by CAD may cause problems of figure processing when used as GIS data file. Some GIS data produced by certain systems also have the topology problem.

3.2 Existing GIS

A survey of GIS data inventory in the relevant 10 agencies was carried out to examine the GIS data and system outline, and clarified the title of GIS, software, frequency of use, database contents, data structure, GIS staff, and maintenance conditions. Preparation of a database for this GIS is still at the initial stage. However, each of GIS systems is operated everyday.

Table 3.2 Summary of Existing GIS in Dakar

Organization	GIS Software	Purpose of GIS Use (Operation)	Area of available data	Data Exchange Format of GIS
DTGC-MET	Geo Concept 3.6	Digital mapping (Everyday)	Whole country, Dakar Region	DXF
DUA-MUH	Geo Concept 3.6	Urban planning (Everyday)		DXF
DAT-MEFP	PAMAP 4.2, Map Info 4.5	Regional Planning (Everyday)	Whole country, Dakar Region	DXF, other GIS format
DID-MEFP	Micro Station V5	Administration (Everyday)	A part of Dakar Region	DXF
SDE	Micro Station 95	Facility management for water supply (Everyday)	Almost all the Dakar Region	DXF
DTP-MET	VISSAGE 1.21	Facility management for roads (Everyday)	Whole country, Dakar Region	DXF
SGPRE-MH	PC Arc Info, Arc View 3	Water resources management (Everyday)	Whole country, Dakar Region	DXF, other GIS format
ADM	Geo Concept 3.6, Auto CAD, Map Info 5.0	Urban planning (Everyday)	Whole country, Dakar Region	DXF, other GIS format
DEFCCS-MEPN	PC Arc Info, Arc View	Forestry management (Everyday)	Whole country	DXF, other GIS format
CSE	PC Arc Info, Arc View 3, Map Info, Erdas Imagine8.0, CHIPS	Ecological resources and environmental information management (Everyday)	Whole country, Dakar Region	DXF, Raster format, other GIS format

Source: JICA Study Team

Current GIS Usage at DTGC and DUA

(1) DTGC

DTGC uses GIS for the generation of geographic map data files, editing of map data files, and creation of output in the form of prints or digital data files. Software called CADMAP and GeoConcept are used for data input and processing.

The primary reason for using GIS is the shortage of skilled manpower or young technicians who would carry on the skill of analogue map making. GIS therefore is viewed as a useful tool to mitigate the staffing problem. All the three GIS projects of DTGC are depend on the other agencies. They are PADDEL project (with ADM which is a World Bank funded agency for development), map updating project (with 1/200,000 scale) by IGN France, and

JICA Study project. PADDEL project and JICA project are implemented in cooperation with DUA.

(2) DUA

DUA operates a GIS utilizing GeoConcept software. It is used as a planning tool to produce thematic maps, edit, and print them. However, no analytical functions of GIS for the purposes of urban planning are used at present, because of the very limited GIS data availability in DUA. Inconsistency within statistical data and administrative boundary is one of the major problems. DUA has produced various thematic maps for urban planning projects. Since October 1998, DUA in association with ADM and DTGC has been working on an urban location address identification program using GIS. The project is expected to continue till October 2003.

3.3 Assessment of Existing GIS

Utilization of GIS

Many agencies are in a stage limited to the individual preparation of thematic maps. In this stage it is not easy to carry out spatial analysis because of the limited spatial data availability. The agencies tend to share valuable digital data with each together to maximize the efficiency of the limited budget.

GIS Data Management

GIS data management is constrained by the respective software formats in each agency. It is necessary to prepare a document on data structure and contents as the meta data.

Issues on GIS Data Production

There are many instances of incompatibility in map coordinates. Also there is a problem of dispersion of accurate data sources and information. A meta data is needed. Some data sets are weak in topology and can not be directly used as GIS data. Simple electronic files (such as CAD file) can not be directly used as GIS data either.

Data Exchange

DXF files and text files are commonly used for data exchange to import and export figures and the associated attributes. But there is no rule for data exchange on the specification of data information. Diskette is commonly used for data exchange and there is certain a limitation about the data size. Some agencies use the media of ZIP and CD-ROM for data exchange.

System Environment

As for the machine room of GIS, there are many agencies who set aside an air-conditioned computer room to prevent dust entering from the outside. Some agencies suffer from a dust problem when using plotter. Old and new operating systems are used in the same agency. Some agencies encounter limitations because of the difference in operating system.

Memory Capacity and Network

Many software applications can not attain the intended performance in Dakar due to the hardware limitation of memory shortage. ZIP and CD-ROM are used to back up the data. The Local Area Network (LAN) is not common in many governmental agencies. Wide Area Network (WAN) is not established to connect agencies.

Maintenance

The unfavorable financial situation makes it difficult to prepare a budget for the maintenance of GIS. In most cases an improvement is only undertaken when machine trouble occurs. Because of the expensive consumables of ink and paper, stock is insufficient. Cost recovery is not sufficient either. Few agencies keep a log of system problems.

Usable Data for the Initial IIMS

Available spatial information varies in scale and accuracy. The Study Team set a 1/5,000 map scale as the IIMS data standard and tried to adjust all maps to this standard. GIS data with a smaller scale is used as thematic maps for reference purposes only. The following table shows the usable data collected by the Study Team.

Table 3.3 Collected Usable Data

Organization	Data contents	Data format
DTGC-MET	Digital map of 1:50,000 and 1:10,000 so called Croquis	Geo Concept
DUA-MUH	Digital map of 1:50,000 and 1:10,000 so called Croquis	Geo Concept
ADM	Regional planning supporting map in Dakar area - Advantages and site constraints - Drainage - Water supply network - Land use - Solid waste management - Extension tendency - Major penetrating axis in Dakar - Boundaries of cities - Boundaries of communes d'arrondissement - Power supply network - Sewage network - Public facilities - Markets - Roads	AutoCAD release 14
	Regional planning supporting map in Pikine area	Auto CAD release 14
	Regional planning supporting map in Guediawaye area	Map Info
	Regional planning supporting map in Rufisque area	Geo Concept 3.6
DTP-MET	Road management data	Auto CAD release 14

Source: JICA Study Team