THE CONTRIBUTION OF GEOGRAPHIC INFORMATION SYSTEM TO THE URBAN PLANNING PROCESS IN TURKEY

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Approval of the Graduate School of Natural and Applied Sciences.

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ABSTRACT

THE CONTRIBUTION OF GEOGRAPHIC INFORMATION SYSTEM

TO THE URBAN PLANNING PROCESS IN TURKEY

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This thesis attempts to show the contribution of Geographic Information System to urban planning process in Turkey. GIS can enhance the planning system by providing an access to accurate, reliable and update geographical information, producing alternatives according to the scenario and ensuring participation in the evaluation of the alternatives. This is the high level contribution of GIS for the enhancement of planning. The contribution can occur; if certain conditions are sustained such as establishment of geographical data provision system among public institutions. Obviously, these are connected with available technical and social infrastructure. Although, there is not a digital infrastructure system among the public institutions, several general directorates have started to provide some geographical information in their works. These efforts should be increased in quality and quantity. From the planning point of view, we argue that these are not even at satisfying level to work with the GIS in the plan-making processes. To prove our argument, the use of GIS and technology in the Bank of Provinces and private planning offices are inquired. The results of the thesis study show that the Bank of Provinces is in the transition period for the use of GIS. Private planning offices are in the initial stage and some of them seem unable to adopt themselves if the plan-making process becomes digital, because of the extra costs for them. Therefore, geographical data provision policies among public planning institutions will determine the future development of GIS in the planning process.

Keywords: Geographical Information, Geographic Information System, GIS, Planning, Bank of Provinces, Private Planning Office, Contribution, Technology, Turkish National Geographic Information System, Plan-making Process

ÖZ

TÜRKİYE'DE COĞRAFİ BİLGİ SİSTEMİNİN KENTSEL PLANLAMA SÜREÇİNE KATKISI

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Tez Yöneticisi: Doç. Dr. Çağatay Keskinok

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Bu tez, Türkiye'de Coğrafi Bilgi Sisteminin(CBS) kentsel planlama süreçine katkısı göstermeye çalışmıştır. CBS, doğru, güvenilir ve güncel coğrafi bilgiye erişimi sağlayarak, senaryoya göre alternatifler üreterek ve alternatiflerin değerlendirilmesinde katılımı sağlayarak, planlamayı geliştirebilir. Bu, CBS'nin planlamanın gelişimi için sağlayabileceği en üst düzeydeki katkısıdır. Eğer kamu kurumları arasında coğrafi veri sunan sistemler kurulması gibi şartlar yerine getirilebilirse, CBS'nin katkısı gerçekleşebilir. Kuşkusuz, bu şartlar var olan teknik ve sosyal altyapıya bağlıdır. Kamu kurumları arasında sayısal bir altyapı sistemi olmamasına rağmen birkaç genel müdürlük kendi çabaları ile sayısal data sunmaya başlamışlardır. Bu çaba, diğer kamu kurumlarına örnek teşkil ederek, coğrafi data sunan kamu kurumlarının niteliği ve niceliği artmalıdır. Planlama bakış açısına göre, bu örneklerin, plan yapma süreçlerini CBS ile birlikte yapmaya yetecek düzeyde olmadığı düşülmektedir. Bu düşünceyi ispatlamak için, GIS ve teknoloji kullanımının hangi düzeyde olduğu İller Bankası ve özel planlama büroları özelinde araştırıldı. Sonuçlar göstermektedir ki, İller Bankası'ndaki GIS kullanımı geçiş dönemindedir. Özel planlama büroları başlangıç seviyesindedirler ve eğer planlar sayısal ortamda hazırlanmaya başlanırsa ki bu fazladan maliyet yaratmaktadır, bazı bürolar bu değişime ayak uyduramayacak durumdadırlar. Bu yüzden, kamu kurumları arasındaki coğrafi veri sunum politikaları, CBS'nin planlama için gelecekteki kullanımını belirleyecektir.

Anahtar Kelimeler: Coğrafi Bilgi, Coğrafi Bilgi Sistemi, CBS, Planlama, İller Bankası, Özel Planlama Büroları, Teknoloji, Türkiye Ulusal Coğrafi Bilgi Sistemi, Plan Hazırlama Süreçleri

Dedicated to my dear wife, Arzu

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I would like to express my special appreciations to my family and my wife for their patience, encouragement and helps. I state sincere appreciation to Assoc. Dr. Çağatay Keskinok for his supervision throughout my university education and during this research as well. I offer sincere thanks to all staffs in the Bank of Provinces for great support, concern and comments. And I would like to thank all other friends for their helps.

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LIST OF ABBREVIATIONS

BUSKI:	General Directorate of Bursa Water and Sewer System
CAD:	Computer Aided Design
DHLI:	General Directorate of Operation of Airfields and Harbors
DSI:	General Directorate of State Hydraulic Works
EIE:	General Directorate of Electrical Power Resources Survey and Development Administration
ESRI:	Environmental Systems Research Institute
GIS:	Geographic Information System
GPS:	Global Positioning System
HGK:	General Commander of Mapping
IGABIS:	Istanbul Natural Gas Infrastructure Information System
IGDAS:	Istanbul Natural Gas Distribution Corporation
JEGA:	More Detailed Geo-technical Survey Needed Area
KHGM:	General Directorate of Rural Services
MTA:	General Directorate of Mineral Research and Exploration
TAKBIS:	Land Registry and Cadastre Information System
TCDD:	General Directorate of Turkish State Railways
TCK:	General Directorate of Highways

TEDAS: General Directorate of Turkish Electricity and Distribution Corporation

TKGM: General Directorate of Land Registry and Cadastre

TNGIS: Turkish National Geographic Information System

TPAO: Turkish National Oil & Natural Gas Company

UIS: Urban Information System

UVDF: National Data Exchange Format

XML: Extensible Markup Language

CHAPTER 1

INTRODUCTION

1.1. THE AIM OF THE STUDY

The aim of this study is to figure out the possibility of using Geographic Information System (GIS) in urban planning through a case study on the Bank of Provinces in Turkey. The study also attempts to show the possible effects of using GIS on private planning offices. The study will search under which circumstances GIS can be used in plan-making process. At the end, the study will define the principle guidelines of using GIS for planning. The guidelines will be derived from the inquiry of two examples, namely, the Bank of Provinces and the private planning offices.

Evolution of planning and computers goes on with their speeds. In the modernist era, planning was based on comprehensive planning in developed countries. At that time, the computer worked with a punched card machine. After a half-century, digital computer was invented. Criticism on comprehensive planning leads planning to towards strategic planning. With the invention of microprocessor in 20 years ago, the cost of computer has fallen dramatically and the capability of computer has increased enormously. Computer has become commonly used tool in planning and management. At the last decade, planning became more management-based project and participatory sustained platform at the hand of urban managers. The applications of computer have drastically started to change the way of working in our daily lives. In the development of graphics, distributed processing and network communications, GIS became widely used application in many fields, especially in management in developed countries.

However, the same development did not happen in urban planning in Turkey. In this sense, the study will search the question of "in which aspect GIS has been using in planning?" The study will mainly focus on this question as in the case study on the Bank of Provinces.

The Bank is the most important public planning institution, determining the general framework of plan-making process in the public administration, especially in 1/5000 scaled master development plan and 1/1000 scaled application development plan. Is the use of GIS in the Bank necessary for his work? Has the Bank appropriate infrastructure and knowledge on GIS? Under which circumstances can the Bank use GIS and what will be the possible effects on planning?

The reason to use GIS in many fields in developed countries can be listed as existing tasks more efficiently, new tasks not previously possible, data management, scenario modeling, value-added processing and information provision. Overall benefits of using GIS can be grouped into three: cost reduction, cost avoidance and increased revenue. To what extent, can those benefits be achieved with the use of GIS in planning in Turkey? Does the cost and timesaving sustain with the use of GIS in the public institutions, especially in the Bank of Provinces? If the Bank decides to prepare all plans with GIS, how will the private planning offices be affected by this change?

From the invention of computers to the development of geographic information technology, applications in the computer have attempted to enhance planning system. Although the achievements have helped different kinds of progress in planning system in developed countries, it could not go beyond being only a supportive tool. Since 1990s, many Turkish public institutions have started to establish geographic information system in their organization for sustaining more effective and efficient work environment. There achieved some progress in the use of GIS in the several General Directorates in Turkey. However, when overall technical and social infrastructures are considered as necessities for the use of GIS in planning in Turkish public administration, the achievements seem to be inadequate. Therefore, the study will conclude at the end that under which circumstances GIS can support the overall planning system. This will be derived from the examples of the Bank of Provinces and the private planning offices.

1.2. METHOD OF THE STUDY

Existing use of GIS in several institutions is investigated in terms of showing the capabilities and the results of GIS applications in Chapter 2. What the effects of GIS are in terms of time and cost is questioned at abroad and in Turkish public institutions such as General Directorate of Highways and General Directorate of Rural Services. How GIS can give efficiency in reaching the latest update geo-data to all staffs in the organization is searched as an example in Istanbul Natural Gas Distribution Corporation. The principal rules of GIS implementation in an organization and the requirements of administrative changes in the organization chart are shown in the example of Istanbul Metropolitan Municipality.

The information about the existing usage of GIS in public institutions in Chapter 2 is based on the conversations made and recorded by the author of study, and on the presentations that were prepared for GIS seminars in the General Directorate of Hydraulic Works in July 2003.

From the planning point of view, in a general sense, the Bank of Provinces is the major planning authority, planning procedures of which determine the plan-making process of municipalities in production of 1/5000-scaled master development plan and 1/1000-scaled application development plan. In Chapter 3, the relationship of the Bank of Provinces with external bodies, the capabilities, opportunities and possibilities of using technology and GIS in the Bank during plan-making processes are investigated. The performance of overall manual method of making a plan in the Bank is evaluated in terms of time consumption. Several plans prepared with the use of GIS in the Bank, are shown as examples.

Chapter 3 is based on interviews with related staffs in the Bank of Provinces in the summer of 2003, namely the manager of Information Technology Center, the manager of Mapping Department, the staffs and head of Survey and Procurement Department, the engineer in the Geological Department and two planners in different planning groups in Planning and Development Departments.

The opportunities of using technology and GIS are investigated in private planning offices in Chapter 4. The use of technology and GIS in planning offices are queried with survey forms applied in June-July 2003 (see; Appendix A). It is questioned that whether the private planning offices are ready for the change in plan-making process from manual method to technological method that GIS is used.

The effective use of GIS in planning is related with the availability of geographical data. The provision of geographical data policies should give an access to exchange the data freely among public institutions. According to the report of DPT (2001:28), there are at least nineteen public institutions dealing with planning and mapping works. All of these institutions should start to use GIS at the same time. The use of GIS in the organization is related with technical infrastructure and mainly, social infrastructure. An overall evaluation of all available infrastructures in the Turkish public administration can hardly be achieved under the scope of this study. Therefore, Chapter 5 will search the principle guidelines of using GIS in planning. It also attempts to find out the guidelines in terms of under which circumstances GIS can be used in planning.

CHAPTER 2

2.1. REASON FOR USING GIS IN PLANNING SYSTEM

GIS is a digital tool and works under certain conditions. The conditions can vary from technical infrastructure to organizational factors. To use GIS in the planning is a complex phenomenon, because planning deals with nearly all aspect of the life. Although GIS is very powerful tool, it cannot change the structure of planning by itself. The methodology of planning system determines how to use the tool. If the tool is used efficiently, planning will benefit from GIS. The benefit can be cost reduction and timesaving in plan making process.

Many of the public institutions should get involved at the same time in the use of GIS in order to work with GIS in the planning. According to the report of DPT (2001:28), there are nineteen major public authorities producing, using and benefiting from the map and cadastre services. At the moment, each public institution has not been using GIS, because the opportunity of each organization is different and there is no national policy for the support of GIS. However, there are several general directorates that have implemented GIS with their efforts as an example. The reason for using GIS is not so much clear. It can be assumed that there are some specific tasks such as map production and route selection etc. that GIS becomes an essential tool for these tasks because of the requirements of spatial nature in urban environment. This chapter will deal with the expectations from GIS and show how several institutions adopt themselves as examples to use GIS.

The benefits of using GIS will change according to which application area is used. However, in general, there are several advantages that can be listed as: existing tasks more efficiently, new tasks not previously possible, data management, scenario modeling, value-added processing and information provision. There is another category for the benefits of using GIS that can be faced when GIS is operated in the local government authorities like municipalities. The benefits can be grouped into three: Cost reduction, Cost avoidance and Increased revenue.

GIS has the major advantage of replacing paper maps and documents which have traditionally been duplicated throughout an organization and which require frequent updating and replacing. Tangible cost benefits can thus be achieved by removing the need for such paper documents and converting to GIS technology (www.geodata.soton.ac.uk). The automated mapping capabilities of a geographic information system have remarkable contributions more to cost reductions because they improve the productivity of drafter, engineers and other personnel who perform mapping in local government. These reductions can be in a large amount because the daily map updating and facility construction planning functions are labor-intensive and high-volume activities (Huxhold, 1991:245). GIS-based maps can quickly be updated, edited, printed or duplicated whereas traditional maps can take days of careful manual labor to achieve the same (www.geodata.soton.ac.uk). The automated mapping capabilities of GIS for the activities in the local government that listed below in Table 2.1 have been shown to increase productivity by as much as 25-75 percent over manual methods.

Table 2.1. Typical mapping and drafting timesaving by using GIS (Huxhold, 1991, p.245)

Drafting and mapping activity	Time saved (percent)
Updating tax maps	46
Updating zoning maps	32
Updating quarter section maps	45
Updating official maps	75
Updating sewer maps	50
Preparing background drawings for paving plans	50
Preparing background drawings for sewer and water plans	60

Overlay method is too much labor-intensive, because there is the difficulty with the manual overlay method, which includes registering maps that may be published at different scales or projections. The more layers of maps included in the analysis and the more complex they are, the more the likelihood of human error entering the analysis and the longer the process takes. GIS can take maps from different sources and register them easily and is consistent in its analysis of multiple layers of map data. It is also faster than manual methods of analysis, allowing the flexibility to try alternate variables in analysis (www.skyclean.org).

GIS provides the technology to perform tasks not previously possible because they were too time-consuming or not physically practical before automation. Multiple map overlays, generation of buffer corridors, surface interpolation and visualization of terrain models are examples of such sophisticated analysis (www.geodata.soton.ac.uk). These analyses are vital during the preparation of suitability analysis, which should be required to open new development areas in the plan. Buffer and slope analysis are shown in the next chapter of Figure 3.20 and 3.22 as examples for the use of these analyses in the plan-making process. Digital models can be created in a second if the geo-data is available (Figure 2.1.). The availability of data becomes crucial for GIS to operate.

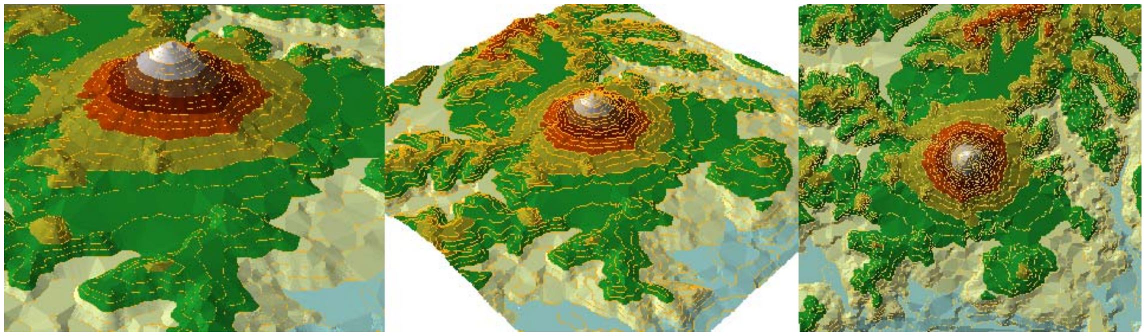


Figure 2.1. An example of terrain model; different perspective views of digital elevation model (Source: DEM is derived from ESRI sample data)

GIS provides all the advantages of controlled information management such as sharing data between multiple users, reducing data duplication and increasing security, accuracy, integrity and validity of data (www.geodata.soton.ac.uk). This is the benefit of database side that GIS provides. Shared access to a central database is much more efficient than providing numerous copies of the same data for everyone to view and alter as they wish. It is then that inconsistencies in the data arise and errors can develop and therefore the data become less reliable and useful (www.geodata.soton.ac.uk). To share geographic entities and the database in the organization will open a new gate that causes to attend more participants and take more comments during the process of making a plan. The planning decisions can be taken in a more transparent and democratic environment, as seen in many cases of collaborative planning at abroad in the literature.

GIS provides answer to many questions such as “location, what is at”, “condition, where is it”, “trends, what has changed since”, “patterns, what spatial pattern exists”, “modeling, what if” and aspatial questions (www.gisdevelopment.com). The question of “what if?” is the most sophisticated one that is needed in plan making process, because planning system predicts the future according to certain scenario. GIS provides capabilities to undertake modeling scenarios and test `what if?' type queries. This is an extremely powerful tool for planners whereby different potential outcomes resulting from changes to the input parameters can be tested quickly and efficiently. The potential for better-informed decision-making is thus greatly increased (www.geodata.soton.ac.uk).

GIS provides potentiality to create new information from existing data, through selection and combination analysis techniques. Individual data layers can be combined in numerous ways to produce further information layers (www.geodata.soton.ac.uk). The most important benefit of GIS is to form information provision systems:

> GIS tends to be based around the realization that information is a valuable resource to be utilized to its full potential. GIS provide very effective data management, retrieval and analysis tools, but perhaps the greatest strength of GIS is the capability to visualize

> spatial features and relationships. Knowledge of the location and characteristics of objects as well as their relationships to each other is crucial for effective management, planning and investment decisions. Increasingly it is becoming a statutory requirement for organizations to provide accurate and up to date information for a wide variety of purposes, thus the demand for GIS and other automated data handling systems is likely to increase (www.geodata.soton.ac.uk).

With the use of GIS, cost can be saved in the long run. The decrease in operating expenses of the organization is primarily caused by savings in time and by operating personnel in performing their tasks more efficiently. These savings can be directly related to budget reductions (Huxhold, 1991:244). GIS can increase revenues of a local government by selling data and maps, increasing property tax collections, and improving the quality of data used to apply (Huxhold, 1991:245). For example, in one Midwestern County, creating a continuous digital map of base properties in the entire jurisdiction allowed this county to collect property taxes on properties that had never been taxed before. The additional revenues received more than paid for the cost of GIS (Huxhold, 1991:249). Another example is from Britain, in which Ordnance Survey Data Providers in some countries attempt to recover the cost of data provisions. The data is protected by copyright and the agency itself already recovers 70% of its costs (GIS Diffusion, 1996:11). Another example is the establishment of soil information system by Soil and Water National Information Center in the General Directorate of Rural Services in Turkey. The overall cost of implementing and operating GIS in this center from November 1999 till 2003 is approximately $500,000. The total amount of selling geo-data for commercial use has reached $150,000 in two years. The recovery of cost with the existing trend will be completed approximately in five years (interview with Head of Soil and Water National Information Center in the General Directorate of Rural Services in June 2003).

In addition to cost savings, the benefit of using GIS occurs when the manner of identifying the problems that bases on geography is realized, and when the use of GIS has been diffused to the other organizations. GIS-based analysis performed on one project can often exert multiplier effects by attracting attention from another field. For example, GIS components of various projects in West Africa have generated much interest among policymakers from other ministries and neighboring countries (Tunstall, 2001).

The manner of identifying the problems with computer has been developing in Turkish public organizations. By this way, the use of GIS diffuses to the external authorities. For example, in the last decades, Bursa Metropolitan Municipality made approximately several million USA dollars investment on GIS with Intergraph software vendor. Multiplier effects of this investment is seen today in other organizations such as Bursa Police Department, General Directorate of Bursa Water and Sewer System (BUSKI) and Uludag University etc. Bursa Police Department would establish Computer Aided Dispatching and Management Center, because the base map of whole Bursa region and digital geo-coding address service for the streets and apartments was available in the municipality and transferred to the Police Department (Aksoy, 2002).

The implementation of GIS in the same region such as land consolidation planning studies by Uludag University (Aslan, 2002), the traffic accidents inspection and evaluation project by Bursa Metropolitan Municipality (Işık, 2002), and the integration of sewerage data to GIS by BUSKI (Hasal, 2002) are some examples that GIS diffuses into other organization when the geo-data becomes available. The goal of all these applications is to provide more efficient and effective service to public.

Figure 2.2 shows the baseline cost comparison chart that is used first by Hank Emery in the mid 1970s. The baseline cost comparison chart emphasizes the benefits associated with GIS technology by comparing the costs of running local government without using GIS to the costs of running local government with GIS. The difference between the two is the benefit of GIS (Huxhold, 1991:250).

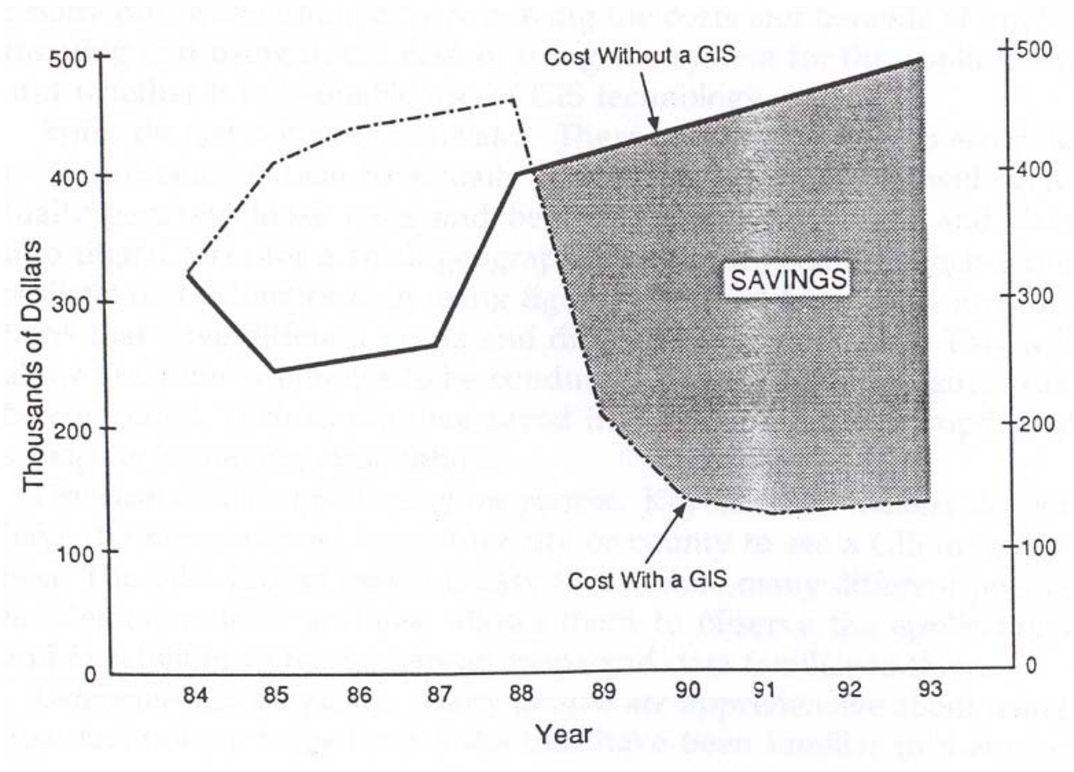


Figure 2.2. Saved cost with GIS in the local government in the period of ten years

(Source: Huxhold, 1991:250)

Huxhold (1991:250-251) explains the benefit analysis of GIS with the chart as:

> Solid line represents the costs of mapping and geographic information processing tasks in local government projected over a ten year time frame using traditional manual methods. The line slopes upward because it represents the cost of tasks that are labor-intensive and therefore always increasing. The dotted line is above the solid

line in the beginning of time frame, because of additional costs for implementing GIS early in the project. The shaded area, labeled "savings," is a graphical representation of the benefits associated with the use of GIS.

The cost of mapping and geographical information tasks in local government can be reduced with the use of GIS after almost five years of GIS implementation as shown in chart, although the implementation cost exceeds the initial cost of running geographical information tasks in the earlier stage. The same cost savings is happened in the General Directorate of Rural Affairs. If the sale of geographical data for commercial usage goes in the same trend, all implementation and operation cost of GIS in the institute will be recovered in almost seven years.

The similar cost and timesaving have happened in the General Directorate of Highways, after the use of GIS in the organization. The General Directorate of Highways has started a pilot project for implementing GIS in 4^{th} Regional Office in Ankara. Regional office has measured their efforts for providing geographical

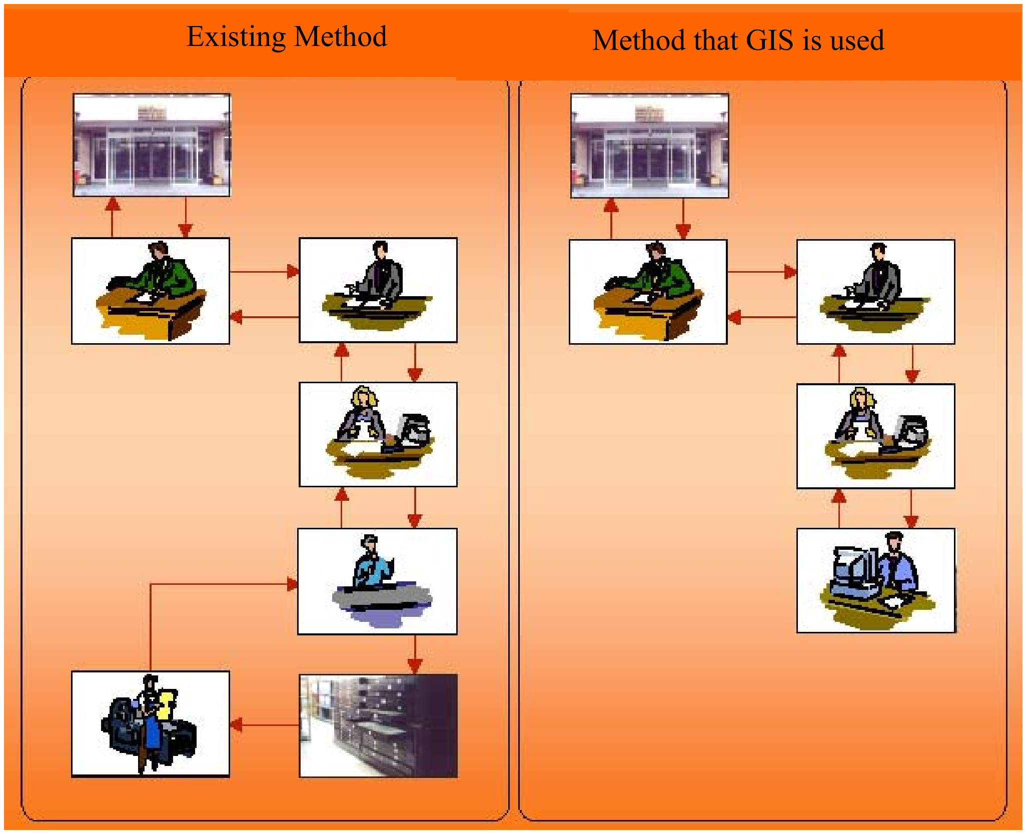


Figure 2.3. The flowchart for comparison of existing method with the method that GIS is used (Source: Presentation of General Directorate of Highways for GIS Seminars in State Hydraulic Works in July 1st, 2003)

information to external authorities with using GIS and with manual methods in terms of time that spent for this task, cost and the number of personnel worked for it. For example, Ministry of Forestry has requested a map. The map would show the land acquisition boundary of highways that passes on the forestlands. Maps will be prepared in two different ways: first one is by traditional existing manual method and the second is by using GIS. Flowchart of two different methods is shown in Figure 2.3.

In the existing method that GIS is not used, the request letter from Ministry of Forestry reaches to Regional Office. The letter will be sent to related department. Lead engineer of land acquisition will transfer the letter to related engineer. The engineer will give the list of requested maps to officer. The officer will find related maps in the archive (Figure 2.4).

Figure 2.4. Maps in the archive

Maps and documentations will be delivered to copy center. All maps will be copied and original ones should be sent to archive in order to put properly (Figure 2.5). Copied maps will be classified and attached with the letter in order to send to the Ministry.

Figure 2.5. Multiple copies of maps in copy center

In the second method that GIS is used, the differences between two methods starts when lead engineer transfers the letter to related engineer. Related engineer gives the request directly to GIS Expert. GIS expert prepares the maps as a hard and soft copy of map in the requested format and attaches with the letter in order to send to the Ministry. Although the differences in between seem to be little, the consumption of time and cost, and the number of working personnel for this task is enormous, as summarized in figure 2.6.

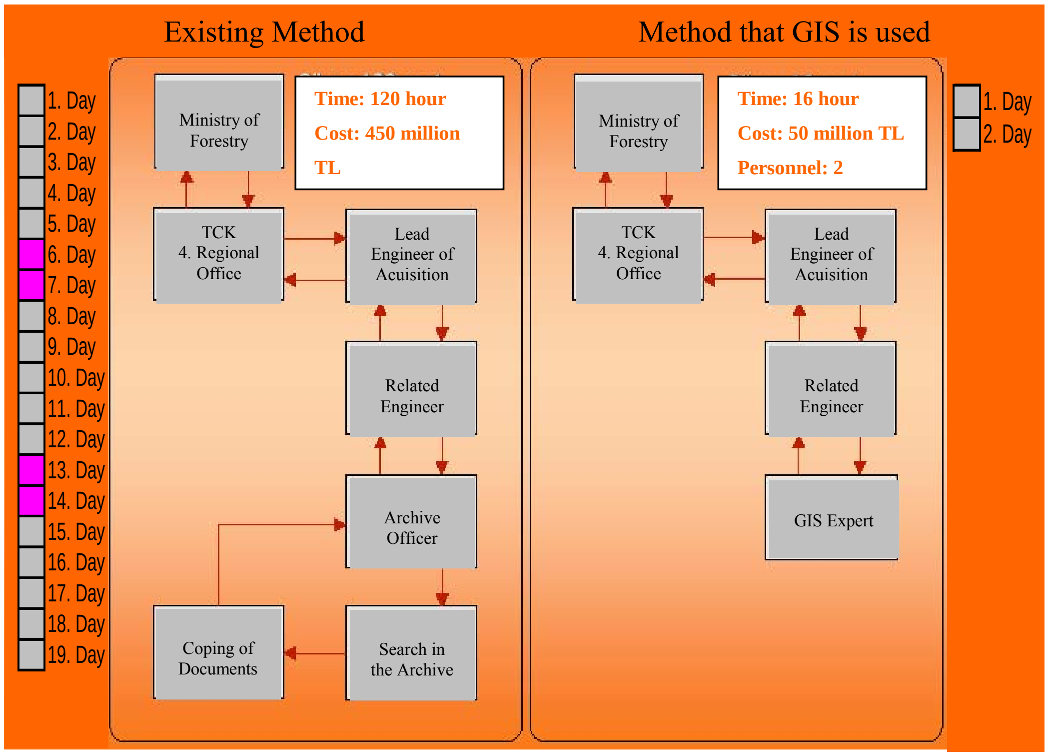


Figure 2.6. The cost differences between two methodologies (Source: Presentation of General Directorate of Highways for GIS Seminars in State Hydraulic Works in July 1st, 2003)

In the first method, the work is completed in 19th day (120 hours of working day), whereas in the second, the work is completed only in two days. The cost in the first method is nine times higher than the second method. The number of working personnel for this work in the first method is seven times more than the second method. These are the differences of operation cost between the use of GIS and the use of manual method. The benefit of GIS in Turkish public institutions will create cost reduction in those amounts.

2.2. THE USE OF GIS IN ORGANIZATIONS IN TURKEY, SEVERAL EXAMPLES

The use of GIS in organizations can be categorized into four groups. First group is that GIS program will work standalone in several personnel computers in organization. GIS works separately and only helps to the user. Second group is that one unit is responsible for using GIS in one department. This can limit the flow rate of geographical information among departments, because the interaction of digital geographical information from responsible unit to the other department does not occur and the interaction will work on hard copy of maps. This results in slowing down the flow of information. Third group is that the use of GIS is distributed among several departments with shared responsibilities. In this way, specific tasks are carried out with the use of GIS by coordination of workflow among departments. Last group is the enterprise solutions. The tasks are managed with the use of GIS not only in several departments but also in the whole organizations which includes the exchange of digital geographical information between headquarter of organization and its branch offices. Within this categorization, existing use of GIS varies in four groups with their combinations in Turkish organizations. Next section will give several different examples in the use of GIS.

2.2.1. Operational and Functional GIS in the Utility Management

This case is chosen to show the most advanced use of GIS in one of the institutions, which is in the fourth category, enterprise solution. Istanbul Natural Gas Distribution Corporation (IGDAS) distributes natural gas to Istanbul and has reached to serve 70% of region with over two million subscribers. IGABIS is an infrastructure information system, which analyzes and stores all network of natural gas structures with coded streets, buildings and information about subscribers (Figure 2.7 & 2.8). The integration of information about subscribers with geographical information is continuing. When this progress is finalized, all documentation of subscribers can be operated in the system. The subscribers can be queried as shown in Figure 2.9.

The goals of IGABIS is to provide data and base map to other departments for operating their works, to give an digital access to reach integrated information of

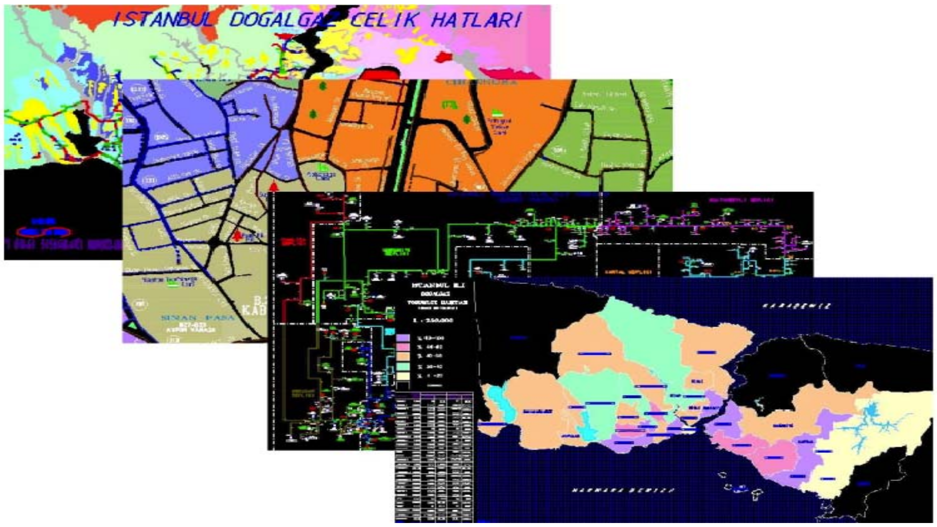


Figure 2.7. Different views from the IGABIS

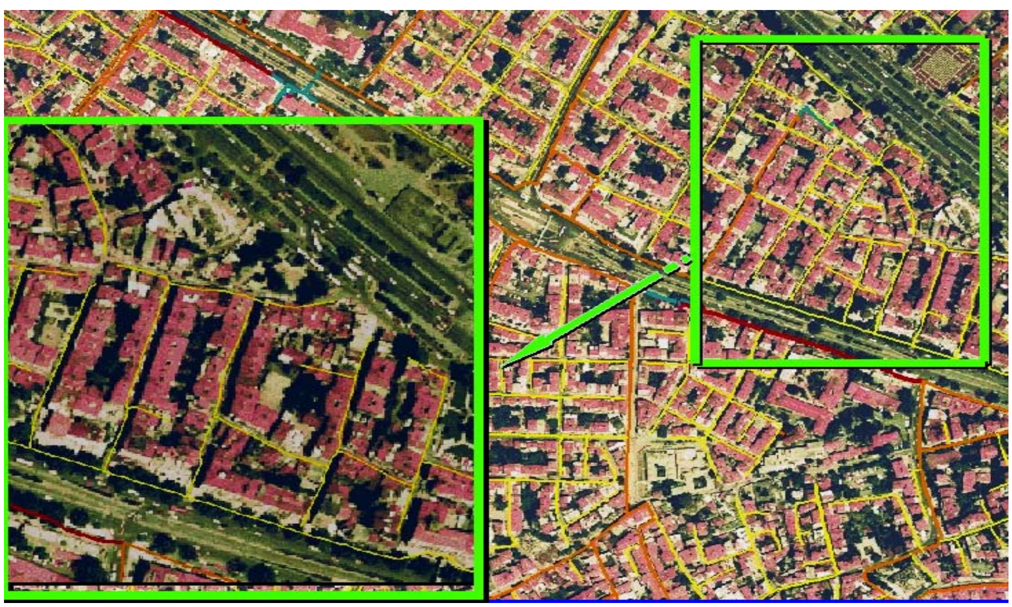


Figure 2.8. Digital natural gas pipeline network superimposed on IKONUS satellite images.

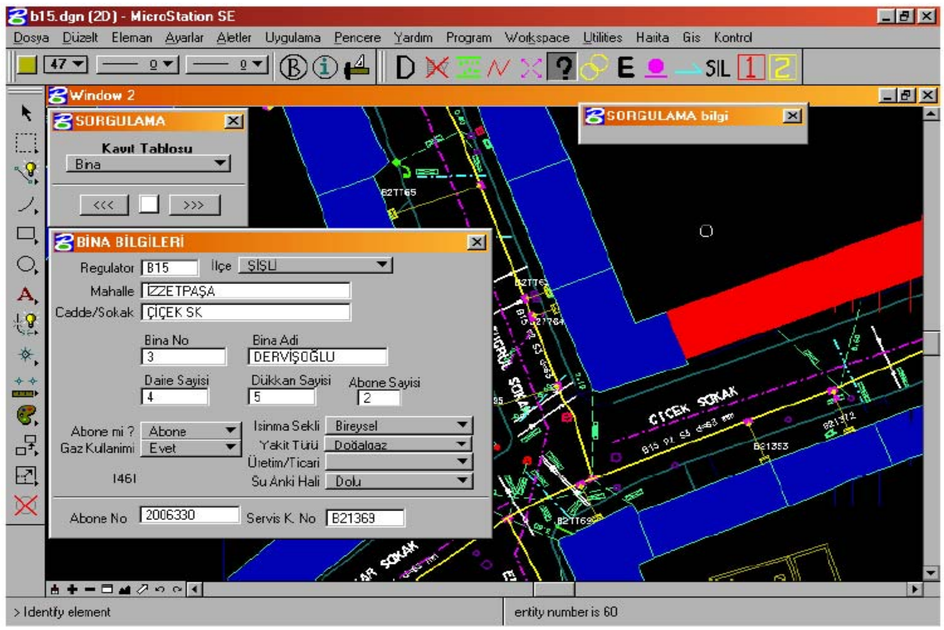


Figure 2.9. Query of information about subscribers that linked with geographical features

infrastructure to other departments by sharing and publishing the data, to work for the use of geographical information more economic and effective way, to maintain, update and share the geographical information, and to keep all information more accurate and precise way within the standard of national coordinate system.

Up to now, this information system in IGDAS has achieved to display and analyze geographical information, to produce desired format and different scaled maps such as 1/200 scaled as-built plans (Figure 2.10 & 2.11), to update related maps, to make statistical calculations, to exchange information with other institutions, to publish and share online all information through intranet, to make survey works and to prepare route selection projects.

IGABIS is integrated to all parts of organization such as from the department of survey and mapping, information systems, production control and construction, marketing and sales, technical safety and civilian defense, to technical works and maintenance. Besides this integration, IGABIS takes information with his connection from SCADA system, which monitors online all networks in order to work the system more safe and healthy. In case of any unexpected events such as explosion or changes in the pressure of gas, the SCADA system can control the flow of gas by closing or opening the related valves.

Intranet application is even opened to technicians. If technician is coming from the field in regional offices, he can enter the system with his user name and password, and can update the information. The system is opened to all workers in IGDAS and update mechanism is online, therefore the system can be used in daily works (Figure 2.12).

IGABIS gives opportunity to exchange the latest information immediately with the other institutions. IGDAS has a relationship between several external institutions

Figure 2.10. Production of digital maps

Figure 2.11. 1/200 scaled as-built plans that produced by IGABIS

Figure 2.12. Possibility of reaching geographical information through intranet

such as Istanbul Metropolitan Municipality, Istanbul Water and Sewer System Institute, District Municipalities, Turk Telecommunication Institute, Turkish Electricity Distribution Corporation and other institutions.

Under the consideration of four categories, as explained above, the use of GIS in IGDAS is under the category of an enterprise solution. All the information given in this section refers to conversation that is recorded and presentation prepared by Survey and Mapping Department in IGDAS for GIS Seminar in General Directorate of State Hydraulic Works in July first, 2003.

2.2.2. The Use of GIS in Municipality of Greater Istanbul

Municipality of Greater Istanbul uses GIS. It is very important in the sense that what kind of organizational structure is required to operate GIS in such a biggest institution. This structure will give a clue for the establishment of GIS in other organizations.

The responsible organ for the operation of GIS in the municipality is the Coordination of Information Technology Section, which works under the status of Information Technology Department. The Information Technology Department plays a major role in the establishment of GIS into any organization. GIS can be applied to other departments for their specific works, but the maintenance and operation of GIS should be managed by Information Technology Department or by a specific section that works under this department. GIS is directly related with information technology, because GIS uses infrastructure of information technology department.

The activities of Coordination of Information Technology Department to work for the establishment of Urban Information System can be listed as, Disaster Coordination Center, Vehicle Following System with Global Positioning System, Clever Route Selection Queries and publishing of Urban Guide through Internet etc.

GIS is used to a certain extent in some of the units in the municipality. If these studies are not structured under one shared framework, it will not be a meaningful for the whole organization. Therefore, when the department has started to establish Urban Information System, their first attempt was to work on the system design in the whole organization. A new commission, the Commission of Searching GIS Data Model and Data Standards, is charged with this duty. This commission interviewed with 13 units in the municipality in order to find out the relationship and workflow of units and with 10 private companies in order to find out how GIS can operate in the organization more effectively and efficiently. System design work that prepared by the commission covers defining GIS needs in all units of municipality, forming basic concepts for urban services, determining system model and standards, forming administrative structure of GIS, identifying basic geo-layers that have to find in the system, sharing and updating mechanism of these data by the responsible units, upgrading the latest version of GIS software that will be used in the Urban Information System, and training related staff to learn and use the programs.

Organizational structure of Urban Information System (UIS) in the municipality is formed under three sections; namely, UIS Management Committee, UIS Technical Coordination Committee, and GIS Operation Unit for UIS. The importance of management committee is that all heads of departments in the municipality such as head and deputy head of general secretary of municipality, head of information technology department, head of planning and development department, head of transportation department, and general manager of external bodies such as Istanbul Water and Sewer System Institute and Istanbul Natural Gas Distribution Corporation should attend to this committee. To operate a successful GIS application in the organization can be sustained with the coordination of responsible units.

Many new staff should also be placed in the organization such as GIS Manager, System Manager, Database Manager, GIS Analysts, GIS Application Programmer, Data Automation Expert, Data Entrance Officer, Hardware/Software Technical Support Expert and Trainers. This requirement comes from the difficulty of finding personnel that uses GIS program and knows how to work in the job. GIS has started to develop mainly in the last decades in Turkey. The young educated staff knows what to do with the technology, but do not know how to use this technology in the organization.

The list of geo-layers that should exist in the municipality's system and the name of units that are responsible for providing those geo-layers to the organization are summarized below as in Table 2.2.

Table 2.2 Official work distributions

List of geo-data that exist in the system	Responsible Unit
Administrative boundaries	Mapping Department
Building and its information	
Cadastral parcels and building blocks	
Ownership information	
Field information (address codes)	
Center lines of road	
Information about public institutions such as Health, Education, and Orphanage etc	Coordination of Information Technology Department
Population information based on neighborhood	
Cemetery and tent areas	
Fire station, and water station and depots	
Consulate building, Dormitories	
Public bread buffets	
Municipality emergency aiding units	
112 emergency aiding stations	
Road network information	Transportation Coordination Department
Public transportation network	
Transportation system	
1/5000 scaled geological maps	Ground and Earthquake Inspection Department
1/5000 scaled settlement suitability maps	
1/200 scaled natural gas pipeline maps	Istanbul Natural Gas Distribution Corporation (IGDAS)
Infrastructure projects	
Superstructure facilities	
Natural gas route risk and consumption density analysis	

Some of GIS applications as examples in Municipality of Greater Istanbul's urban information system are online digital traffic watching system (Figure 2.14), inquiring geological structure of whole Istanbul region through Internet (Figure 2.15), the best shortest route selection for ambulance and fire vehicle (Figure 2.16 and 2.17). The traffic is watching online with 22 digital cameras that are located around the region and those cameras can also be watched through the Internet. All geological maps of Istanbul are published digitally and open to the use of public in the Internet and are ready to be queried.

All information given in this section is based on conversation that is recorded and presentation prepared by the Coordination of Information Technology Section in Municipality of Greater Istanbul for GIS Seminar in the General Directorate of State Hydraulic Works in July first, 2003.

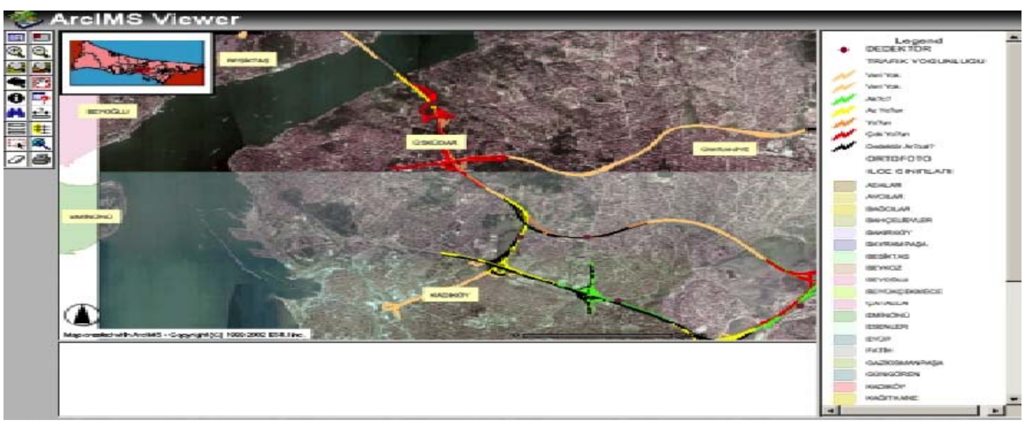


Figure 2.13 Online digital traffic watching system

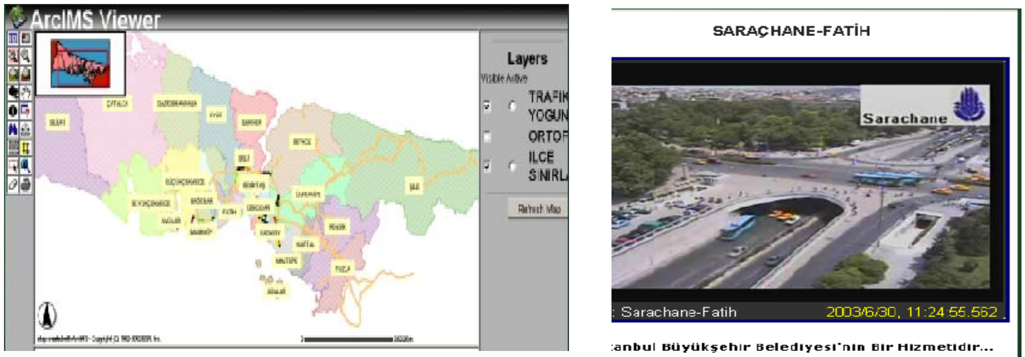


Figure 2.14. The location of 22 cameras in Istanbul and one view of camera

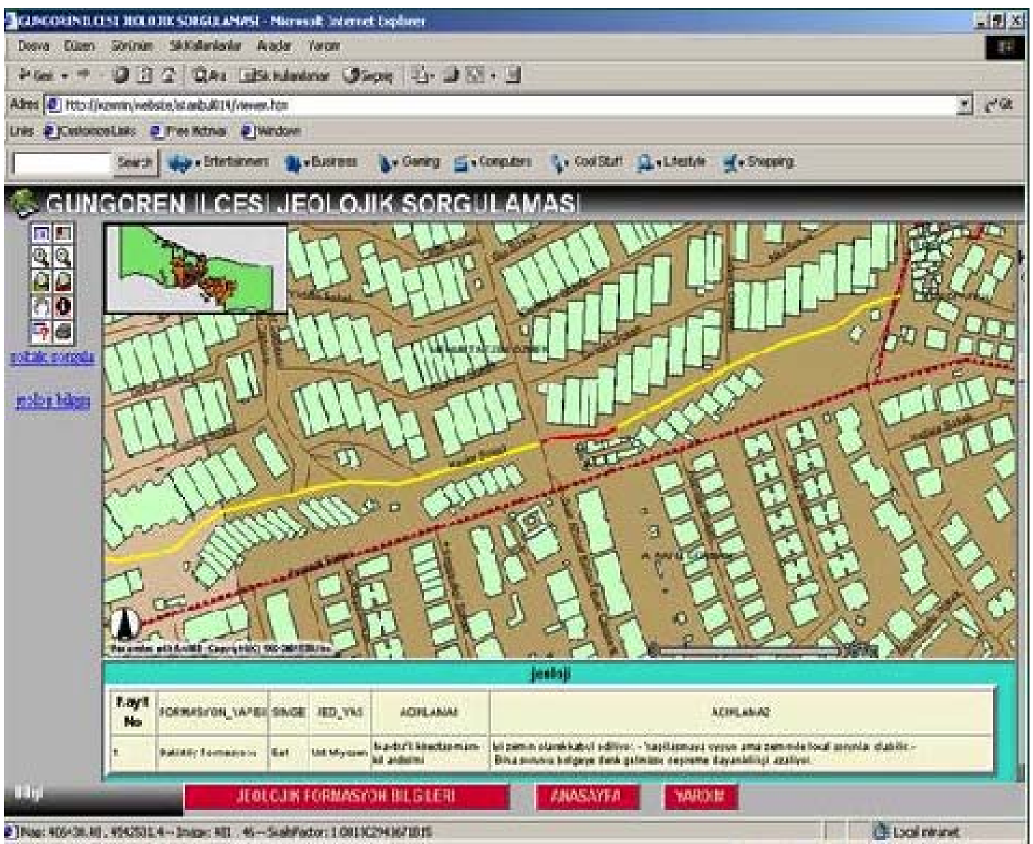


Figure 2.15. Query of Geological Maps through the Internet

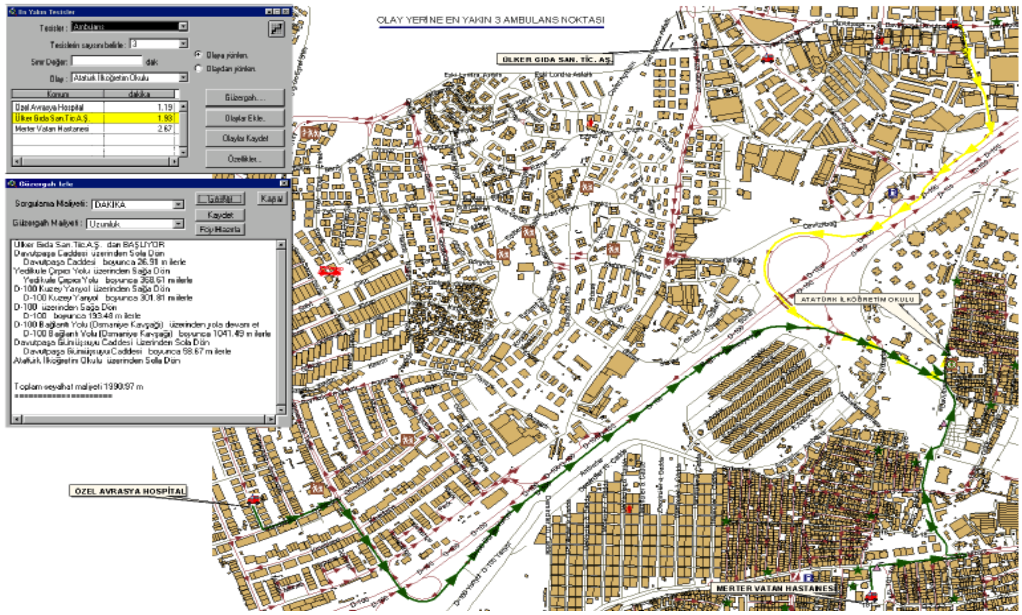


Figure 2.16. Nearest route selection for the ambulance closest to the accident

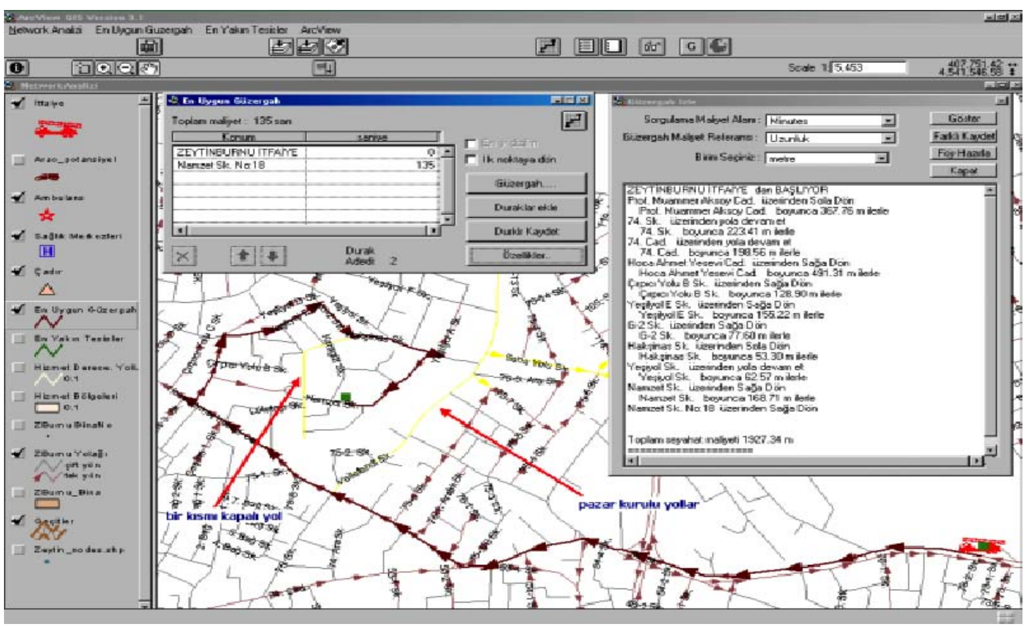


Figure 2.17. Fire notification from one address in order to dispatch the fire vehicle

CHAPTER 3

3.1. PLAN-MAKING PROCESS IN BANK OF PROVINCES

From the planning point of view, in a general sense, the Bank of Provinces is the major planning authority, planning procedures of which determine the plan-making process of municipalities in production of 1/5000-scaled master development plan and 1/1000-scaled application development plan. In order to enhance plan-making process with contribution of GIS, the workflow of Bank of Provinces will be shown in the chapter.

The workflow will be analyzed in terms of time, because in addition to other benefits, such as better visualization capabilities, making more detailed queries and analyzes, main benefit of using geographical information technology solutions is to decrease the duration of plan-making process. The use of GIS decreases time consumption in the plan-making process, because it can form a shared framework between public institutions. The use of GIS can make easy the flow of geographical information among institutions.

Municipality has two ways of making new development plan. The first way is to apply to the Bank of Provinces. Second is to make the plan by himself. This study involves primarily in the public institution. Therefore, the relationship between plan-making process and GIS in the Bank will be studied. The Bank obtains the plan in two ways. First way is to make the plan as in the trust phase and second way is to put the plan making process out to tender as in the procurement phase.

The three phases during the plan-making in Bank of Provinces are preliminary phase, procurement or trust phase and control phase. After correction of plan in the control phase, plan will be approved by Bank and submitted to the municipality.

3.1.1 Preliminary Phase; Collection of Data from Public Institutions

In preliminary phase, process can be divided into three steps. The first is the preparation of base map, second is the collection of first priority information from related five public institutions such as General Directorate of State Hydraulic Works, General Directorate of Turkish Electricity and Distribution Corporation, General Directorate of Highways, General Directorate of Forestry and General Directorate of Rural Services, the last is the collection of secondary information, if it is needed.

3.1.1.1. The Preparation of Base Map with Tender Process

The plan-making process starts with the base map. It will be prepared by Mapping Department (Figure 3.1). The department searches the availability of base map in his map archive for the requested area. In the map archive, base maps – prepared before 1996 - are stored as hard copies. Base maps prepared after 1999, (or if transition period is not taken into consideration, after 1996) maps are all in the digital format and stored on CDs. There is no attempt to convert hard copy maps to digital form.

There are several advantages of preparing maps in digital format. When a map is drawn in the computer, software gives great opportunities to the user. There have been created a lot of useful tools for the purpose of preparing a base map in Turkish drawing programs such as Netcad, Eghas and Cartocad according to the large scaled map-making regulation. In digital map archive, maps are stored in its original format in which software it was prepared. Three formats exist in the map archive namely: AutoCAD, NetCAD and Eghas. Approximately %80-90 of digital format is Netcad, the rest of them are Eghas and AutoCAD.

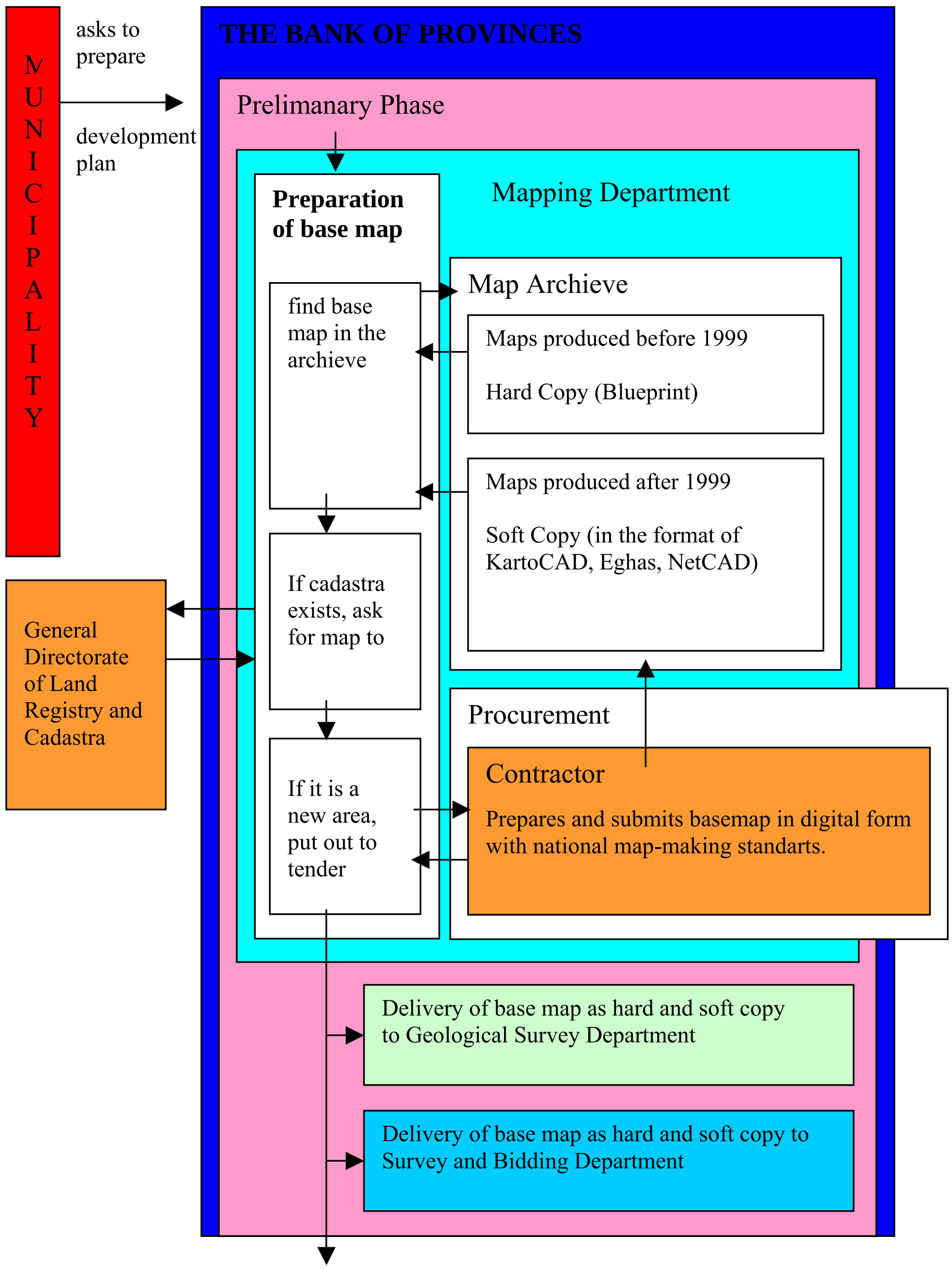


Figure 3.1: The preparation of base map

Every one can purchase soft copy of base map, when he pays the delivery cost, which is around 8.5 million TL in 2003. The digital data is given on CD. If it is first in the demand, it is free for the municipalities. If needed later on, municipality also has to pay the delivery cost. If the requested area is new and map is not found, the department will put the preparation of base map out to tender. Map producer contractor would work for it and submit hard and digital copy of map to the Bank of Provinces on the format in which software he uses. It would be mainly Netcad, because most of map producer offices uses and believes that Netcad is the right tool for making a map. According to the experience of Head of Mapping Department, these private offices complete approximately 1500 ha area in 4 months under normal conditions. This is fairly fast progress. Mapping Department submits hard copy of base map as a blueprint and digital copy on CD as mostly in Netcad format to the Survey and Bidding Department, Planning Department, and Geological Survey Department.

If there is any cadastral map in the working area, the Department asks cadastral situation from General Directorate of Land Registry and Cadastre. The institution delivers the cadastral map as a blueprint copy to the Mapping Department and then to Survey and Bidding Department. General Directorate of Land Registry and Cadastre has GIS, namely Land Registry and Cadastre Information System (TAKBİS), which stores cadastral maps in the digital form as a rectified geo-data and land registry as a record in the database. Digitization process still continues by converting analog maps into digital form as geo-data. The system can give the maps as hundred percent compatible as with the Netcad and Eghas formats. Even though digital cadastral maps are available for some of the requested areas, the exchange of cadastral situation to Bank of Provinces goes on formally with the hard copy. The reasons of exchanging information on hard copy are that the parcel boundaries are the legal boundaries and could not be changed by any un-authorized users. When the parcel boundaries are submitted with the soft copy of map, the General Directorate worries that the boundaries can be changed very easily.

3.1.1.2. Preparation of Internal Input: Geological Map

When the base map is obtained from Mapping Department, Geological Survey Department starts to prepare geological map step by step (Figure 3.2). First step is to make pre-study before going to the field. Pre-study researches the definition of rock types. If the planning area is close to that of previous plans, the Geological Survey Department searches the map from geological reports. If not, the Department searches the rock types from several institutions, namely, General Directorate of State Hydraulic Works, General Directorate of Mineral Research and Exploration, General Directorate of Disaster Work, universities and Internet. The department would ask the information about the boundary of flood, landslide, avalanche and rock falls etc. from the public institutions. The requested information can be found especially in the General Directorate of Disaster Work.

With the help of gained information, one geology engineer, who works in General Directorate or Branch Offices of Bank, makes classic geological field survey. During field survey the use of technology is too limited. The engineer makes his observation and draws boundaries of geological areas on the base map by hand without using any device in the field.

The types of area are classified into three categories: Preventive Areas, More Detailed Geo-technical Survey Needed Areas (JEGA) and Hazardous Areas. If the area is classified as JEGA, a new geo-technical survey should be done. Machine Drilling Department makes this further survey. If the municipality wants to speed up the process, he will put the geo-technical survey out to tender. One of the universities or private offices can complete this task under the scope of new contract. After this survey, the type of the area is determined.

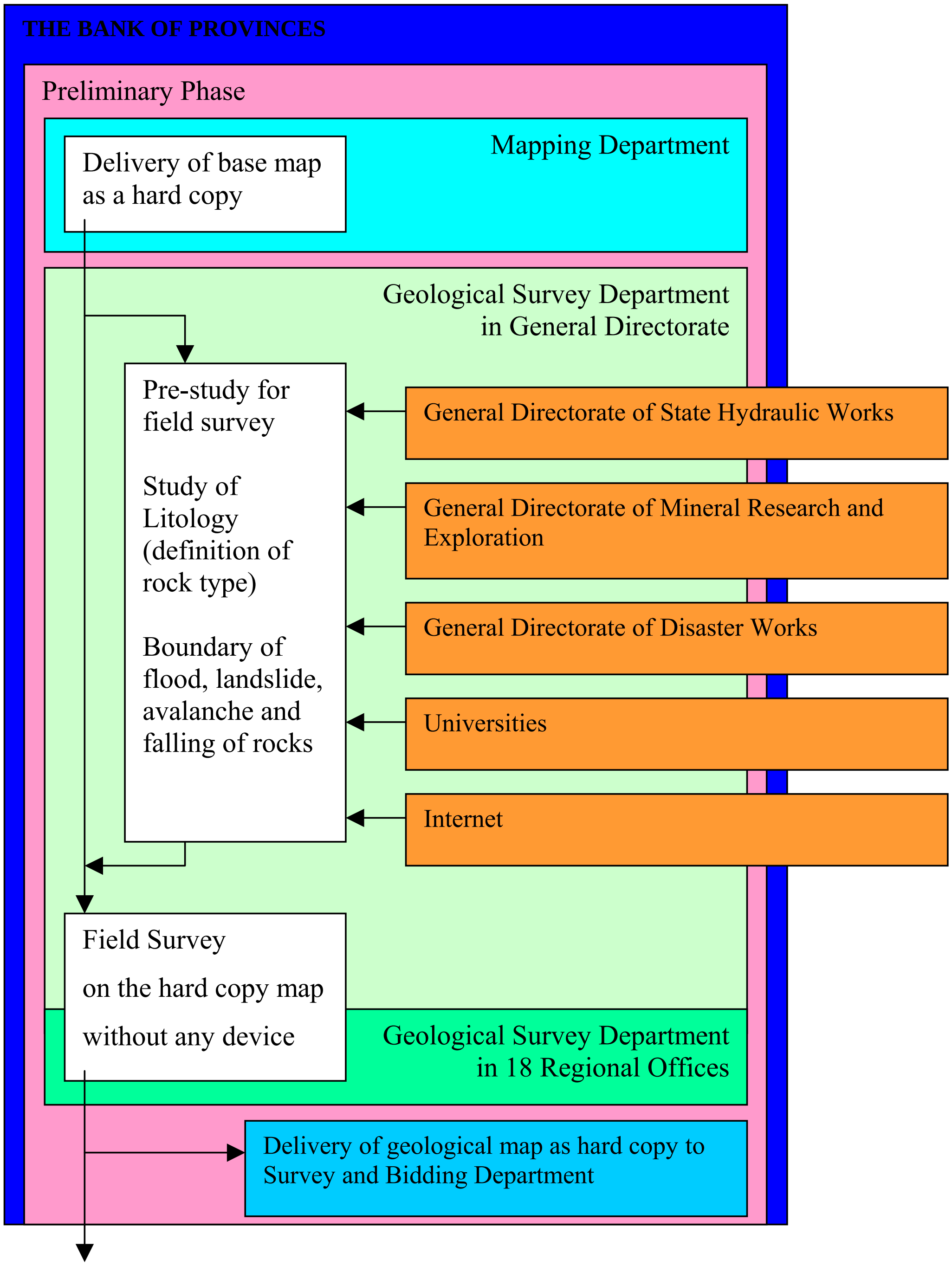


Figure 3.2: Preparation of the geological map

If the area is classified as “hazardous areas”, then General Directorate of Disaster Works goes to the field in order to control the classification and boundary of the area. After being accepted as “hazardous areas” by General Directorate of Disaster Works, the approval of boundary goes to the Council of Ministers. To classify someone’s immovable property as a “hazardous areas” means that the right of using this asset is restricted. The restricted boundary in the map is shown to public in one year during announcement process for review and comments. Even though the Council of Ministers approves the boundary, the owner has a right to go to the court. Restriction for the use of the asset can be changed by court decision according to the report of expert in the court.

When any area is classified as “hazardous areas”, the duration of the process increase tremendously. This can be shortened with the procurement via putting out to the tender, as depending upon municipality’s financial capacity. If it does not or the area is classified as “hazardous areas”, no body knows how many years the process will take, because the coordination of working together on the geographic issues with several public institutions are the most longest process in Turkish Public Administration. Identification of the boundary and type of geological area, which needs detailed survey with more accurate devices, is the longest part of the process. To verify the coordinates of area with GPS device in the field can be matched easily and faster on the map with GIS.

Technological capabilities vary to a large extent in public institutions. It is obvious that there is a need for a well-organized framework among public institutions. This will provide a base for sharing and exchanging geographical information.

When classification of all geological areas is completed, geological map is submitted to the Survey and Bidding Department. This map will serve the settlement suitability analysis from geological aspect in the plan.

3.1.1.3. Collection of First Priority Information

During the preliminary phase, the Survey and Bidding Department asks geographical information from public authorities within two stages: collection of first priority information and secondary information. In the first stage, there are five public institutions, namely: General Directorate of State Hydraulic Works (DSİ), General Directorate of Highways (TCK), General Directorate of Turkish Electricity and Distribution Corporation (TEDAŞ), General Directorate of Forestry and General Directorate of Rural Services (KHGM). Thematic maps are requested for each plan from these institutions. The department sends fixed number of blueprint copy of the base map to the each public institution. Related public authority draws his information on blueprint copy by hand and delivers to the Bank. The way of exchanging maps with the new information among public institutions follows on the same procedure.

Figure 3.3 shows the flowchart of the collection of first priority information. Firstly, irrigation channels, flood boundary of rivers and boundary of improvement projects are requested on the base map from General Directorate of State Hydraulic Works; expropriation boundary of highways, proposed boundary of profile and route from General Directorate of Highways; existing and proposed high voltage lines from General Directorate of Turkish Electricity and Distribution Corporation; usable and un-usable agricultural lands from General Directorate of Rural Services; and boundary of the forests from General Directorate of Forestry. The last item, the geological map, is prepared internally by Geological Survey Department in the Bank. Geological map as a hard copy is delivered to the Department. All requested maps are collected and bended in order to put the plan out to tender as in the Procurement Phase or to start the preparation of plans in the Bank as in the Trust Phase.

According to the Head of Survey and Bidding Department, the collection of requested geo-information from public institutions will be completed in 5-6 months under normal conditions. If there is already any project for the working area, the duration of delivering map to the Bank will be completed after waiting period of two

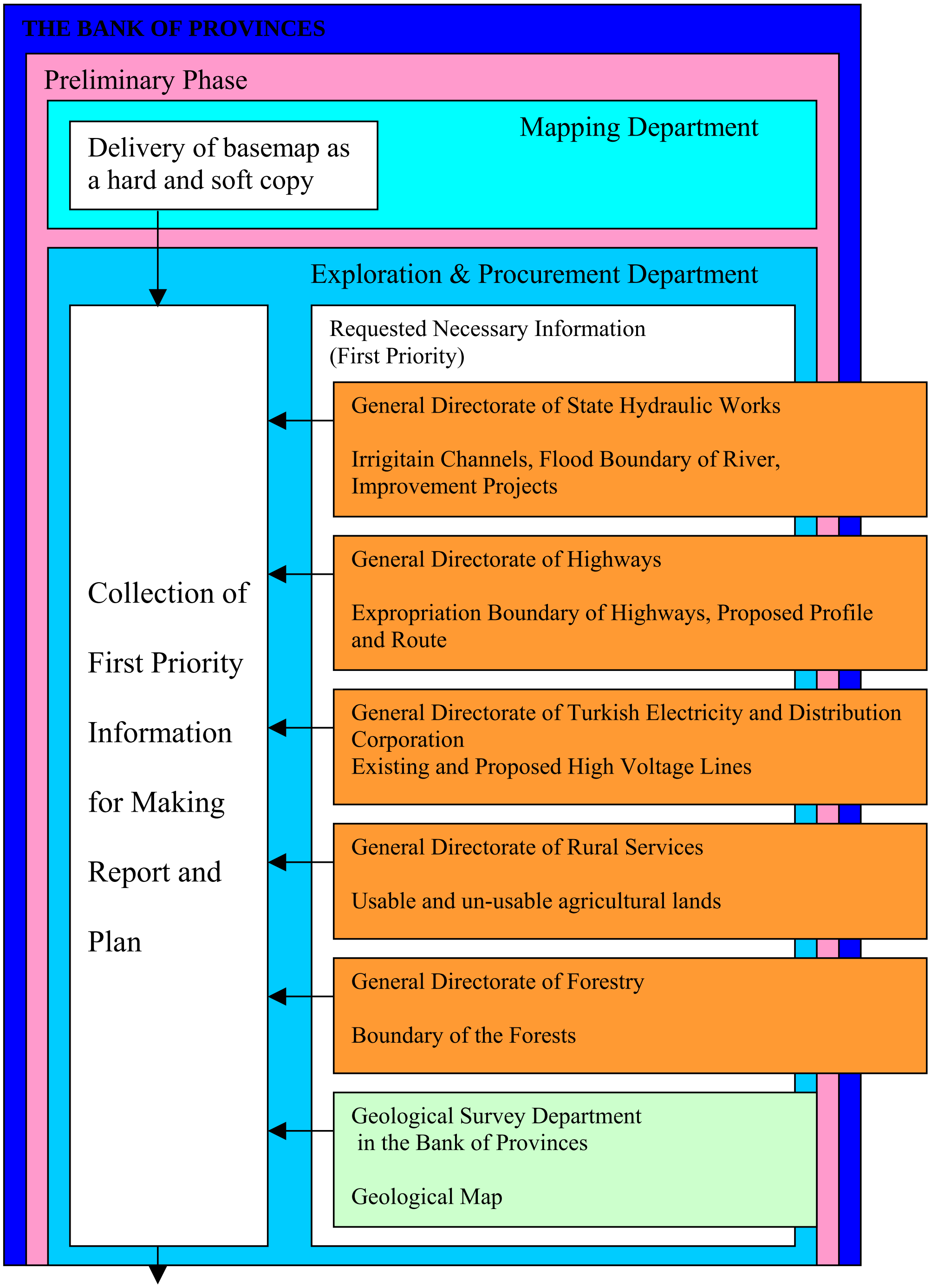


Figure 3.3: The collection of first priority information

or three years. The institution does not have any opportunity to show the progress of project results step by step. So, the institution prefers to wait the completion of project. Afterwards, the information is sent to the Bank.

3.1.1.4. Collection of Secondary Information

Next stage is optional. At this stage, secondary information can be collected from twelve public institutions. According to the properties of planning area, the information can be requested from those institutions, if it is needed. Figure 3.4 shows the list of requested information and where this information is taken originally. In most cases, it is not realized that this information is needed before going to the field, because there is no overall stored geographic information for the whole country. So this stage can be followed not only in Preliminary Phase but also in Trust Phase or in Procurement Phase. The duration of taking information from related public institution is different and ties with the response time of the institution. In many cases, the planner in the Bank advises municipality to speed up the progress by following the requested information from public institutions.

When GIS is established in the public institution, one of the advantages for user can be that it allows to reach latest update geographic data and to see all

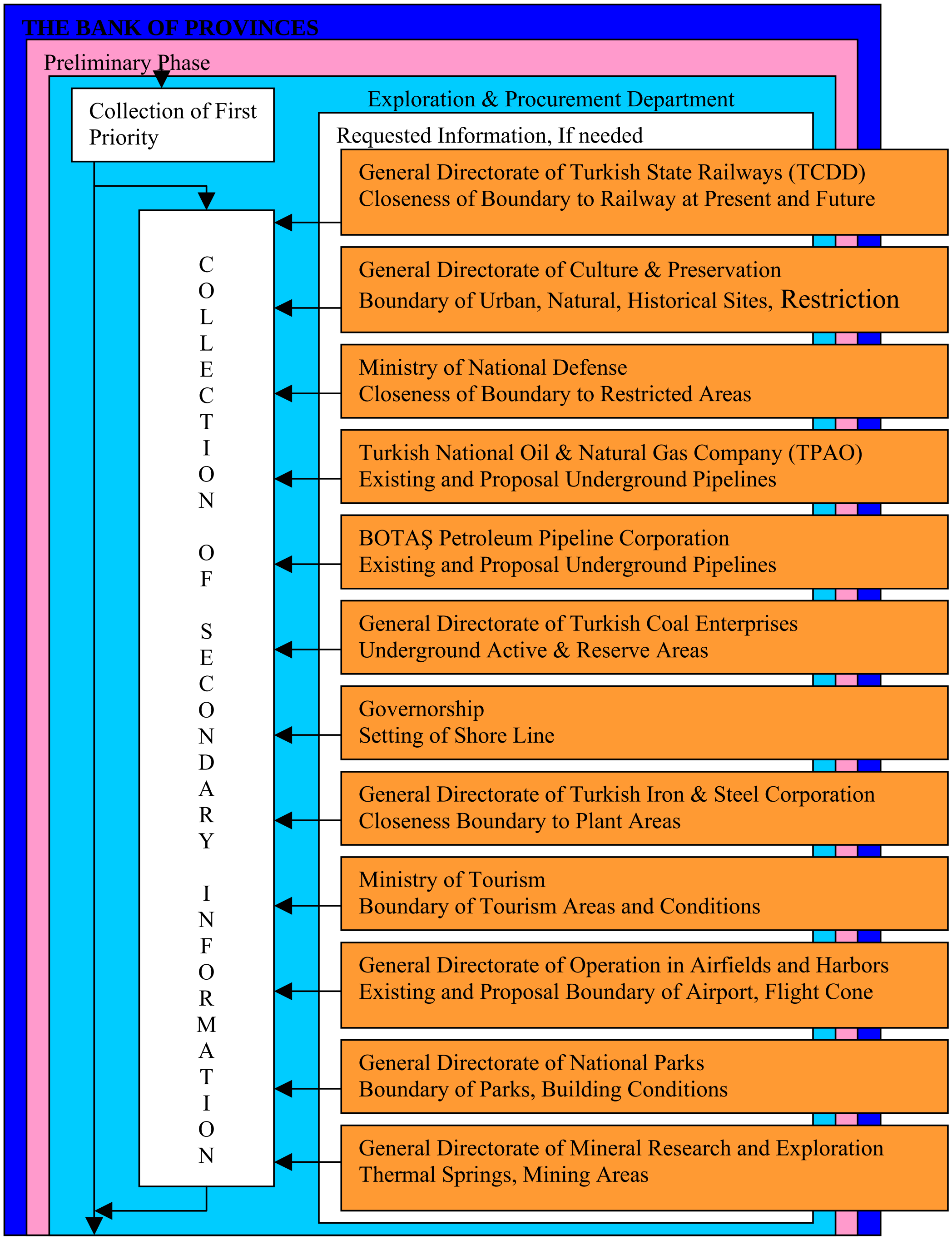


Figure 3.4: The collection of secondary information

geographical results online during whole process. This will also provide a base for a more democratic, transparent and participant environment. The establishment of this environment is under the responsibility of administrator by organizing the system in that manner. In this respect, GIS only has the technical capability of displaying geographical data to the user in the organization when certain technological infrastructure is constructed.

3.1.2. The Procurement or Trust Phase

All collected data; maps, sketches, reports, charts and diagrams are gathered and bended. Bended information is the sign for the completion of Preliminary Phase. The Bank of Provinces now has two alternatives in plan-making process. First one is to prepare plan and report by the Bank itself as a Trust Phase. Second option is to put the plan out to the tender as a new Procurement Phase.

3.1.2.1. Procurement Phase

The Bank prefers to put the plan making out to the tender for big areas. Private planning office has a right to make a plan in Turkey, if a new contract is signed with the municipality or the Bank. The offices can apply to the tender, if they sustain several requirements in the procurement contracts. The office, which asserts the price below the average of the bid, will win the tender. The process of preparing plan by private planning offices will be examined more detailed. How the plan is prepared, to what extent technology is used and what external relations they have with private and public authorities will be clarified by analyzing survey forms applied to private planning offices in the fourth chapter.

3.1.2.2 Trust Phase

When the Bank has decided to make a plan by himself, Trust Phase starts. Collected preliminary data is submitted to Planning Department by Survey and Bidding Department. Planning Department starts to get prepared before going to field. There are six planning groups in the General Directorate of Bank of Provinces and three Planning Departments in Regional Branch Offices. One of the planning groups takes the responsibility of plan making. There are four steps in the Trust Phase: namely, preparation of synthesis map, inquiry of macro-planning decisions, field survey and preparation of pre-design plan.

3.1.2.2.1. Preparation of Synthesis Map

There are four ways to prepare synthesis map in the Bank (Figure 3.5). Each way differs according to the degree of using technology. In the first way, the least improved technology and in the last way, the most improved technology is used. First way is to put all hard copy of maps on top of each other over the lighted table, and synthesis map will be created with drawing by hand one by one on the same base map. The planner can only use this synthesis map as a supportive drawing. When any information on the map is needed on the plan, it should be re-drawn. This way carries all handicaps of hand drawing such as difficulty of changes in mistakes and in the re-adjustment of color balance, and difficulty of producing more colorful copy etc. The aim of second way is to use technology for only presentation purposes. After drawing the synthesis map by hand on the lighted table similar to the first way, map is scanned and some modification are made in the digital copy of scanned map with the use of graphic design software programs. To compare with the first way, there are several advantages such as producing easily more colorful copy in terms of time as the plotter is used in the Center of Information Technology, more comfortable storage environment, more quick modifications and better opportunities for presentations.

Third and fourth ways give planner the chance to query and use each layer during design and making analysis. The differences between them are changes in the process. In the third way, synthesis map is prepared with drawing by hand on the lighted table and then map is scanned.

Afterwards, the process goes on with digitizing. There is no need to register (rectification), because all layers are matched on top of each other on the lighted table. The fourth way is to scan each map one by one and then to digitize. Afterwards, the map is registered according to the National Standard Coordinate System. By this way, all maps become ready to overlay on top of each other and to use in the query and analysis. In the last years, all planning groups prefer to use third or fourth ways.

If National Standard Coordinate System is applied in the third or fourth way, the user has a chance to overlay different kinds of geo-data from external resources. If the coordinate system is defined in national standards, all geographical objects on the earth can overlay on top of each other at their exact position in the screen with the help of geographic information technology solutions. It means that planner can read and write the coordinates from field to computer screen with the help of Global Positioning System (GPS) devices or vice versa.

To prepare a plan with the use of GIS is under the responsibility of planner in the Trust Phase. The municipalities, applying to the Bank for making a plan, are generally small municipalities in terms of their budget and the population. It has hardly technical staff. The municipality will most probably make the first development plan. The bank organs think that the staff in the municipality would

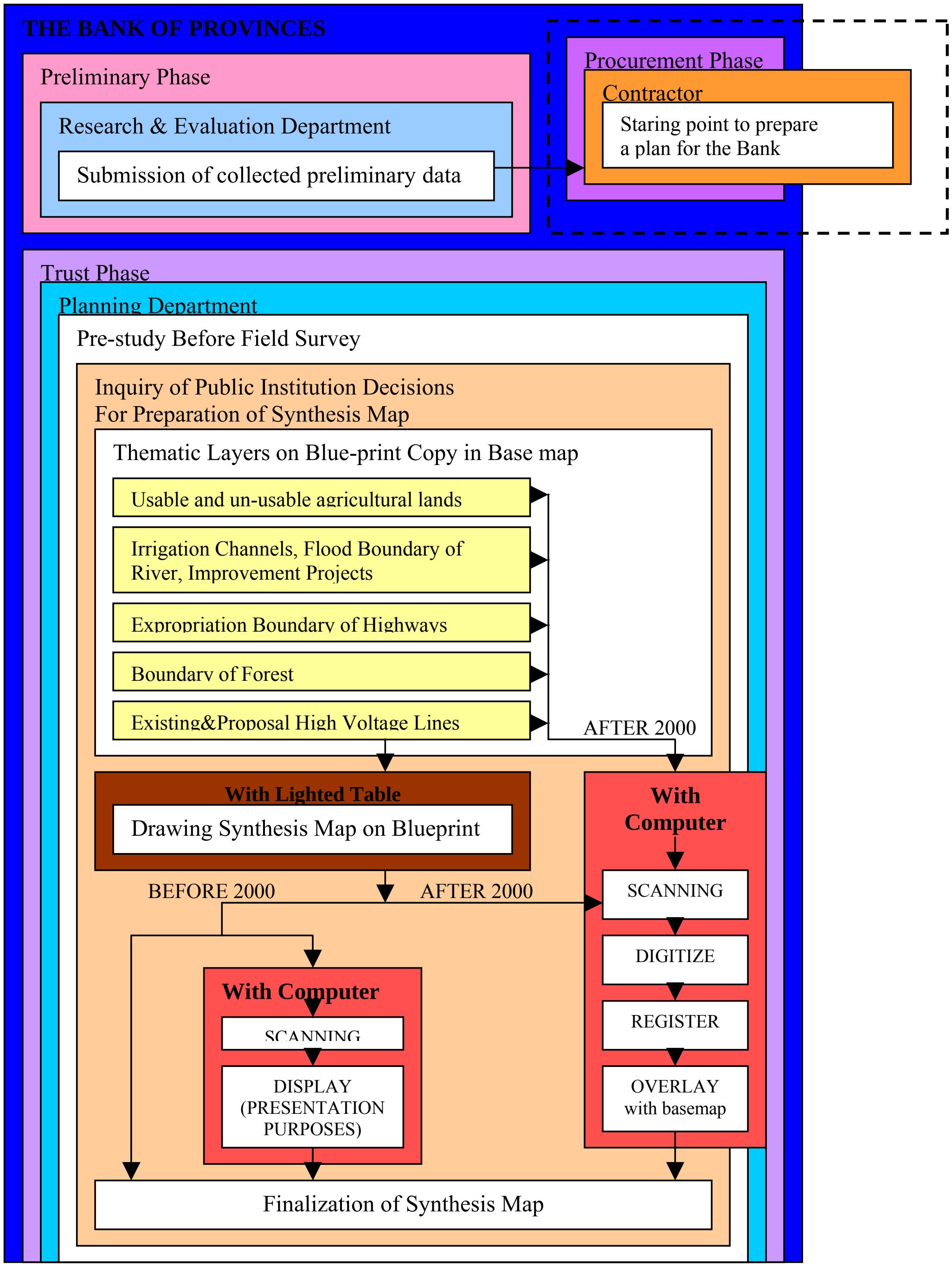


Figure 3.5 The Preparation of Synthesis Map

hardly evaluate the use of GIS in his daily work. Therefore, digital data obtained by the Bank during the plan-making process in trust phase, is not given to the municipality. So, only the planner benefits from using GIS in the plan-making process. The benefits can be listed as more easily and flexible design environment, better query and analysis opportunity and chance to show the plan by publishing the digital map through intranet etc. Instead of using this technology, because of missing relevant software and hardware, comments are taken in the colloquium during the control and approval phase. This is the Bank's traditional procedure for taking other's opinion about the plan.

The most important benefit of planner for the use of GIS is to integrate a rational electronic device in the plan-making process. This provides a defense mechanism for planner, because it will be accepted that suitable areas are opened according to the suitability analysis, which is made with the rationality of GIS. An example of suitability analysis is made in the Çalapverdi plan. Another important benefit is to decrease the time periods of plan-making process by sustaining quick exchange of digital geographical information among public-planning institutions.

3.1.2.2.2. Inquiry of Macro-planning Decisions

Another pre-study before the field survey is to search macro-planning decisions on planning area as shown in Figure 3.6. To sustain a hierarchical relationship and consistent feedbacks between plans is an important issue in planning. Each institution makes his plan within their scope. For example, the Ministry of Tourism prepares Tourism Plan and the Ministry of Culture prepares Conservation Plan.

When any institution like Bank of Provinces asks for Environmental Regulation Plan for a specific area, nobody can predict in what time the map and its report will be delivered. In the interview, the planner in the Bank explained that all micro-scaled plans should be delivered with new or revised plans to the Bank. However, this is theoretical side, practically it is not working.

There is no digital working system for looking at geographical information on the plans and maps among public planning institutions. It leads to delay in many jobs and miss coordination between public institutions about planning decisions, because even then submission of drawing thematic layers on the base map from five public institutions to the Bank has been completed in 5-6 months. There are more than five authorities that have a right to make decisions on the geographical phenomena. There is a need to establish a shared framework among them more effective and efficient operating planning system.

There is a lack of desire for rapid delivery procedures in those institutions, as listed in figure 3.6. Sometimes, the delivery of plan was realized after two or three years. Therefore, the Bank almost skips this step without asking institutions' opinions for macro-planning decisions, especially in the Environmental Regulation Plans.

There is no effort to record period of handover time. However, there is a strict time schedule in the private planning offices' contracts in the procurement phase. The time changes according to the size of planned area. The duration interval extends from four to eleven months just for preparing a pre-designed plan. But in other phases such as Preliminary, Trust, Control and Approval Phases, there is no recorded time in which step time schedule is started and finished. All of time periods that are mentioned in this chapter come from practically personnel experiences of the staffs that interviewed in the Bank in June and July 2003.

In general, the Turkish planning system has hardly got opportunity to orient the investment to the desired areas, because of the needs of long preparation time in the

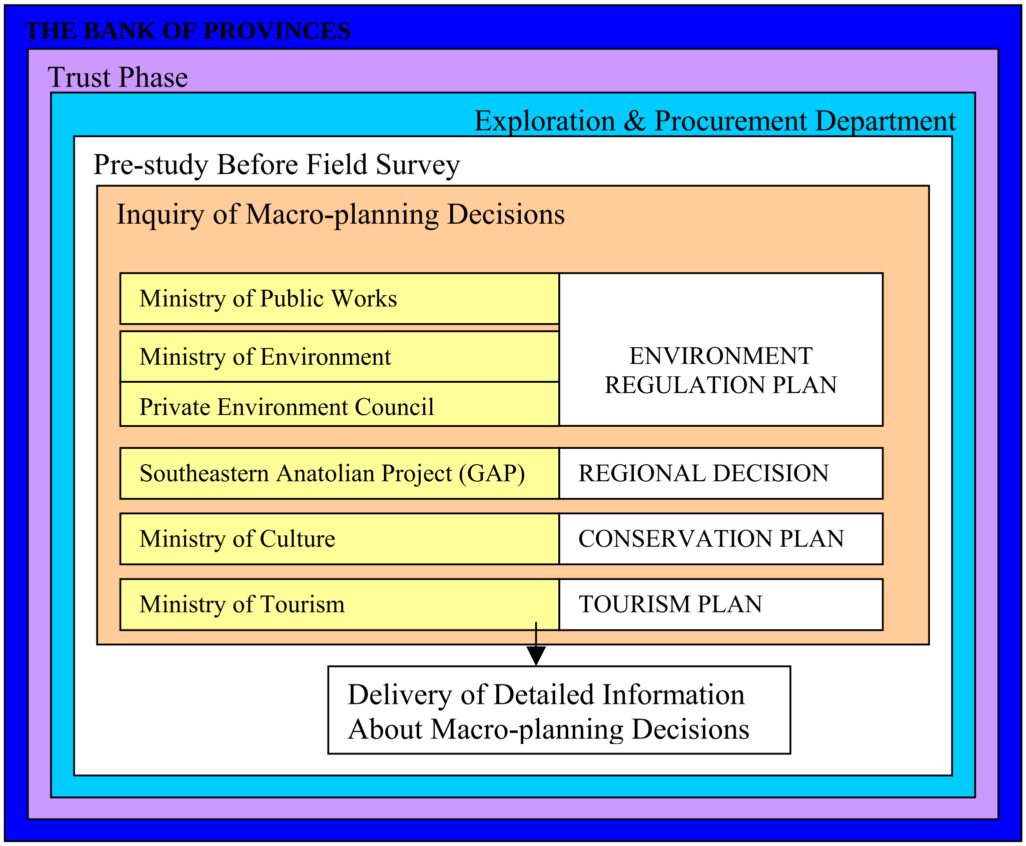


Figure 3.6 The Inquiry of Macro-planning Decision

process of plan-making. Therefore, planning system in Turkey suffers from the problems in coordinating the works in the public administration.

3.1.2.2.3. Field Survey

There is one technical drawer in each planning group in the Bank of Provinces. Technical drawer goes to worked area for field survey as shown in Figure 3.7. This

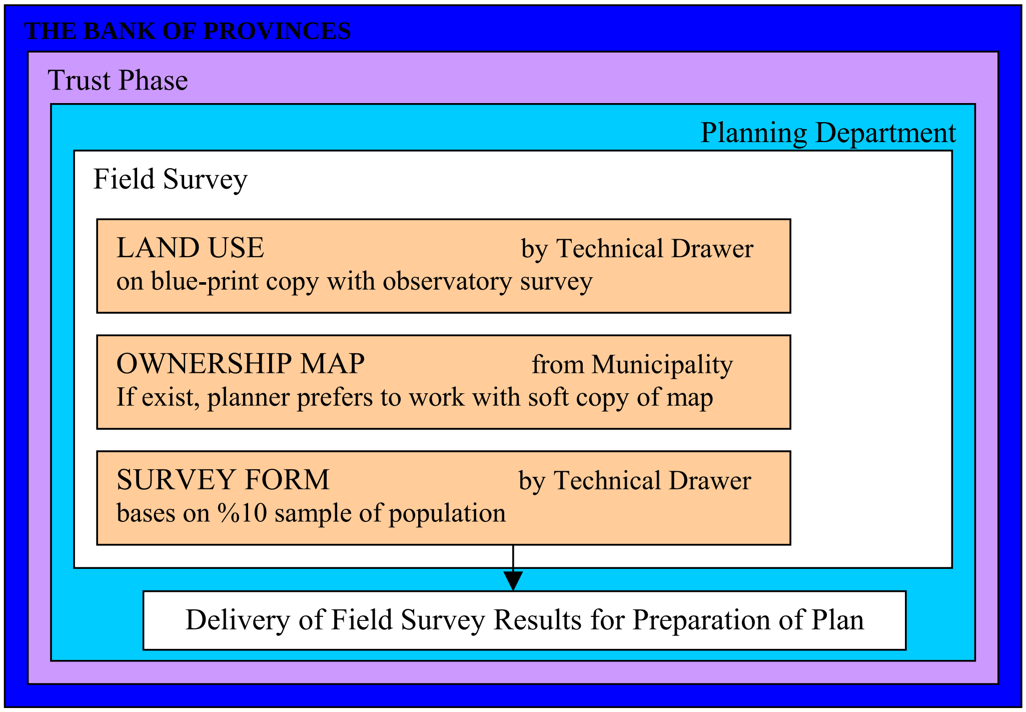


Figure 3.7 Field Survey

study in average is completed in five days. He marks the land use on blueprint copy of base map and takes photograph. If the ownership map is not received from General Directorate of Land Registry and Cadastre, it can be asked from the Municipality. Planner in the Bank prefers to work with digital copy. Therefore, the drawer tries to get the ownership map as a soft copy, if it is available in the municipality.

Next study is to apply survey forms in the field. Survey forms have vital role in preparing report and in the study of the social and economic potential of the settlement. Survey forms are applied on 10% samples of population. In most cases, form is given to students for filling with parents at night and delivering the next day to the primary school. The types of survey forms vary from the surveys in commercial uses to industry, small-scaled industry, public institution, family, education and health facility, etc. By this survey, the aim is to understand the developmental dynamics of the settlement and the required space for projected social and technical infrastructure in the settlement.

With the help of observation in the field survey and survey forms, projection is made to figure out how much new development areas should be opened according to the population distribution and economic indicators such as employment rate, number of flowing goods and the range of hinterland. The projection will be used in the calculation of proposed density on the plan, which will lead to open enough parcel blocks in the new development areas.

3.1.2.2.4. Preparation of Pre-Designed Plan

After completion of all collected data, the planner finds the suitable areas for new development needs. Planner prepares the plan on the basis of the synthesis of all collected information as shown in Figure 3.8. This plan will be a pre- designed plan,

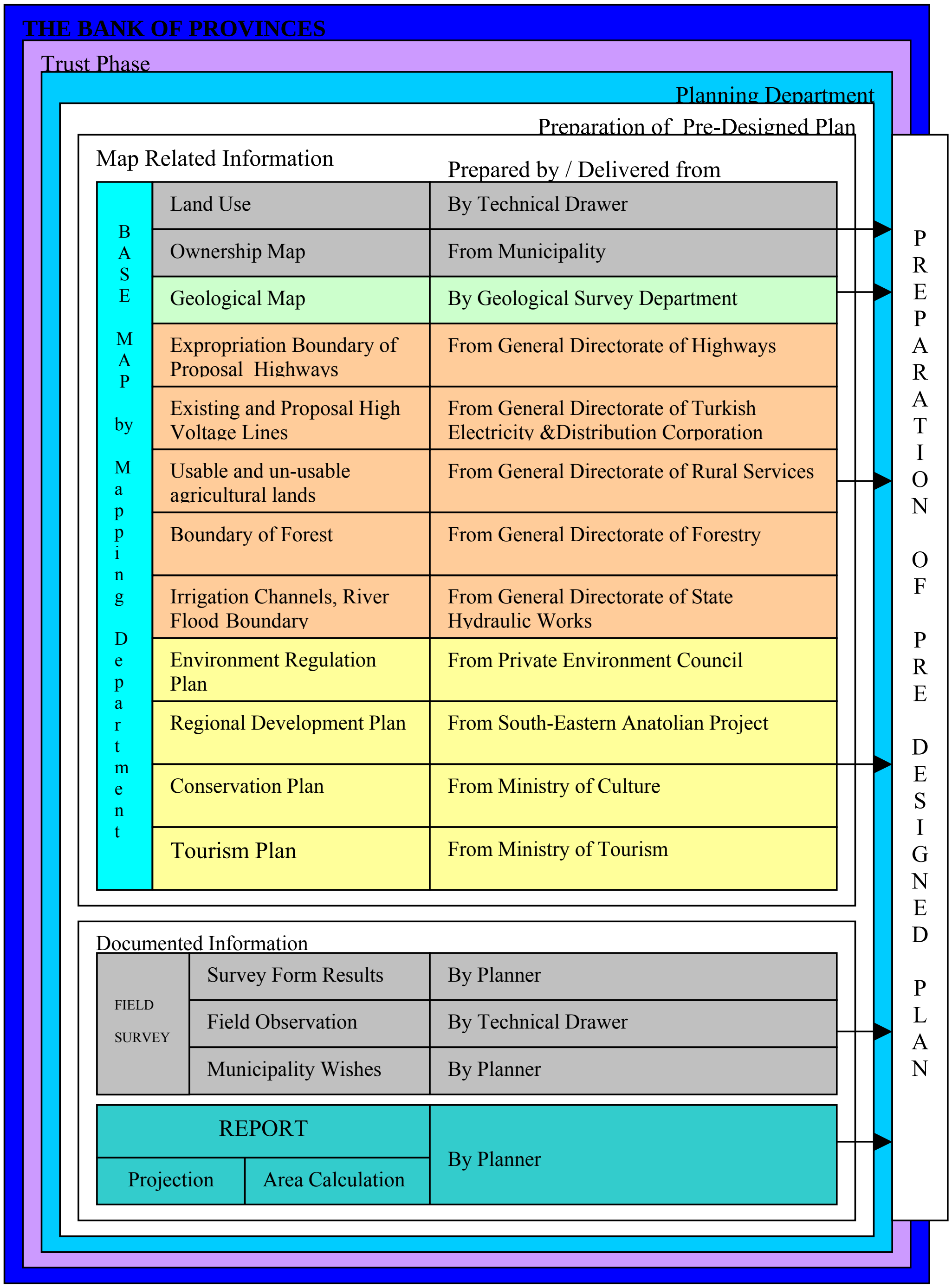


Figure 3.8. Preparation of Pre-Design Plan

because it is open to changes in the control and approval phase according to the comments of head of departments and municipality.

One of the examples for the use of GIS in the plan making is explained in the following section. In general, whole plan-making process except several plans, in which GIS is used, is executed in classical way in the Bank. After the completion of design of plan, it will be delivered for making review and comments in the colloquium.

3.1.3. The Control and Approval Phase

There are two steps in the Control and Approval Phase, namely, the colloquium and the review of plan. The final review before approval of the plan is the last but optional step taken at the end of the process. When private planning office submits the pre-design plan to the Bank in Procurement Phase, the plan is checked by the Planning Department according to the requirements in the technical contract. At this stage, the Bank can request from contractor to add or modify certain sections in the report. When the control is finalized, the colloquium step starts in the Approval Phase. When the planner has finished the pre-design plan in Trust Phase, then comes colloquium step.

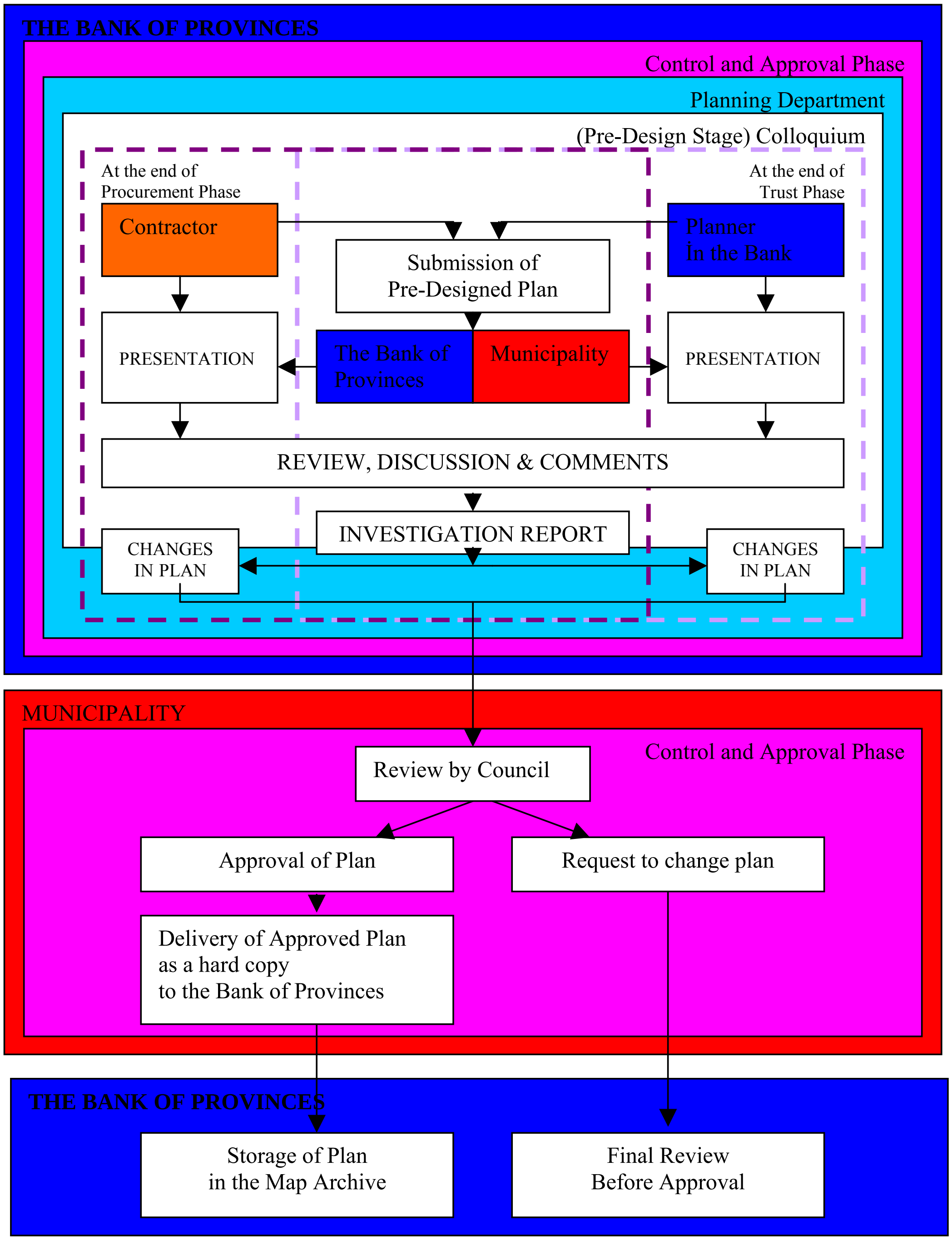


Figure 3.9. The Colloquium and Review in the Control and Approval phase

The planner or the contractor, the head of departments in the Bank and the municipality attend for reviews and discussions on the plan in the colloquium. The contractor or planner explains his scenario and reason of decisions that proposed in the plan during his presentation. The participants from the Bank play a consultancy role between the producer of plan and the municipality as shown in Figure 3.9.

If all participants are satisfied on the plan, it will be submitted to the municipality for approval. If the municipality requests some changes in the plan and if the Bank has accepted to change it, the reason of request is explained in the investigation report. According to the report, changes will be made by the producer of the plan and will be submitted to the Municipality for approval.

The municipality has now two alternatives in this second step of Approval Phase. After the review of plan in the municipality council, the council can request new changes, one more time or approve the plan. In the former, the requested changes are informed to the Bank and the Bank has to make final review. In the latter, approved plan as a hard copy is delivered to the Bank for storage purposes in the map achieve.

In the final review, the requested changes from Municipality are investigated once more time by the Bank as shown in Figure 3.10. If reasons are accepted, it will be documented in the memorandum and changes are made on the plan. If not, the plan is

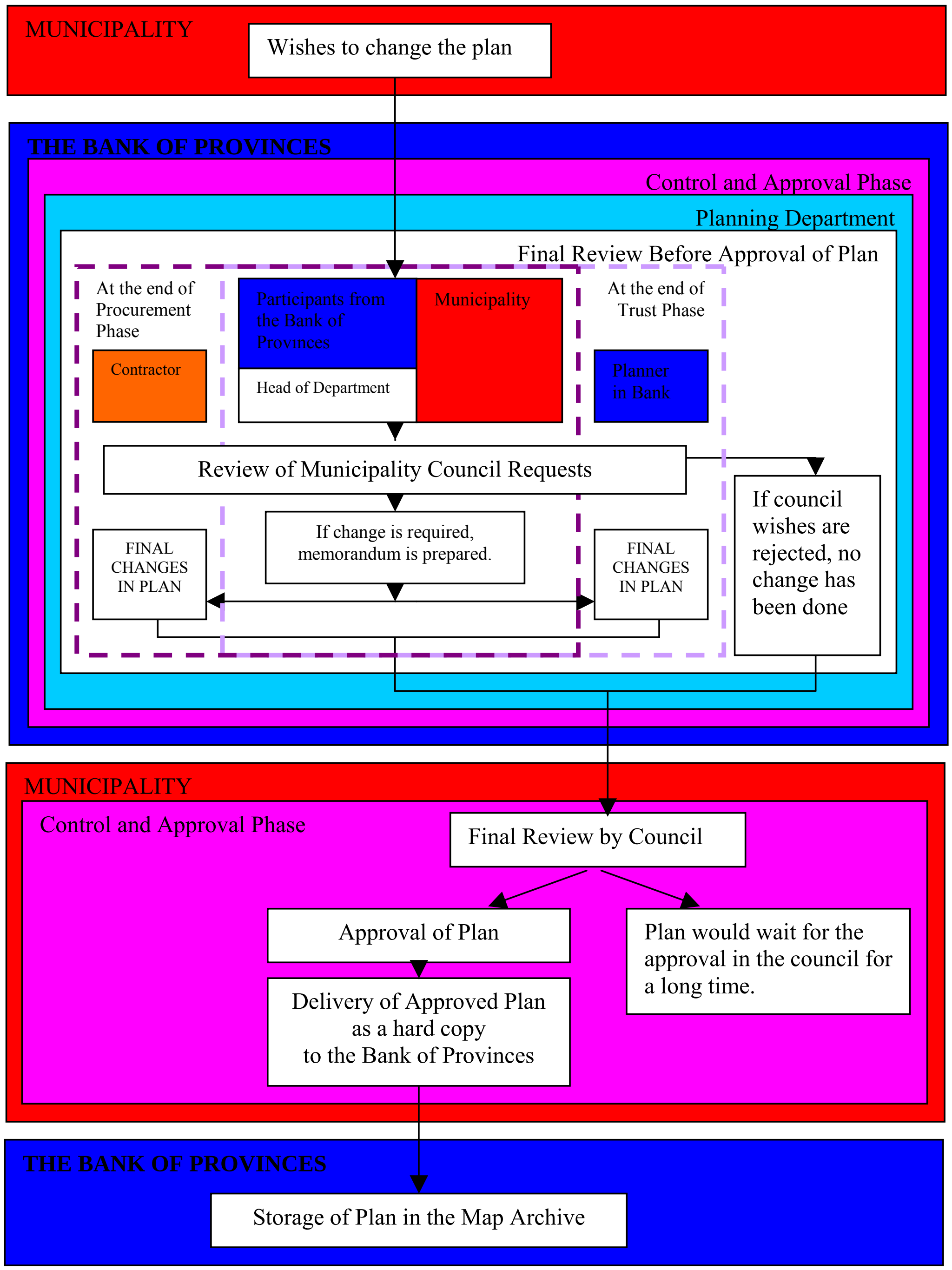


Figure 3.10 Final reviews before approval of the plan

re-sent to the Municipality. The plan is reviewed again in the municipality council and in most cases it is approved. Sometimes the council rejects to approve the plan and the approval of the plan in the council will wait for a long time.

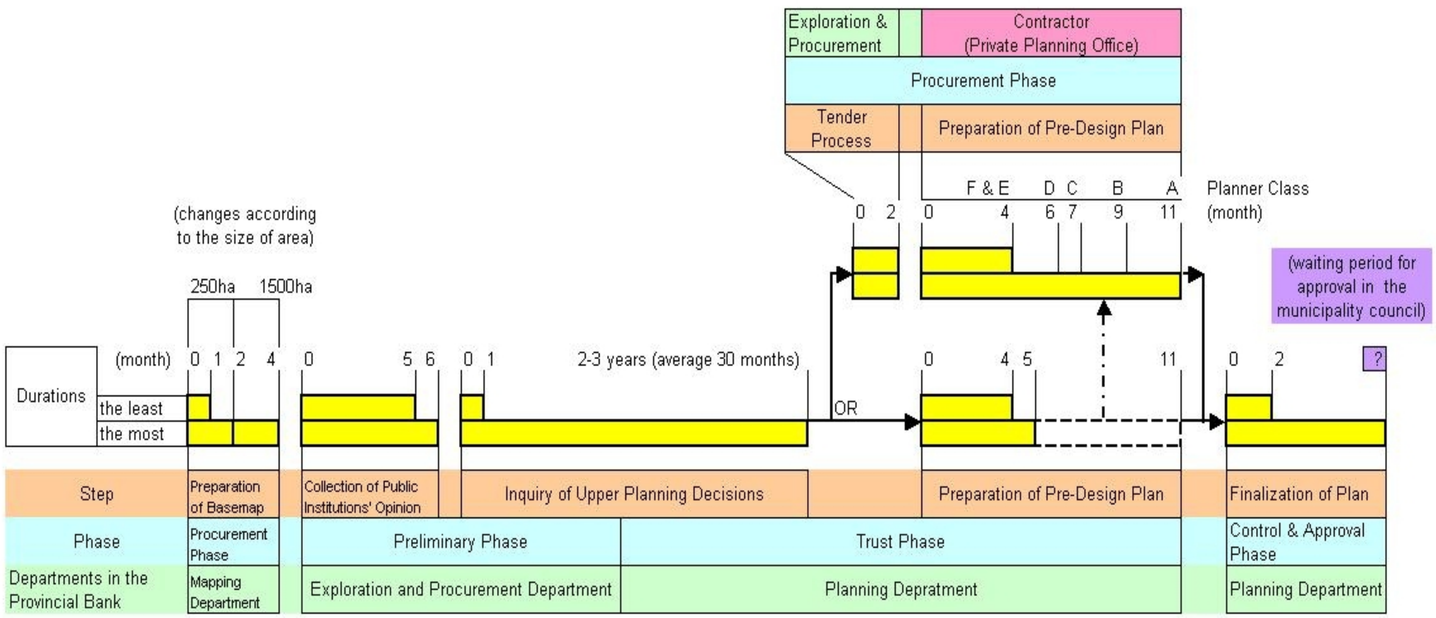
3.2. EVALUATION OF PLAN-MAKING PROCESS IN TERMS OF TIME

The total duration for plan-making process in the Bank is explained in Figure 3.11. Timeline diagram starts with the preparation of base map which duration changes according to the size of area. Two different size of areas, 250 ha and 1500 ha, is chosen as examples. The former area is accepted as F graded planning group and the latter is A graded planning group. This assumption changes the duration of the process, because the Bank prefers the preparation of plans for big areas as in the procurement phase.

For 250 ha, the preparation of base map will be completed in 1-2 months in average or under normal conditions. Next step is the collection of public institutions' opinion, which will be finished in 5-6 months. The duration of inquiry of macro-planning decisions is hard to predict, because in some cases, the requested information is never submitted to the Bank and in some cases if there is a problem related with the plan or making a new project, submission will be completed in 2-3 years. Therefore, the Bank prefers to pass this step or in some cases the information is delivered in one month, so the duration of this step is accepted as one month as a minimum duration under normal conditions and average 30 months as maximum.

For 250 ha, if the preparation of pre-design plan is decided to do in the Trust Phase, it will be completed in 4-5 months. If it is prepared as in the Procurement Phase, the duration will be totally six months as shown in figure 3.11, which extra 2 months come from the preparation and evaluation of tender process. With the new procurement law, the pre-requirement of private planning offices are searched more detailed. Therefore, the minimum duration of 250 ha pre-design plan will be 4 months and the maximum is 6 months. The approval of plan will be completed in 2 months as a minimum duration. The municipality sometimes does not accept to approve the plan. The approval of plan will wait for a long time, which is out of this calculation, so the maximum duration of approval of plan is also accepted as 2 months.

If the minimum durations for 250 ha are summed as 1 month during the preparation of base map, plus 5 months during the collection of public institutions' opinion, plus 1 months during inquiry of macro-planning decisions, plus 4 months during the preparation of pre-design plan in the Trust Phase, and plus 2 months during the approval of the plan, the result will be 13 months. As a maximum, if the duration are



Areas (ha)	Duration (months)	Preparation of Basemap	Collection of Public Institutions' Opinion	Inquiry of Upper Planning Decisions	Preparation of Pre-Design Plan: Trust Phase by the planner	Preparation of Pre-Design Plan: Procurement Phase tender process	Preparation of Pre-Design Plan: Procurement Phase by the Contractor	Approval of Plan	Total Time (month)
For 250 ha	The minimum duration	1	5	1	4	-	-	2	13
	The maximum duration	2	6	30	-	2	4	2	46
For 1500 ha	The minimum duration	4	5	1	-	2	11	2	25
	The maximum duration	4	6	30	-	2	11	2	55

Figure 3.11. Time Schedule of Plan Making Process in the Bank of Provinces

summed as 2 months during the preparation of base map, plus 6 months during the collection of public institutions' opinion, plus 30 months during inquiry of macro-planning decisions and plus 2 months during tender process, plus 4 months during the preparation of pre-design plan in the Procurement Phase, plus 2 months during the approval of the plan, the result will be 46 months. The maximum duration of plan-making process for 250 ha has reached to approximately three years. That is why; in general, if it is accepted as more traditional way that the inquiries of macro-planning decisions step is skipped, the maximum duration amount will be 17 months.

The differences in the duration between planning area of 1500 ha and that of 250 ha reveal while preparing the base map and pre-design plan. In the base map, the preparation period of base map increases from 1-2 months to 4 months for 1500 ha. For large areas, the Bank does not prefer to prepare the plan in the Trust Phase. 1500 ha is accepted as A graded planning group whose duration is 11 months, so the results for 1500 ha will be 25 months as a minimum duration and 55 months as a maximum. Without the inquiry of macro-planning decision step, the maximum duration for 1500 ha will be 26 months and the minimum is 25 months.

To sum up, the duration of plan-making process in the Bank for planning areas of 250 ha and 1500 ha are approximately 1-1,5 years and 2 years respectively within the consideration of skipping the inquiry of macro-planning decisions as shown in figure

3.12. The mayors are elected for four years. Approximately half of the terms of office equals to the duration of Bank's plan-making process. Therefore, this becomes so critical for mayors.

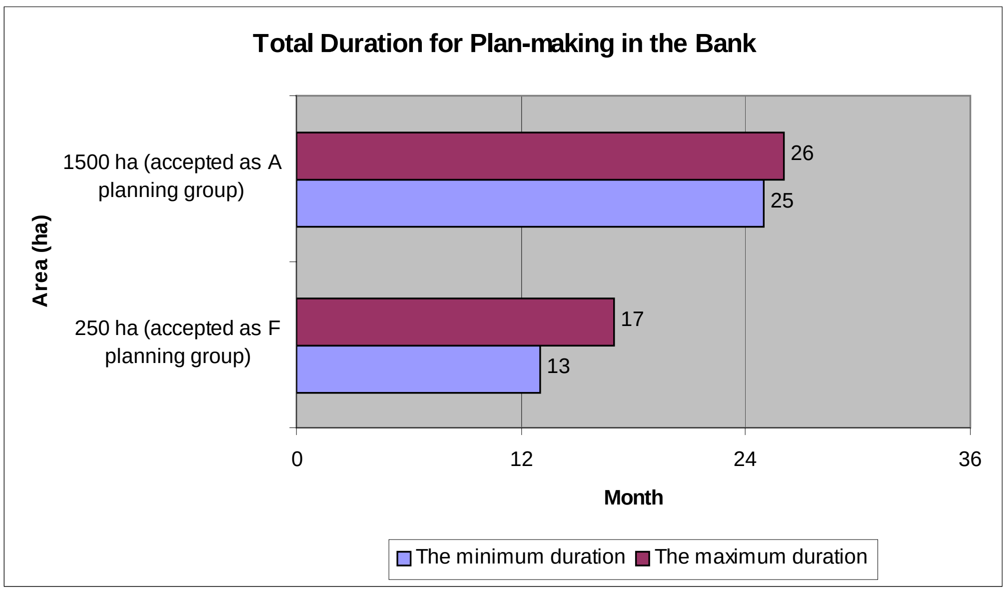


Figure 3.12. Total Duration for Plan-making in the Bank

The most important benefit of GIS in planning is to form a shared framework among public planning institutions for exchanging, displaying and querying geographical information. When all geographical information becomes ready as digitally on the same platform among public institutions, the period of plan-making process will be shortened. This will lead to well coordination, better, effective and efficient mechanism for planning system among the public institutions.

3.3. TECHNICAL CAPABILITY OF THE BANK OF PROVINCES

The Center of Information Technology Department has one A0 Scanner and two plotters. A0 Scanner and plotter is centralized and opened to use of all staffs in the Bank. Network among computers has been just established since 2002. With the establishment of network, the Bank has newly online Internet connection. As the existence of hardware, each planning group has four personnel computers and one printer. The use of technology in planning group is different as it is explained in the section of preparation of synthesis map.

Officially, available computer aided design (CAD) and GIS software are one license of ArcView GIS 3.2, one license of NetCAD and NetInfo, five licenses of AutoCAD 2000 and two licenses of AutoCAD Map 2000. The Bank has not got any service agreement with any of private software vendors. Besides on this official license, there are a lot of NetCAD programs with temporary licenses in the computer of planning groups. There are several ILWIS software, which make Raster Composite Overlay and are learned to use in the master in Holland. NetCAD is the Turkish software program and has a lot of customized tools for preparing map. Other programs are foreign oriented. At that moment, the Bank officially has not got any chance to use the latest version of the software, because every upgrade requires extra costs for the Bank.

3.3.1. Education: Knowledge of GIS in the Bank

Several staff had a chance to take a scholarship from the Bank for GIS master study at abroad. Two geology engineers and five city planners has gone to the Holland for studying GIS as master study in the International Institute for Aerospace Survey and Earth Sciences. The institute has three programs: master degree in 18 months, professional master in 12 months and post-graduate in 11 months.

In the master level, the institute uses ArcInfo, ArcView and ILWIS, which is the software that written in the institute and makes Raster Composite Overlay. This property can be used in planning for building different scenario during plan making process. Each layer can be classified with the new weighted scores and calculated with a mathematical algorithm to figure out new areas by overlaying different layers on top of each other. This program is still using in the Bank. This overlay analysis is applied in the Bank during one of the plan-making processes, which is explained in the following section as an example of Çalapverdi Development Plan.

In the master degree, they learned to develop and use GIS projects in many different application fields such as disaster management, environmental impact analysis, air pollution, decision support system and infrastructure etc. At the end of master study they are choosing the many real problem that can be faced in daily life. The topics can vary from solid waste, poverty, drainage, and to housing for poor. The students are trying to solve the problem by using GIS. All topics are chosen under the subject of Urban Planning and Urban Management in the Institute.

These seven staffs had a good experience in the use of GIS. Although their number is very small, as it is compared with the number of staff in the Bank, it is just a starting point for forming GIS team in each planning groups. They should be assigned as a teacher to teach how to use GIS in each planning groups.

3.3.2. Two Examples of Using GIS in Plan-Making Process

There are three plans that are prepared with the use of GIS in the Bank. One of them is the Çalapverdi Development Plan, in which GIS is used for the analysis in the preparation of pre-design plan. Second one is the Niksar Conservation Plan, in which GIS is used for collection of inputs in the field survey and for thematic mapping in the report.

3.3.2.1. Çalapverdi Development Plan

Çalapverdi Plan has been made as in the Trust Phase in the Bank of Provinces in 2000. In this example, GIS is used in the analysis. The Çalapverdi Municipality has founded in 1996. This plan was the first plan made for this place. As the planner explains, one of the planning goals was to use GIS in the plan-making process for providing sensitive and dependable analysis (Tanrıkulu, 2000:2).

The methodology of preparing plan in Çalapverdi is shown as in figure 3.13 (Tanrıkulu, 2000:3). Its methodology differs from the classical way of preparing plan, because the differences come from not only using of GIS but also documenting the alternative drawings by building scenario that is possible with the use of GIS. In the classic plan making process, the planner eliminates other alternatives in his mind and decides on one alternative, which is drawn as a final plan. The evaluation of alternatives occurs in his mind, which is related with his knowledge that has been formed with his efforts during the collection and investigation of related information. This part of process should become more rational. To prepare plan alternatives can become possible in a short time with the use of GIS.

Suitability Analysis has been made with GIS, whose methodology is shown in figure 3.14 (Tanrıkulu, 2000:18). Identification of criteria and scoring them are the main core of suitability analysis during creation of all scenario and alternatives. In this plan, there are nine criteria:

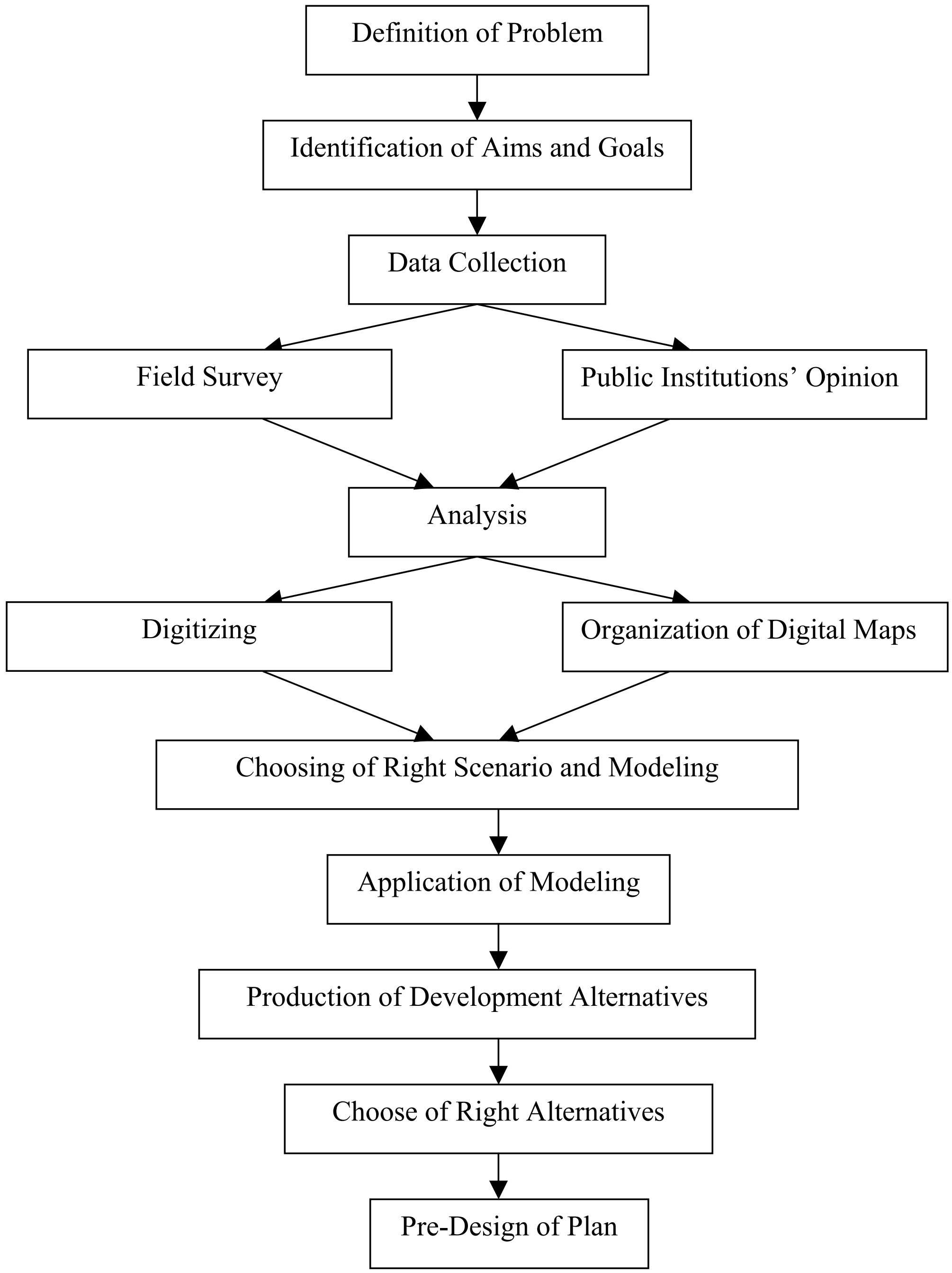


Figure 3.13 Methodology of preparing Çalapverdi Plan

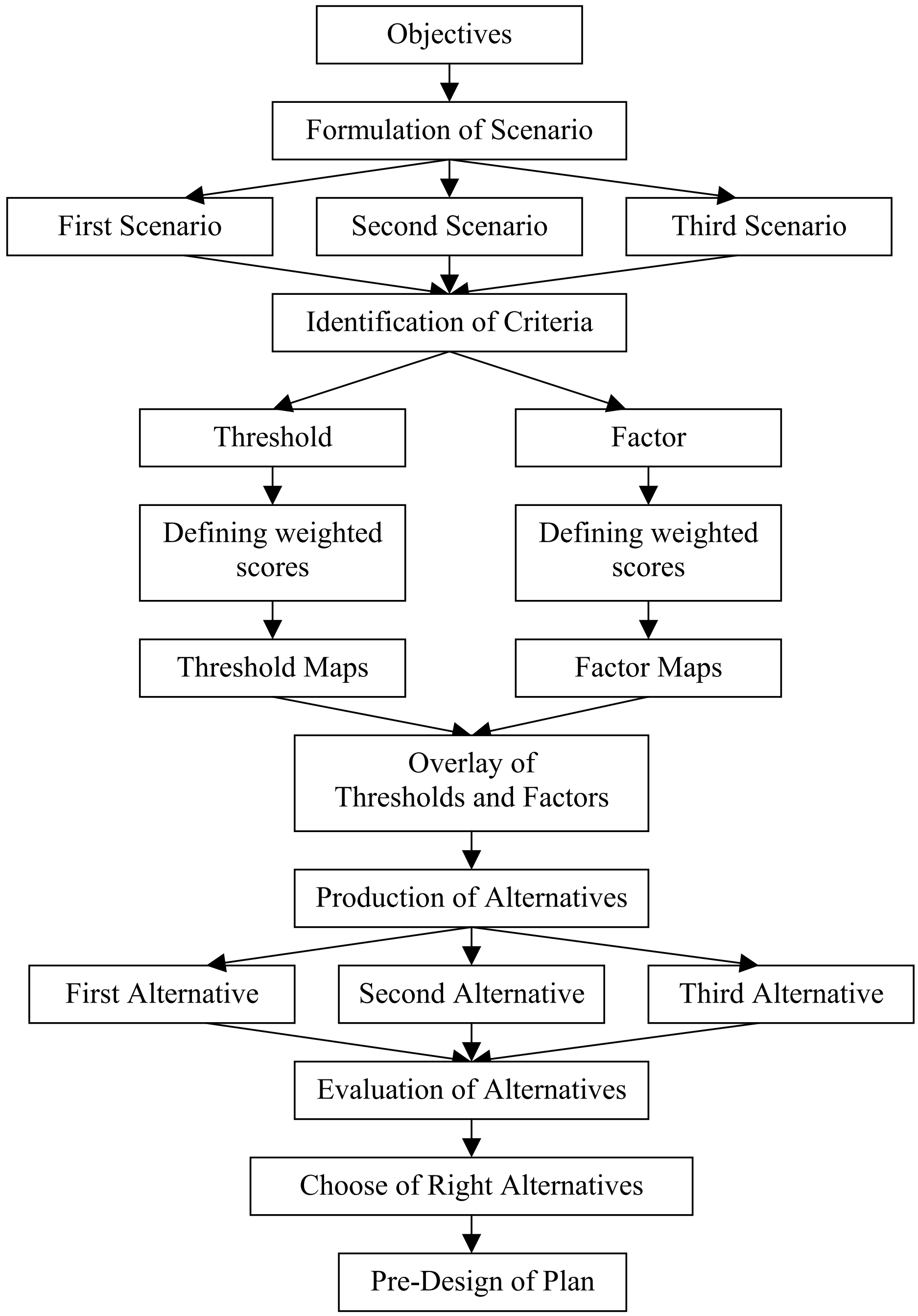


Figure 3.14. Conceptual model for preparing the plan with GIS

namely existing land use, irrigation channel, highway, soil type, geological structure, slope, closeness to commercial center, closeness to transportation system and closeness to education center.

These criteria are classified into two groups: threshold and factor. Threshold group shows the area where certainly cannot be settled down, and factor group shows the area where can be settled down according to relatively suitable areas when it is compared with thresholds. Thresholds are the inputs that come with public institutions' opinions. 12-meter protection corridor of irrigation channel drawn by General Directorate of State Hydraulic Works and 30-meter buffer corridors of highways drawn by General Directorate of Highways are two examples of thresholds in the plan.

Thresholds and factors are scored in order to create three different alternatives. Threshold scores are –100 or 0, where –100 score is not suitable areas and 0 for suitable areas. Factor scores are between 1 and 10, where 1 score is the least suitable area for urban development areas and 10, the most suitable areas. Weighted multiplier is 10. By this way, scoring numbers are decided as not giving any chance to open threshold areas as development areas (Tanrıkulu, 2000:21). Scores are summarized in table 3.1.

Figure 3.15 shows available digital layers that come from digital copy of base map, which is delivered by Mapping Department. Analysis starts with classification of digitized thematic layers. Existing occupation of settlement is classified as unsuitable areas and out of this area is suitable for development areas as a land use layer (Figure 3.16). This is the first classified layer that will be put on top of the others in order to overlay for finding out the most suitable development areas. The second layer is the classified layer of soil types that is delivered from General Directorate of State Hydraulic Works as the hard copy of base map (Figure 3.17, 3.18). As it is explained in the previous section of preparation of synthesis map, all geo-layers are produced from hard copy by digitizing and rectification process. Third layer is the protection corridor of irrigation channel, which is shown in figure 3.19. The figure from 3.20 to 3.25 shows the following layers respectively: buffer corridor of highways, geological structure of settlement, slope analysis, closeness to commercial center, closeness to transportation system and closeness to education center.

Factors such as geological structure, slope, closeness to commercial center, transportation and education center are classified with weighted scores. Thresholds such as existing land use, irrigation channel, highways and soil types are also classified with their weighted scores as shown in table 3.1. Raster composite overlay analysis is applied to all factors and thresholds. The result in the new raster will show

Table 3.1. Summary of scoring the criteria in GIS

Classified Criteria	Criteria	Type of Criteria	Scores	Weighted Scores (over 10)		
				Scenario 1	Scenario 2	Scenario 3
Threshold	Existing Land Use	Agricultural and un-used lands	0	-	-	-
		Settled down areas	-100			
Threshold	Irrigation Channel	12m protection corridor	-100	-	-	-
		Out of protection corridor	0			
Threshold	Highway	30 m buffer corridor	-100	-	-	-
		Out of buffer corridor	0			
Threshold & Factor	Soil Types	Vineyards and orchards	-100	-	2,5	-
		Pasture lands	-100			
		Watery agricultural lands 1,2,3	-100			
		Watery agricultural lands 4	0			
		Un-used lands 1,2	0			
		Settlement areas	0			
Factor	Geological Structure	Slope rubble	10	3	2	2
		Alluvium	5			
		Tasman	1			
Factor	Slope	Less slope (0-10)	10	3	2	2
		Slope areas (10-20)	5			
Factor	Closeness to Commercial Center	500m	10	2	1,5	2
		1000	8			
		1500	6			
		2000	4			
		2500	2			
		>2500	1			
Factor	Closeness to Transportation	200m	10	1	1	2
		300	8			
		400	6			
		500	4			
		700	2			
		>700	1			
Factor	Closeness to Education Center	500m	10	1	1	2
		750	5			
		>750	1			

the areas where can be opened as new development areas in the plan. By this way, three alternatives are produced, as shown in figure 3.26, 3.27 and 3.28. The proposed new development areas in the alternatives will be compared with the necessary areas that are found during the calculation of density and population projection. After evaluation of this study, one or composite of three alternatives will be prepared as pre-design plan (Figure 3.29). It will be reviewed and commented in the colloquium by municipality and the Bank.

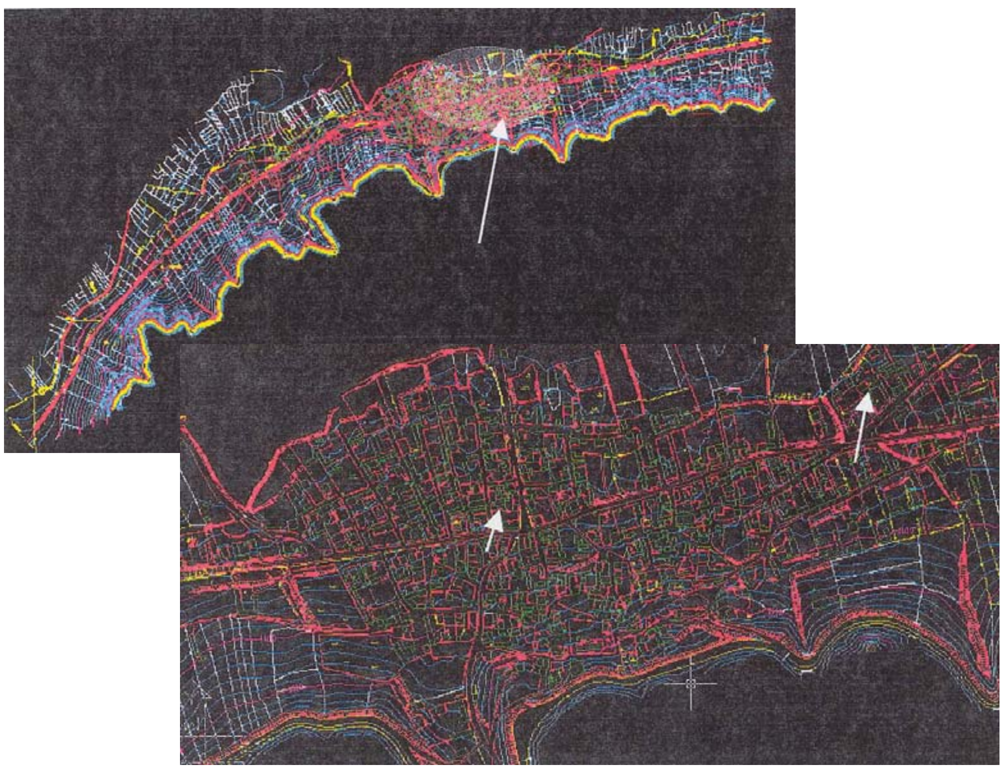


Figure 3.15. Available Digital Layers at the Beginning of Analysis

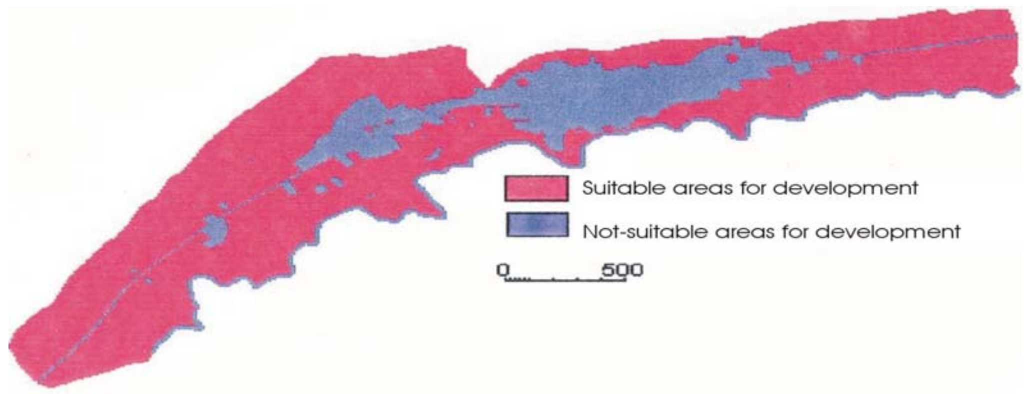


Figure 3.16. Classified Land Use

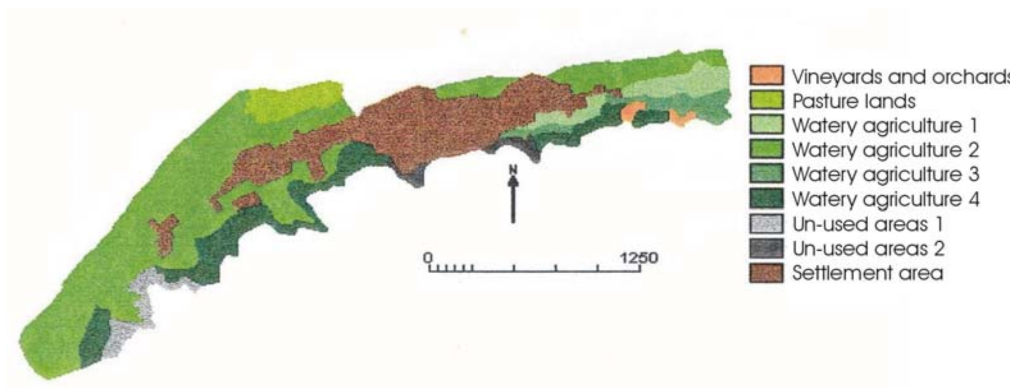


Figure 3.17. Soil Types

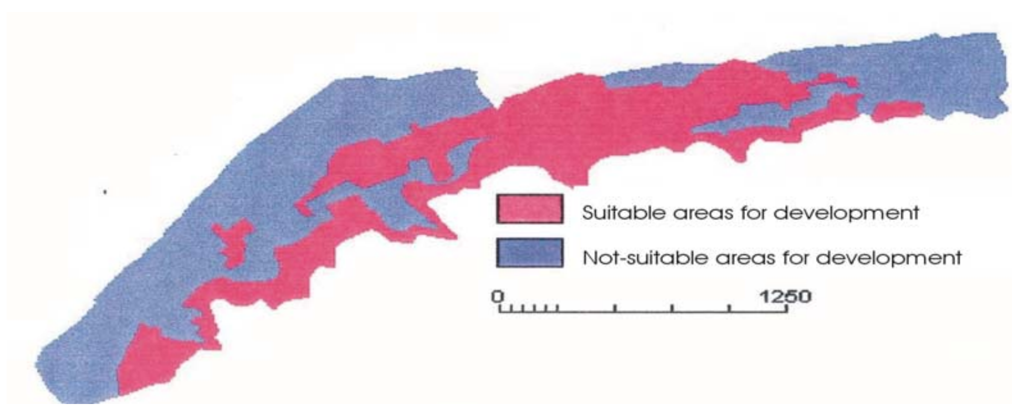


Figure 3.18. Classified Soil Types

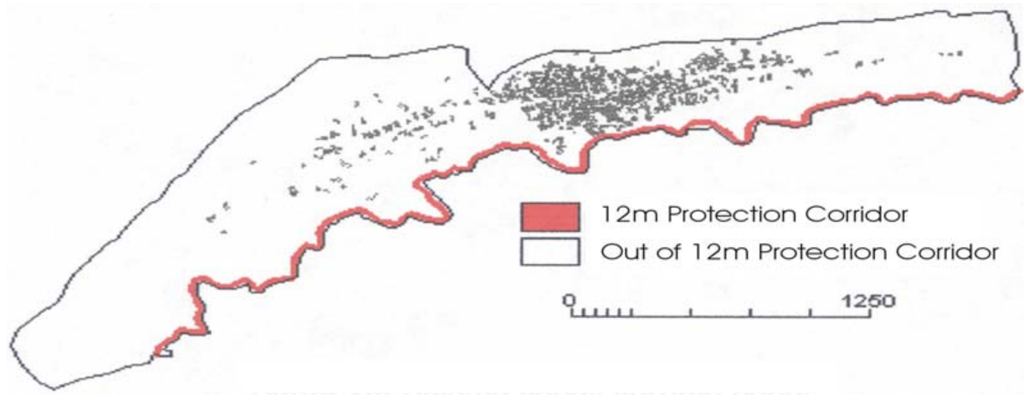


Figure 3.19. Protection Corridor of Irrigation Channel

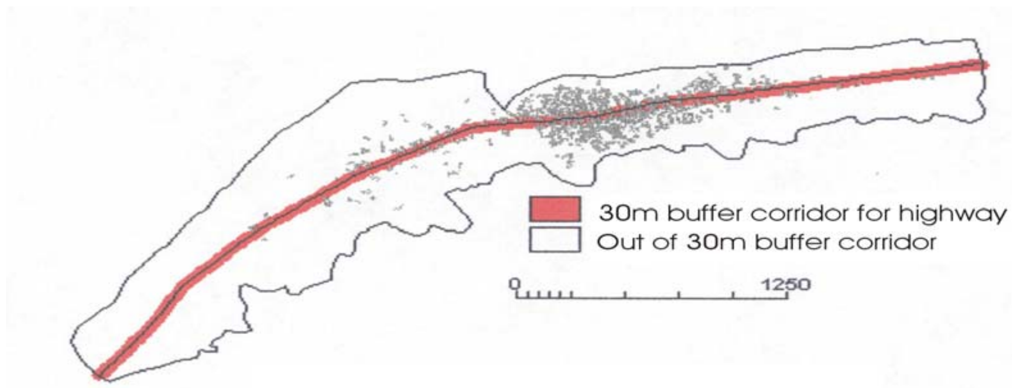


Figure 3.20 30m Buffer Corridor of Highway

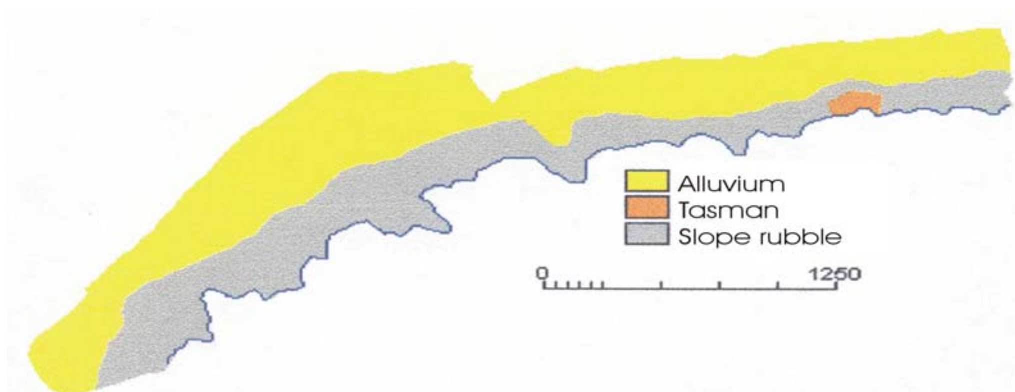


Figure 3.21 Geological Structure of Settlement

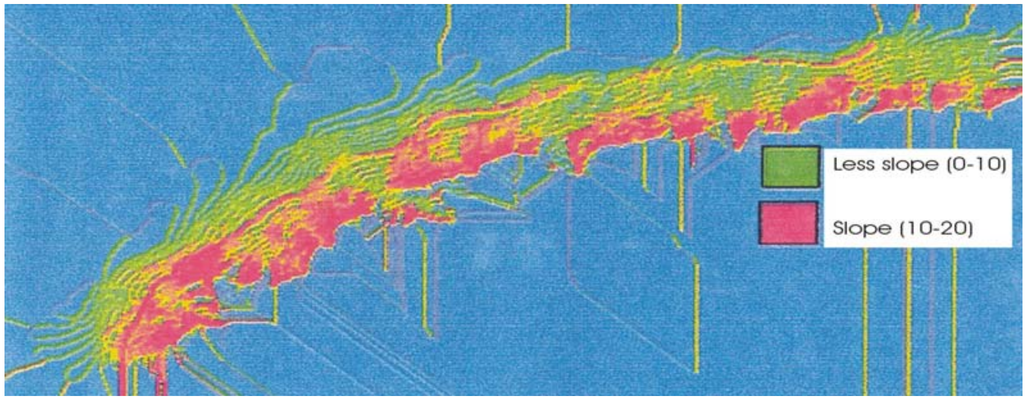


Figure 3.22 Slope Analysis

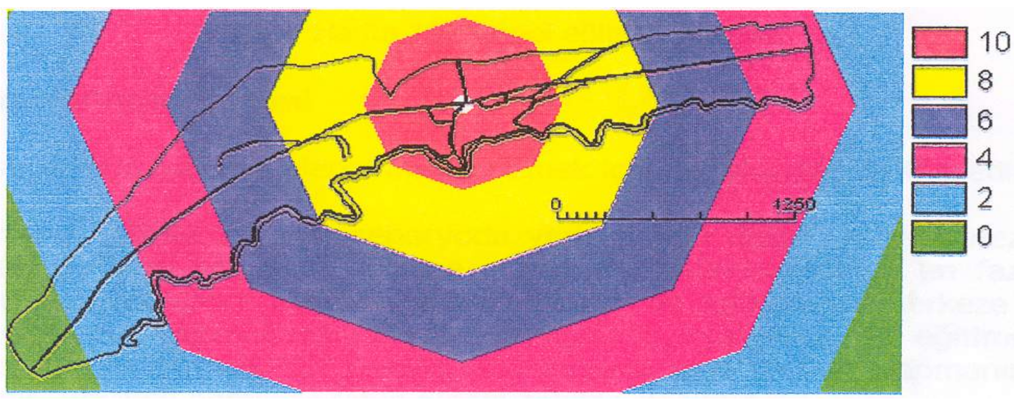


Figure 3.23 Closeness to Commercial Center

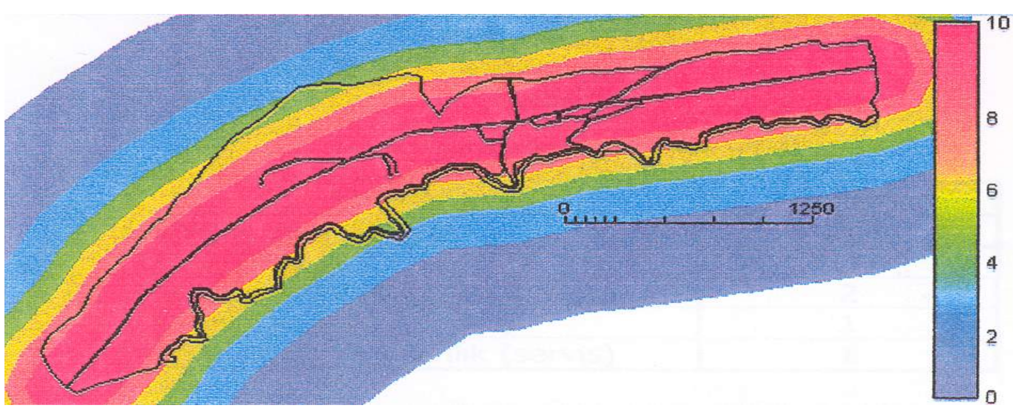


Figure 3.24 Closeness to Transportation System

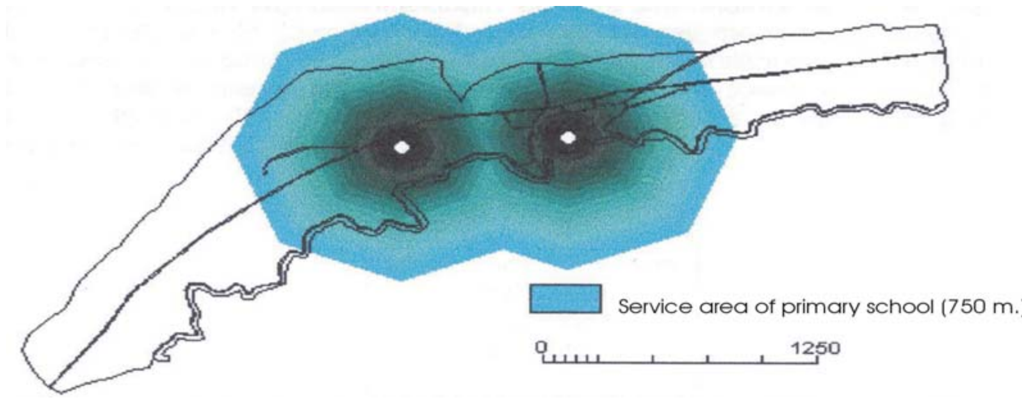


Figure 3.25 Closeness to Education Center

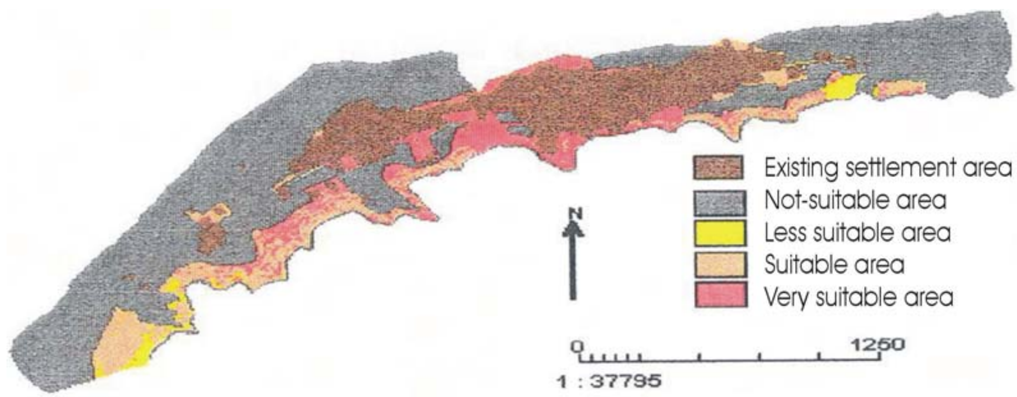


Figure 3.26 First Alternative

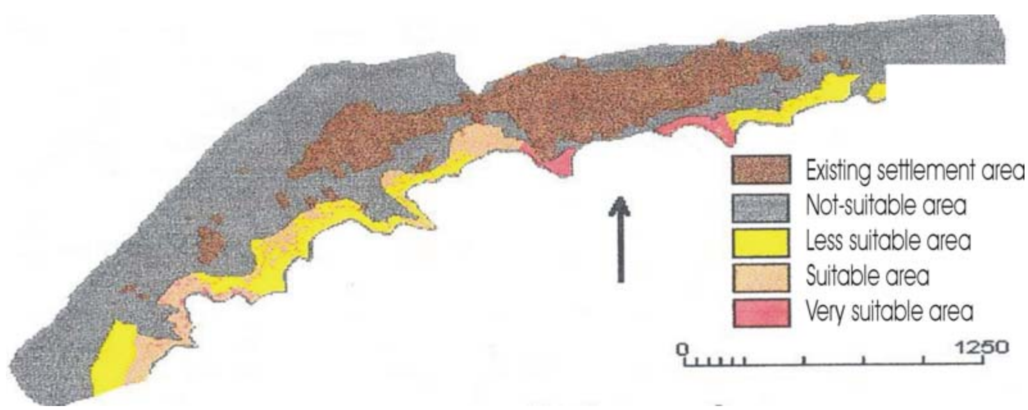


Figure 3.27 Second Alternative

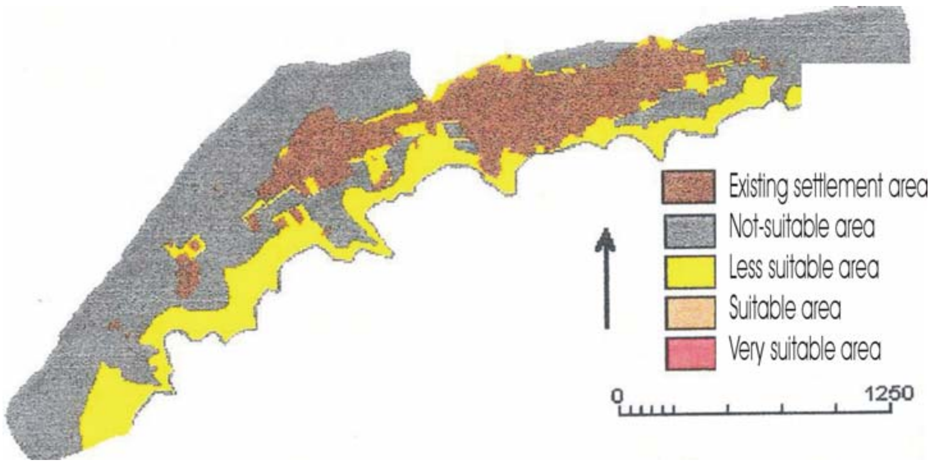


Figure 3.28 Third Alternative

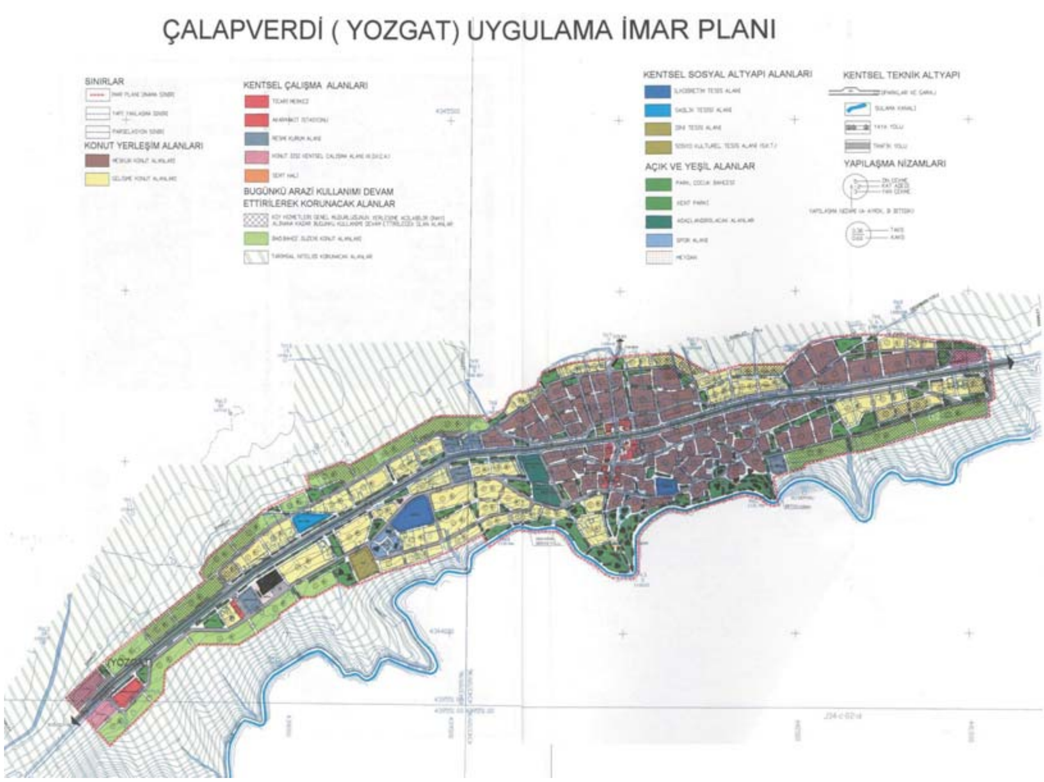


Figure 3.29 Final plan of Çalapverdi

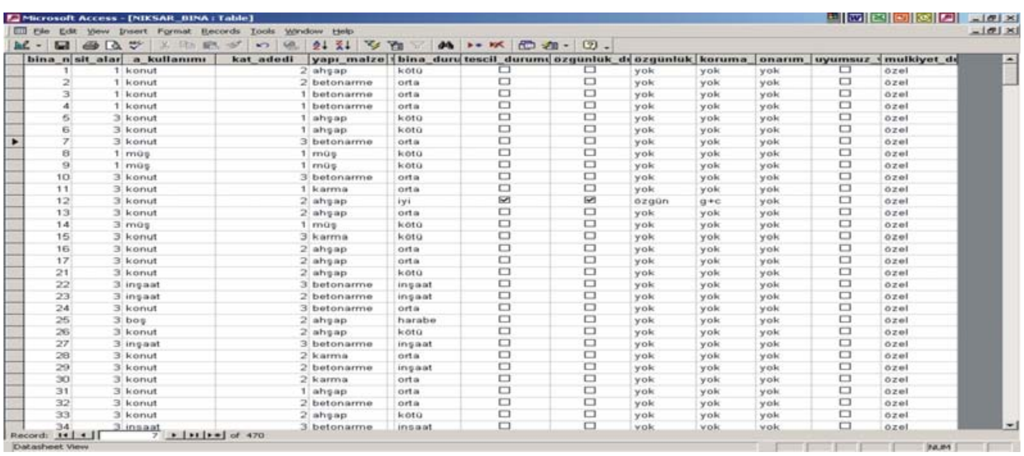
3.3.2.2. Niksar Conservation Plan

Another example of using GIS in plan-making process is the Niksar Conservation Plan. Conservation Plan requires accurate and detailed information about each building. GIS provides a base for planner to process a great amount of collected data in a short time.

Niksar Conservation Plan is required to work with the coordination between the Bank of Provinces and the conservation council in the Ministry of Culture. Therefore, the exchange and the progress of the information that collected in the field and prepared drawings on the base map should be shared among the institutions more quickly. That is why, GIS is used for preparing thematic maps such as land use, originality situation of building etc. The maps are prepared by processing the collected information from the field. Figure 3.30 shows the land use of worked area, which is one of the thematic layers in GIS.

Before going to the field, boundaries of buildings are digitized and unique code number is given to each building. Approximately five hundred buildings are coded. The information related to buildings is collected as a list in the field. The list is entered in the structure of database in the Microsoft Access (Figure 3.31). The digital buildings on the base map are connected to the records in the database. By this connection, when any building is queried in the map, all properties of building can be seen at the same time in GIS software. So, the planner can query all information in a time and display all buildings with changing colors according to the requested results of query. Four examples are shown in figure 3.32 as thematic maps, which are prepared by the queries that linked to the database. The use of GIS in these processes speeds up the collection time of information in a structured way from the field and the duration of preparing thematic maps.

Figure 3.30. The land use of Niksar Study Area (source: Tanrıkulu, 2002:21)



Microsoft Access - [NIKSAR_BINA : Table]

bina_n	sit_alar	a_kullanımı	kat_adedi	yapı_malze	bina_duru	tescil_durumu	özgünlük_d	özgünlük	koruma_	onarım_	uyumsuz_	mulkiyet_d
1	1	konut	2	ahşap	kötü	☐	☐	yok	yok	yok	☐	özel
2	1	konut	2	betonarme	orta	☐	☐	yok	yok	yok	☐	özel
3	1	konut	1	betonarme	orta	☐	☐	yok	yok	yok	☐	özel
4	1	konut	1	betonarme	orta	☐	☐	yok	yok	yok	☐	özel
5	3	konut	1	ahşap	kötü	☐	☐	yok	yok	yok	☐	özel
6	3	konut	1	ahşap	kötü	☐	☐	yok	yok	yok	☐	özel
7	3	konut	3	betonarme	orta	☐	☐	yok	yok	yok	☐	özel
8	1	müş	1	müş	kötü	☐	☐	yok	yok	yok	☐	özel
9	1	müş	1	müş	kötü	☐	☐	yok	yok	yok	☐	özel
10	3	konut	3	betonarme	orta	☐	☐	yok	yok	yok	☐	özel
11	3	konut	1	karma	orta	☐	☐	yok	yok	yok	☐	özel
12	3	konut	2	ahşap	iyi	☑	☑	özgün	g+c	yok	☐	özel
13	3	konut	2	ahşap	orta	☐	☐	yok	yok	yok	☐	özel
14	3	müş	1	müş	kötü	☐	☐	yok	yok	yok	☐	özel
15	3	konut	3	karma	kötü	☐	☐	yok	yok	yok	☐	özel
16	3	konut	2	ahşap	orta	☐	☐	yok	yok	yok	☐	özel
17	3	konut	2	ahşap	orta	☐	☐	yok	yok	yok	☐	özel
21	3	konut	2	ahşap	kötü	☐	☐	yok	yok	yok	☐	özel
22	3	inşaat	3	betonarme	inşaat	☐	☐	yok	yok	yok	☐	özel
23	3	inşaat	2	betonarme	inşaat	☐	☐	yok	yok	yok	☐	özel
24	3	konut	3	betonarme	orta	☐	☐	yok	yok	yok	☐	özel
25	3	boş	2	ahşap	harabe	☐	☐	yok	yok	yok	☐	özel
26	3	konut	2	ahşap	kötü	☐	☐	yok	yok	yok	☐	özel
27	3	inşaat	3	betonarme	inşaat	☐	☐	yok	yok	yok	☐	özel
28	3	konut	2	karma	orta	☐	☐	yok	yok	yok	☐	özel
29	3	konut	2	betonarme	inşaat	☐	☐	yok	yok	yok	☐	özel
30	3	konut	2	karma	orta	☐	☐	yok	yok	yok	☐	özel
31	3	konut	1	ahşap	orta	☐	☐	yok	yok	yok	☐	özel
32	3	konut	2	betonarme	orta	☐	☐	yok	yok	yok	☐	özel
33	3	konut	2	ahşap	kötü	☐	☐	yok	yok	yok	☐	özel
34	3	inşaat	3	betonarme	inşaat	☐	☐	yok	yok	yok	☐	özel

Record: 7 of 470

Datasheet View

Figure 3.31 Database design of thematic layers

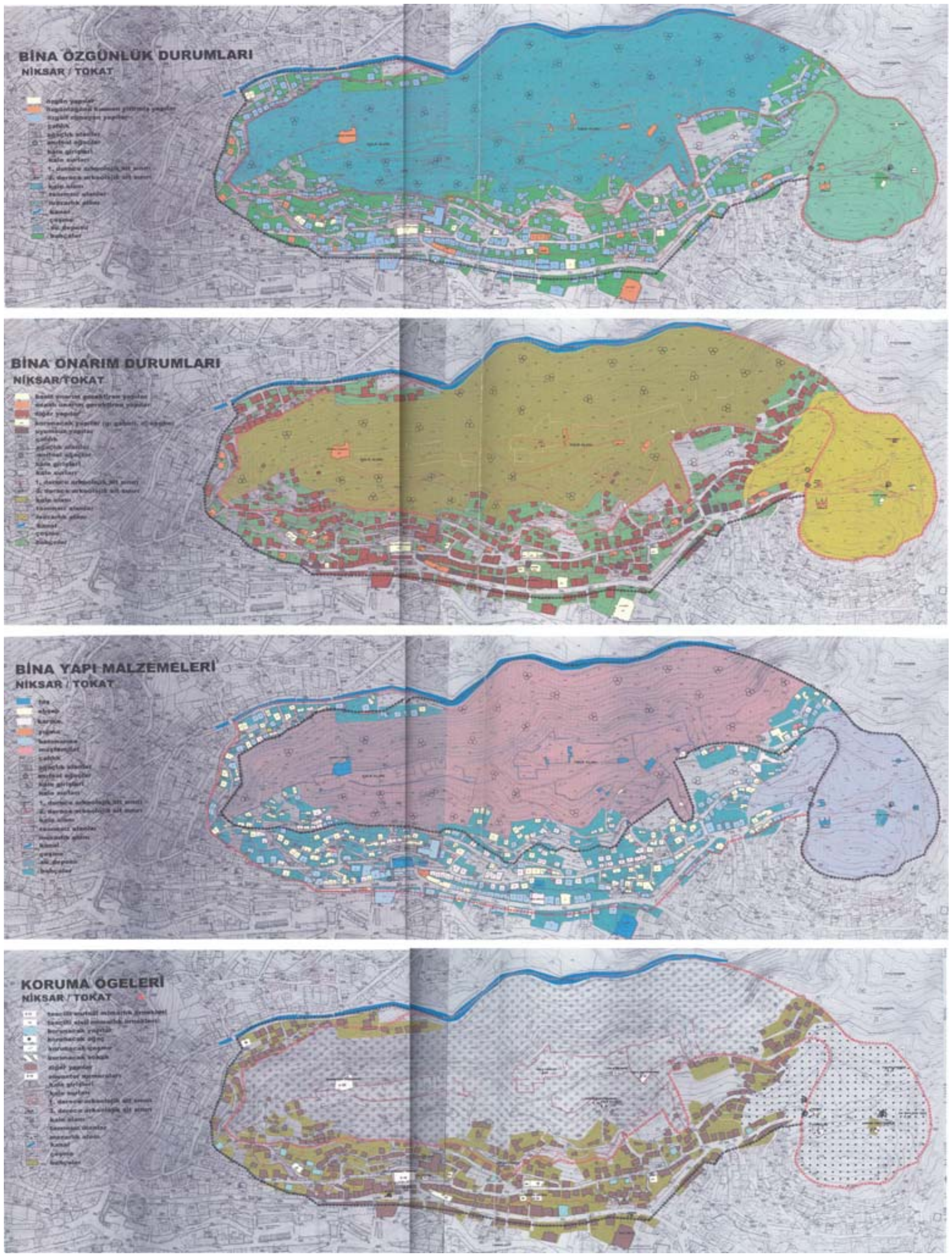


Figure 3.32 Examples for thematic maps, prepared in the Niksar Conservation Plan (source: Tanrıkulu, 2002:23-27)

CHAPTER 4

4.1. THE USE OF GIS IN PRIVATE PLANNING OFFICES

Private planning office prepares the plan when the office has taken the plan-making task from the Bank of Provinces or the municipality. The office is the representative of private sector in the planning. In some cases, private sector is well-organized then public sector. Is this statement true for the private planning offices in the use of GIS? This chapter will focus on whether the office uses the GIS for making a plan or not, and in what degree the office is using the GIS in his daily business life.

GIS is strongly related to the technology. In the first step, the study attempts to understand the use of technology during plan-making process in the office and in what extents the technology is used. Then, the available hardware, software, staff and knowledge of GIS are researched in the office. In the last step, whether the private planning offices can adopt themselves easily to work with the GIS is questioned, when the plan-making process is changed with the use of GIS in the planning.

In order to understand the existing use of GIS for plan-making process in the offices, a survey form is applied to private planning offices. The survey is made in June-July 2003.

4.2. SAMPLE OF THE RESEARCH

Basic unit of survey form is the office. The survey form is applied to 33 offices. It is hard to figure how much percentage of the office is covered with the survey study. There are 149 registered records in the Chamber of City Planners that have the right to make plan in Ankara in 2003. The number of registered records does not represent the number of the office, because the records include the name of planners who work in the office, the name of the boss of the office and the name of planning offices. This makes confusion for finding the number of offices that work actively in the planning field in 2003.

Another difficulty is to reach to the offices, because the addresses of the offices are not known. It is required to make telephone calls. 54% of registered record is called with telephone for applying survey form. Within the telephone called group, 8% of record refused to make any survey about GIS. 20% of the records did not answer the telephone, 4,5% of the records have made an excuse for not making a survey and 67,5% of the records are applied a survey form.

Each of the planners, who work in the same office, registers himself one by one to the Chamber of City Planners. Therefore, it is hard to predict how many planning office is running in the sector. It is unknown that how many repeating records exist in the not-called records. Within the called records, it was realized that twenty-one over fifty-four records were the repeating records and three records declared that they would not work in the planning field anymore. So it can be said that the number of planning offices in Ankara can be more below than the number of 125, which is calculated by the subtraction of twenty-one plus three from 149. As a result, it can be assumed that 26,4 % (33 over 125) of private planning office is covered with thirty-three survey forms in Ankara.

4.3. DATA COLLECTION

Survey form covers seven sections in total question of fifty-six that is attached in Appendix A:

First section asks general information about the private planning offices such as active working years, accredited grouping of planning office, education status, number of staffs working in the office, occupational distribution of staffs, and average income of the offices. Most of the offices refused to answer the question of income.

Second section attempts to figure out the relationship between the office and Bank of Provinces. The critical questions of the section are that how many plans does the office make to the Bank of Provinces and whether there is any technological change while making plans to the Bank. How the plan and report are prepared as a format and type of delivery media to the Bank of Provinces are also researched in this section. This will show the use of technology and GIS during the preparation of plan.

Third section is related to the municipality and the office. In the following section, the same questions are asked to the municipality like in the second section.

Fourth and fifth sections focused on the interaction of offices with external bodies; respectively, public institutions and other private companies, in terms of exchanging, purchasing and using the digital information from them.

Sixth section deals with the technological background of the office in term of available hardware and software such as printer, plotter, scanner and software etc.

Last section is about the knowledge and approach of the office for the use of GIS. At the end of the section, it is searched that whether the office has a capability of establishing an urban information system for the municipalities or not.

4.4. STATISTICAL ANALYSIS TECHNIQUES USED IN THE RESEARCH

According to analysis of answers given in the questionnaire, both descriptive and basic statistics for multivariate analysis are used such as independent samples t-test and analysis of variance. These are made by using SPSS for Windows 11.5. It is used mostly nominal and ordinal variables. Also, some of the interval variables and open-ended questions are recoded in order to apply quantitative analysis. After the dependent variables representing the use of GIS and technology in the planning offices are selected, Independent Samples T-test and One-Way ANOVA techniques are used to test the mean differences between the dependent variables. By this way, at the end, we have reached some conclusions about use of technology and GIS in these offices.

4.5. APPROACHES OF PRIVATE PLANNING OFFICE TO TECHNOLOGY

Several questions are asked to find the level of technology during plan-making process. These questions can be categorized into three groups:

- the method of preparing the plans made for the Bank of Provinces,
- availability of hardware and software,
- the planner’s consideration of using technology effectively in the office.

In the first group, 62.5% of the respondents have answered that there was a technological changes between first and last plan that they made (Table 4.1). Technological change starts with the use of computer. The date of this technological change is shown in Table 4.2. As it can be seen, all technological change has started by the 1990s.

Table 4.1. Technological difference between the first and last plan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**In the last plans, we started to use computers.**	***15***	***45.5***	***62.5***	***62.5***
	There is no technological difference	***9***	***27.3***	***37.5***	***100.0***
	Total	***24***	***72.7***	***100.0***	
Missing	**N.A.**	***7***	***21.2***		
	No Answer	***2***	***6.1***		
	Total	***9***	***27.3***		
Total		***33***	***100.0***		

Table 4.2. If yes, when the technological changes?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1991**	***2***	***6.1***	***15.4***	***15.4***
	1993	***1***	***3.0***	***7.7***	***23.1***
	1995	***1***	***3.0***	***7.7***	***30.8***
	1998	***3***	***9.1***	***23.1***	***53.8***
	1999	***1***	***3.0***	***7.7***	***61.5***
	2000	***1***	***3.0***	***7.7***	***69.2***
	2001	***1***	***3.0***	***7.7***	***76.9***
	2002	***3***	***9.1***	***23.1***	***100.0***
	Total	***13***	***39.4***	***100.0***	
Missing	**N.A.**	***16***	***48.5***		
	No Answer	***4***	***12.1***		
	Total	***20***	***60.6***		
Total		***33***	***100.0***		

The percentage of offices that is said there is no technological change is 37.5, which are nine offices over 24. However, there is a need to look at the establishment date of the office to understand the reason behind why some of them state that there is no change in technology they used. The result can be seen very easily that six of nine offices has already established after the 1990s (Table 4.3). They were the young planners that started to work with the computers. Therefore, only three offices could not adopt themselves to use the computer during this period.

As a result, 91% of the offices is using computer in their offices and the use of computer in planning offices has started from 1990s. Only 9% of the offices have not adopted themselves to use computer in the office.

Table 4.3. Establishment date of office, which said there is no any technological change.

By 10 years		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**1970-1979**	***1***	***11.1***	***11.1***	***11.1***
	1980-1989	***2***	***22.2***	***22.2***	***33.3***
	1990-2003	***6***	***66.7***	***66.7***	***100.0***
	Total	***9***	***100.0***	***100.0***	

The use of technology in the office is also related to the media of map that is taken from the Bank of Provinces. The Bank has started to provide base map in the digital form after 1998. If the map is taken in the CAD or GIS format, the whole process in the office may go on the same type of media. In other words, if the map is only given as a printed copy, plan-making process will go with the manual methods and if the map is given both hard and soft copy, the process will be executed with digital methods. This assumption should be tested with Chi-Square analysis, which shows whether there is a significant relationship between two compared variables or not. If this assumption can be verified statistically, the importance of provision of geographical data to the planning offices will be proofed again. It also shows that whether the office has got the ability to prepare the plan in the computer or not.

The assumption will be tested with one main and three supportive questions in the survey form. The main question of the assumption will be that in which media the plan has been drawn / prepared for the Bank of Provinces. The frequency distribution of the answers for the main question is shown in Table 4.4. 52% of planning offices make their plans by manual method, 40% of them use computer, and the rest uses both methods at the same time. Three supportive questions are "In which media did you get maps from Bank of Provinces?", "In which media were the plan handed over to Bank of Provinces?" and "If it is requested, were you able to hand over the plan in CAD / GIS format?". The distribution of these three questions is listed respectively in following Tables 4.5, 4.6, and 4.7.

Table 4.4. In which media the plan has been drawn / prepared for the Bank of Provinces

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Manual	*13*	*39.4*	*52.0*	*52.0*
	By computer	*10*	*30.3*	*40.0*	*92.0*
	Manual and by computer	*2*	*6.1*	*8.0*	*100.0*
	Total	*25*	*75.8*	*100.0*	
Missing	N.A.	*7*	*21.2*		
	No Answer	*1*	*3.0*		
	Total	*8*	*24.2*		
Total		*33*	*100.0*		

Table 4.5. In which media maps are taken from Bank of Provinces

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Hard Copy / Blueprint Copy**	*13*	*39.4*	*50.0*	*50.0*
	Soft Copy as CAD or GIS Layer	*9*	*27.3*	*34.6*	*84.6*
	Hard Copy and Soft Copy	*4*	*12.1*	*15.4*	*100.0*
	Total	*26*	*78.8*	*100.0*	
Missing	**N.A.**	*7*	*21.2*		
Total		*33*	*100.0*		

Table 4.6. In which media the plan was handed over to Bank of Provinces

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Hard Copy / Blueprint Copy**	*15*	*45.5*	*60.0*	*60.0*
	Hard Copy and Soft Copy	*10*	*30.3*	*40.0*	*100.0*
	Total	*25*	*75.8*	*100.0*	
Missing	**N.A.**	*7*	*21.2*		
	No Answer	*1*	*3.0*		
	Total	*8*	*24.2*		
Total		*33*	*100.0*		

Table 4.7. Possibility to hand over the plan in CAD / GIS format

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Yes**	***16***	***48.5***	***64.0***	***64.0***
	No	***9***	***27.3***	***36.0***	***100.0***
	Total	***25***	***75.8***	***100.0***	
Missing	**N.A.**	***7***	***21.2***		
	No Answer	***1***	***3.0***		
	Total	***8***	***24.2***		
Total		***33***	***100.0***		

It can be seen from the tables that nine offices had a chance to take the base map from the Bank in the digital form (Table 4.5). Ten of them have prepared the plan in the computer (Table 4.4). Ten offices, the same portion, hand over the map to the Bank in both soft and hard copy (Table 4.6). Sixteen offices have an opportunity to prepare the plan in CAD / GIS format in the office (Table 4.7). It means that even though six offices were able to prepare the plan with the use of computer, the offices did not prefer this way, because most probably, they have not got the base map as a soft copy from the Bank.

These figures only provide us descriptive statistics. It should be tested whether the same offices have any relationship of starting, preparing and handing over the plan. Table 4.8 shows the relationship between the types of media in which the plan is prepared and the media that map is taken. The p-value of Pearson Chi-Square and Phi-Cramer's V tests (p= 0.001) prove that there is a significant difference between them. As a result, it is clear that if the Bank gives the data digitally, the process goes within the computer. In other words, the assumption above is true. If the map is delivered with the soft copy from the Bank of Provinces to the office, the office will prepare the plan with the use of computer.

Table 4.8. Crosstabs between the type of media that plan is prepared and media that maps are taken

		In which media did you get maps from Bank of Provinces?			
		Hard Copy	**Soft Copy as CAD / GIS Layer**	**Hard and Soft Copy**	**Total**
In which media have you drawn / prepared your plan for Bank of Provinces?	**Manual**	**12**	**1**	**0**	**13**
	By computer	**0**	**7**	**3**	**10**
	Manual and by computer	**1**	**1**	**0**	**2**
Total		**13**	**9**	**3**	**25**

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.167(a)	2	.000
Likelihood Ratio	24.376	2	.000
Linear-by-Linear Association	7.063	1	.008
N of Valid Cases	25		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is .80.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.876	.000
	Cramer's V	.876	.000
N of Valid Cases		25	

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Ten offices handed over the plan to the Bank of Provinces both hard and soft copy. In this point, the next assumption will be that whether these are the offices that started to prepare the plan in the computer? This question is important in order to test the technological capability of the office for achieving the completion of digital plan in the computer, because some of planning office draws the plan by hand and in the last step digitizing work is purchasing from the external bodies. In other words, although the plan seems to be handed over to the Bank as a soft copy, it does not prepare in the office. By this way, the final product becomes the output of computer, which is good for presentation purposes. The relationship between the offices that has started to prepare the plan in the computer and the offices that has handed over the plan to the Bank is shown in Table 4.9. There is a significant difference between these offices because the p-value of Pearson Chi-Square and Phi-Cramer’s V tests is smaller than 0.05 (p= 0.001). As a result, it is clear that the same offices prepares the plan in the computer and submits the plan to the Bank.

Table 4.9. The relationship between the offices that has started to prepare the plan in the computer and the offices that has handed over the plan to the Bank

		In which media did you hand over plan to the Bank?		Total
		Hard Copy	Hard and Soft Copy	
In which media have you drawn / prepared your plan for Bank of Provinces?	Manual	13	0	13
	By computer	1	9	10
	Manual and by computer	1	1	2
Total		15	10	25

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.167(a)	2	.000
Likelihood Ratio	24.376	2	.000
Linear-by-Linear Association	7.063	1	.008
N of Valid Cases	25		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is .80.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.876	.000
	Cramer's V	.876	.000
N of Valid Cases		25	

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

The use of technology for the plans made for the municipality is same with the plans that are made for the Bank. It should be tested that whether the same technological level is used both for the Bank and for the Municipality. According to One-Way ANOVA test as shown in table 4.10, there is no significant differences between the means of those which prepared the plan by manual methods, those which prepared the plan by computer and those which prepared the plan by both methods for the municipality with comparison of preparing the plans that are made for the Bank (F=1.493, p=0.248). Therefore, there is no technological level of differences between the plan that is made for the Municipality and the plan that is made for the Bank.

Table 4.10. Relation of technological level of differences between the plan that is made for the Municipality and the plan that is made for the Bank.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	*2.194*	*2*	*1.097*	*1.493*	*.248*
Within Groups	*15.431*	*21*	*.735*		
Total	*17.625*	*23*			

To sum up all findings till now in the first group is 52% of planning offices make their plans by manual method, 40% of them use computer, and the rest uses both methods at the same time. If the data is given as a soft copy from the authority, the preparation of plan in the office has started and completed within the computer.

The second research subject is to look for available hardware and software. Distribution of the number of computers that exists in the planning office is shown in Table 4.11. 72.7% of the offices have at most three computers and 27.3 % of the offices have more than three computers. Especially, one office has thirteen computers which works not only in the planning but also mainly in the engineering field.

Table 4.11. Distribution of computers in the office

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	*6*	*18.2*	*18.2*	*18.2*
	2	*6*	*18.2*	*18.2*	*36.4*
	3	*12*	*36.4*	*36.4*	*72.7*
	4	*4*	*12.1*	*12.1*	*84.8*
	5	*3*	*9.1*	*9.1*	*93.9*
	6	*1*	*3.0*	*3.0*	*97.0*
	13	*1*	*3.0*	*3.0*	*100.0*
	Total	*33*	*100.0*	*100.0*	

60% of the offices have a network that ties the several computers with each other in the office. For six offices, this question is not applicable, because they have got only one computer (Table 4.12).

Table 4.12. Network connection between the computers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Yes**	*16*	*48.5*	*59.3*	*59.3*
	No	*11*	*33.3*	*40.7*	*100.0*
	Total	*27*	*81.8*	*100.0*	
Missing	**N.A.**	*6*	*18.2*		
Total		*33*	*100.0*		

85% of the offices have an Internet connection and 76% of the office has an e-mail account. When the number of more costly hardware such as plotter, scanner and printer is asked to the planners, the number decreases. 27% of the office has plotter in which one office has two plotters that works also in the construction field. 64% of the office has scanner in which two offices have two scanners. 40% of the scanners can scan A3 sized paper and rest of them is A4. 91% of the office has printer and only three offices have not got any printer. Distribution of printers in the offices can be summarized as 40% of the office has one printer, 43.3% of the office has two printers, 13.3% of them have three printers, and only one office has four printers. 55.2% of printer can print A4 sized paper, 41.4% of printer is A3 and only one printer is A2.

In the survey form, the number of available software programs and their distributions are asked in four categories: CAD Programs, GIS Programs, Remote Sensing

Programs, and Graphic Design Programs. Distribution of total number of programs used in the offices is shown in Table 4.13. 15.2% of the office does not use any programs, 39.4% of the office uses only one program, 24.2% of the office uses two programs, 18.2% of the office uses three programs and only one office uses six programs. As a result, 85% of the office uses at least one program in the works.

Table 4.13. Distribution of number of offices according to the use of total number of programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	*5*	*15.2*	*15.2*	*15.2*
	1	*13*	*39.4*	*39.4*	*54.5*
	2	*8*	*24.2*	*24.2*	*78.8*
	3	*6*	*18.2*	*18.2*	*97.0*
	6	*1*	*3.0*	*3.0*	*100.0*
	Total	*33*	*100.0*	*100.0*	

The use of programs in the office should be compared with the categorized programs in order to understand why these programs are used. The first category, distribution of CAD programs, can be seen in Table 4.14. 15.2 % of the office does not use any CAD program, 42.4% of the office uses only one CAD program, 36.4% of the office uses two CAD programs, and 6.1% of the office uses three CAD programs.

Table 4.14. Distribution of number of offices according to the use of total number of CAD Programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	*5*	*15.2*	*15.2*	*15.2*
	1	*14*	*42.4*	*42.4*	*57.6*
	2	*12*	*36.4*	*36.4*	*93.9*
	3	*2*	*6.1*	*6.1*	*100.0*
	Total	*33*	*100.0*	*100.0*	

According to the second category, the use of GIS programs in the offices is summarized in Table 4.15. The use of GIS programs in the offices is very low, when it is compared with the CAD programs. 78.8 % of the office does not use any GIS program, 18.2% of the office uses only one GIS program, and 3% of them use three GIS programs.

Table 4.15. Distribution of number of offices according to the use of total number of GIS Programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	*26*	*78.8*	*78.8*	*78.8*
	1	*6*	*18.2*	*18.2*	*97.0*
	3	*1*	*3.0*	*3.0*	*100.0*
	Total	*33*	*100.0*	*100.0*	

As a result, the use of technology on the basis of availability of programs is very high. 85% of the offices use at least one program in their works. This rate comes from the use of CAD programs in the office, which is approximately 85%. Only, 21.2% of the office prefers to use the GIS programs in the office. Therefore, the reason of using the programs in the office is mostly for drawing a plan in the computer for presentation purposes.

The programs used in the office according to their categorized groups are listed in the Tables 4.16, 4.17, 4.18 and 4.19; respectively, CAD Programs, GIS Programs, Remote Sensing Programs, and Graphic Design Programs. It is allowed one office to mention more than one program in the categorized groups, so the frequency in the table shows the total number of programs that are used in the offices. Therefore, the total number of record has exceeded the total number of survey forms.

Table 4.16. Distribution of total number of CAD Programs in office

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AutoCAD	*19*	*43.2*	*43.2*	*43.2*
	Netcad	*21*	*47.7*	*47.7*	*90.9*
	LandCad	*1*	*2.3*	*2.3*	*93.2*
	IntelliCad	*3*	*6.8*	*6.8*	*100.0*
	Total	*44*	*100.0*	*100.0*	

Table 4.17. Distribution of total number of GIS Programs in office

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ArcView	4	40.0	40.0	40.0
	ArcInfo	1	10.0	10.0	50.0
	NetInfo	1	10.0	10.0	60.0
	Autocad map	2	20.0	20.0	80.0
	MapInfo	2	20.0	20.0	100.0
	Total	10	100.0	100.0	

Table 4.18. Distribution of total number of Remote Sensing Programs in office

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Autocad Raster Design	1	50.0	50.0	50.0
	Ilvis	1	50.0	50.0	100.0
	Total	2	100.0	100.0	

Table 4.19. Distribution of total number of Graphic Design Programs in office

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Photoshop	5	29.4	29.4	29.4
	Corel Draw	7	41.2	41.2	70.6
	3D Studio Max	3	17.6	17.6	88.2
	Paint Proshop	1	5.9	5.9	94.1
	Picture Publisher	1	5.9	5.9	100.0
	Total	17	100.0	100.0	

As it can be seen from the tables, the numbers of AutoCAD and NetCAD programs are more than other programs and they are used more common in the offices. The Board of Directors in the Bank of Provinces has made a decision about all development plans that will be prepared digitally after 2001. Within this decision, the Bank has accepted two digital formats, namely, AutoCAD and NetCAD that are the most widely used CAD formats. It seems that Bank's decision for accepted format is almost appropriate for the software in the offices.

There are plenty of differences between CAD and GIS programs in terms of their capabilities. As it can be seen from the frequency of tables, the planning offices hardly use the GIS programs in their works, which the percentage of using GIS programs in the office is 21.2.

Third research subject attempts to learn the planner's thought about whether the technology is using effectively in the office or not. The distribution of answers to the question is shown in Table 4.20. 70% of the planner thinks that the technology is using effectively in the office. The whole section is tried to prove the truth of this statement. The most important indicator of showing the use of technology will be the distribution of preparation method of plan in the office. As it is explained above in Table 4.4, the percentage of making a plan with the use of computer is 40% and the use of both manual and computer methods is 8%.

Table 4.20. Distribution of Thoughts on Effective Use of Technology in Office

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	*23*	*69.7*	*69.7*	*69.7*
	No	*10*	*30.3*	*30.3*	*100.0*
	Total	*33*	*100.0*	*100.0*	

In addition, it is tried to learn whether there is significant difference between the means of those who say “yes” and those who say “no” in the case of using GIS in planning process. It is applied Independent Sample T-Test, and it can be said that there is a significant difference between those who uses GIS in their office and those who thinks that they are using technology in his/her office effectively (t=-3.953, p=0.001) as shown in table 4.21.

Table 4.21. Independent Samples T-Test for the Preparation of Plan with GIS

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
V56	Equal variances assu	*16.902*	*.000*	*-2.027*	*31*	*.051*	*-.38*	*.190*	*-.772*	*.002*
	Equal variances not assumed			*-3.953*	*25.000*	*.001*	*-.38*	*.097*	*-.585*	*-.184*

4.6. APPROACHES OF PRIVATE PLANNING OFFICE TO GIS

There are five categorized groups in the survey form that try to define the level of GIS in the office that is used during plan-making process:

- digital exchange capacity of the planning office with external authorizes,
- GIS knowledge,
- intention of planner to GIS,
- the use of GIS in the plan-making process,
- office achievements for the establishment of urban information system to the municipality.

In the first category, the digital exchange capacity of the planning office with public institutions and with private firms are searched with the main questions of “Have you ever get any digital information from any private firms?” and “Have you ever get any digital information from any public institutions except municipality and Bank of Provinces?”. Surprisingly, there is no significant difference between the number of offices that has taken digital information from public institution and from other private firms. The distributions respectively from private companies and from public institution are shown in Table 4.22 and 4.23. One third of the offices have taken digital information from both of the sectors.

Table 4.22. Distribution of digital information that is taken from any private firms (Except Municipality and Bank of Provinces)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Yes**	***11***	***33.3***	***33.3***	***33.3***
	No	***22***	***66.7***	***66.7***	***100.0***
	Total	***33***	***100.0***	***100.0***	

Table 4.23. Distribution of digital information that is taken from any public institutions (Except Municipality and Bank of Provinces)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Yes**	***12***	***36.4***	***36.4***	***36.4***
	No	***21***	***63.6***	***63.6***	***100.0***
	Total	***33***	***100.0***	***100.0***	

The most commonly used geo-data exists in General Commander of Mapping and General Directorate of Land Registry and Cadastre (Table 4.24). All purchased data is used for mainly to form base map and to learn ownership and the parcel boundaries. Other reasons to purchase geo-data can be listed as to prepare the report, to use for the geological structure, and to make analysis. The most known private companies that sell geographical data are respectively NetCAD, MNG, Islem GIS, Sayisal Grafik, INTA and Basari in the order of decreasing importance.

The main reasons not to purchase any digital data are no available digital data, no need and expensive selling price in the order of decreasing importance. Other reasons are no applicable format, too much bureaucracy of purchasing the data and opportunity of digitizing data in the office.

Table 4.24. From which public institution the digital information is taken

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	General Commander of Mapping	12	28.6	28.6	28.6
	Gen. Dir of Mineral Research and Exploration	3	7.1	7.1	35.7
	Gen. Dir of Rural Services	1	2.4	2.4	38.1
	Gen. Dir of Land Registry and Cadastre	7	16.7	16.7	54.8
	Ankara Water and Sewer System Institute	2	4.8	4.8	59.5
	State Statistical Institute	1	2.4	2.4	61.9
	TUBITAK	1	2.4	2.4	64.3
	Ministry of Forestry	2	4.8	4.8	69.0
	Municipalities	5	11.9	11.9	81.0
	Bank of Provinces	5	11.9	11.9	92.9
	Gen. Dir of Highways	2	4.8	4.8	97.6
	Universities	1	2.4	2.4	100.0
	Total	42	100.0	100.0	

The second category is about the planner's knowledge of GIS. The first query is related with when the planner had information about the GIS. 82% of the planner have information about the GIS after 1990s and 9% of them is before 1990s till to 1975. 30% of the planner has taken education about the GIS, especially in the university. 70% of planner's education subject is Introduction to GIS. As a result, the overall knowledge of planners in the planning offices about GIS can be expected at the level of initial phase.

Third category is related with the intension of planner to GIS. 91% of the office accepts that GIS should use in the plan as a tool, but this does not mean that all offices have got opportunity to use GIS in the plan. Only 36.4% of the office stated that they have an opportunity to do it. The defects can be listed as software, hardware, data, staff and knowledge. Three offices also stated that they have not got any things for using GIS in the plan.

Fourth category is related with the question of whether they used GIS in one of the plans or not (Table 4.25). This is one of the main questions that define the level of using GIS in the offices. 21.2% of the offices have prepared a plan by using GIS. Surprisingly, this 21.2% is the same portion with the offices, which uses the GIS programs that is explained in the previous section.

Type of GIS applications used in the plan are 42.9% of the office for development plans, 28.6% of the office for urban design, and the rest for rehabilitation project and for re-settlement project. Even though the number of cases is small for the applications in the planning, they will give clue about in which fields the GIS is used in the planning.

The preparation date of plan with the use of GIS is shown in Table 4.26. As it can be seen in table, all plans are done after 1999. Therefore, the use of GIS in the plan by the planning offices is newly developing.

Table 4.25. Preparation of plan with the GIS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	*7*	*21.2*	*21.2*	*21.2*
	No	*26*	*78.8*	*78.8*	*100.0*
	Total	*33*	*100.0*	*100.0*	

Table 4.26. Preparation date of plan with the GIS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dates are different	*1*	*3.0*	*14.3*	*14.3*
	1999	*1*	*3.0*	*14.3*	*28.6*
	2000	*2*	*6.1*	*28.6*	*57.1*
	2001	*1*	*3.0*	*14.3*	*71.4*
	2002	*2*	*6.1*	*28.6*	*100.0*
	Total	*7*	*21.2*	*100.0*	
Missing	N.A.	*26*	*78.8*		
Total		*33*	*100.0*		

As 88% of the office stated that they wish to make the plan with the GIS, it can be concluded that the offices, which have not done any plan with GIS, have intended to use it.

The most common planner's opinion about the benefits of GIS to planning can be listed as:

- GIS can give a chance to prepare the plan in more correct and effective way,
- GIS can shorten the preparation period of plan,
- GIS can provide easy and good presentation,
- GIS can sustain an access to reach updated data.

In the survey form, it asked whether the planner knows the importance and possible effects of free provision of geographical data by the public institutions to the office. The distribution of the answers is shown in Table 4.27. 68.8% of the planner answers that if geo-data is provided by the public institutions, plans can be prepared in more short time. If that provision is happened, 93.9% of the office wants to prepare the plans with the GIS.

Table 4. 27. Possibility of change in the process, when geo-data is provided to planner

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	*3*	*9.1*	*9.4*	*9.4*
	I do not know	*2*	*6.1*	*6.3*	*15.6*
	I do not think so	*2*	*6.1*	*6.3*	*21.9*
	Plan can be done in a more short time	*22*	*66.7*	*68.8*	*90.6*
	Get rid of bureaucracy in reaching the data	*2*	*6.1*	*6.3*	*96.9*
	Related with provision of update and accessible data	*1*	*3.0*	*3.1*	*100.0*
	Total	*32*	*97.0*	*100.0*	
Missing	No Answer	*1*	*3.0*		
Total		*33*	*100.0*		

Last category is related with the establishment of Urban Information System (UIS) in the municipality. This subject shows the degree of GIS knowledge in the offices in the sense that the offices will have a chance to gain profit from the use of GIS. As shown in Table 4.28, 24.2% of the office has assisted for establishing an UIS to the municipality. Although this figure seems reasonable, when the contribution is searched, that the office actually gives the consultancy work on the establishment of UIS, become 9% (Table 4.29).

The intention of office for giving a consultancy service to the establishment of UIS is shown in Table 4.30. 33.3% of the offices think that they can give this service to the municipalities and 15.2% of the offices have an opportunity to make an investment, if the municipality requests the establishment of UIS from them.

Table 4.28. Assistance of establishing an Urban Information System to the municipality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes, I assisted	8	24.2	24.2	24.2
	No	25	75.8	75.8	100.0
	Total	33	100.0	100.0	

Table 4.29. Distribution of the office that made contribution on the establishment of Urban Information System

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A contact, but not done by the office	1	3.0	12.5	12.5
	Consultancy service	3	9.1	37.5	50.0
	Provision of digital base map	4	12.1	50.0	100.0
	Total	8	24.2	100.0	
Missing	N.A.	25	75.8		
Total		33	100.0		

Table 4.30. Consultancy to the municipality about establishing an Urban Information System

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	*11*	*33.3*	*33.3*	*33.3*
	No	*15*	*45.5*	*45.5*	*78.8*
	If they ask, I could invest	*5*	*15.2*	*15.2*	*93.9*
	Change according to the market	*1*	*3.0*	*3.0*	*97.0*
	Education is important	*1*	*3.0*	*3.0*	*100.0*
	Total	*33*	*100.0*	*100.0*	

As a result, the use of GIS for making a plan in the private planning offices should be explained with the answers to the question of “Have you ever prepared any plan with the use of GIS. As it is shown in Table 4.25, 21.2% of the planning office has prepared the plan with the use of GIS and rest of them has not.

4.7. EXISTING EFFECTS OF WORKING WITH GEO-DATA IN PLANNING OFFICES

The Bank of Provinces has decided that the plan will be submitted to the Bank as both hard and soft copy in 2001. This decision will increase the use of technology and GIS in the planning offices. However, this decision will create an extra cost for the office in the existing situation, if the Bank does not provide geo-data to the office.

Submission of digital plans to the Bank can be in two different ways. These two ways will be the adaptation mechanism of planning office. In the first way, thematic maps are first scanned and then digitized. By this way, all geographical information can be queried into the plan during the whole plan-making process. However, the results of the survey show that none of the planning offices has A0 sized scanner, which is required to scan the map. Digitizing and scanning processes will be the first additional cost. Then, the plan can be prepared with the use of CAD programs. According to the result of survey forms, 85% of the office uses the CAD programs during the preparation of the plan. Within this group, the offices that have plotter can produce their final product as output from the computer very easily. For those who have not got any plotter, output of the plan from the plotter will be the second additional cost. This group who knows how to use the technology can adopt themselves easily.

Those who do not know how to use CAD programs will choose the second way. They have several options such as hiring one staff for this job, purchasing the work of final draw of the plan in the computer from outside, or learning the use of CAD program in the long run. The cheapest solution for this group will be to purchase this work instead of hiring a new staff in short term, because the cost of new staff is more expensive than purchasing this work from outside. Therefore, this group will most probably continue the preparation of plan by manual methods. To purchase the digitizing work from outside will be the additional cost for this group.

There will be a danger of shutting down the offices, which have not adopted themselves to use technology or which have not got any opportunity to cover those additional costs, when the submission of plan as a soft copy became obligation for the offices. As a result, the preparation of digital plans in the computer will create extra costs for the planning office, if the geographical data is not provided digitally by the Bank to the planning offices.

CHAPTER 5

5.1. THE GIS AND PLANNING

The first reflection of GIS usage is the map. As it is stated in the report of DPT (2001:28), below listed organizations are the major public authorities that produce, use and benefit from the map and cadastre services:

1- Ministry of Tourism
2- Ministry of Culture
3- General Directorate of Land Registry and Cadastre (TKGM)
4- General Commander of Mapping (HGK)
5- General Directorate of Bank of Provinces
6- General Directorate of Forestry
7- General Directorate of State Hydraulic Works (DSİ)
8- General Directorate of Highways
9- General Directorate of Land Office
10- General Directorate of Turkish State Railways (TCDD)
11- Head of Mineral Department
12- General Directorate of Rural Services (KHGM)
13- General Directorate of Agricultural Reform
14- General Directorate of Mineral Research and Exploration (MTA)
15- General Directorate of Turkish Coal Enterprises
16- General Directorate of National Real Estate

17- General Directorate of Electrical Power Resources Survey & Development Administration (EİE)
18- General Directorate of Operation of Airfields and Harbors (DHLİ)
19- Municipalities

Nineteen public institutions deal with map. Several institutions can concentrate on specific area at the same time for different purposes. One of institution's decisions can be against to the other. There is no hierarchical order between each other. They do not share a common framework or work under same program or schedule. This makes confusion among public planning authorities, which lead to miss coordination and corruption in the planning.

Public authorities' final decisions on geography are shown on the map. Maps are the concrete evidence and the mirror of institution's thoughts. When map-making mechanisms are established under the same platform in all institutions, the intervention to the geography will be coordinated among different public authorities. When the same platform is sustained, different institution will work together at the same time for the agreed purposes.

To share a common framework in the public institutions, it is needed an information system. From the planning point of view, many decisions are related with geography in a different extent, which requires integration and manipulation of geography in the system. The interaction between geography and information system results to form a GIS, which is a new developing digital tool for the planning.

To work with this digital tool in the manner for the establishment of GIS and transformation of existing information into GIS environment has already started till 1990s in the public administration. Till now, many public institutions have purchased different kinds of GIS software and hardware. The information is converted into digital form without under the control of any national standards. Same data is reproduced several times with different accuracy and method by different institutions, which lead to lose of money and time.

There are a lot of examples in the national level that 1/25000, 1/100000 and 1/250000 scaled raster maps are produced several times in different accuracy by many public institutions. One of the repeated works about the production of same raster maps is done by Soil and Water Resources National Information Center in General Directorate of Rural Services, General Commander of Mapping, and Antalya Metropolitan Municipality. Another repeated work is the establishment studies of real estate information system. The repeated study is done by three different public institutions such as General Directorate of Land Registry and Cadastre, General Directorate of National Real Estate, and Construction Real Estate Department in the Ministry of National Defense (Taştan, 2003(b):17-19).

Almost each institute has attempted to establish his information system, although the exchange of geographical information between them, provision policies and geo-data production standards are not defined clearly. Table 5.1 shows the examples of information systems that are trying to construct and some of them are completed.

The need of coordinating geographical information works in the public institutions in the national level has already started in order to avoid misleading works. This work goes under the supervision of General Commander of Mapping, and Ministerial Mapping Works Coordination and Planning Council (Önder, 2003:14). The aim of the study is to make a consensus on which public institutions will be responsible for the production and maintenance of related data. It also tries to coordinate the provision of geo-data by the responsible institutions, and to define a national data standards for the production of geo-data and a national data exchange format for more easily flow of geographical data among public institutions (Eroğlu, 2003).

To define the production of geo-data within the national geographic information standards, to re-produce the data within the updating process by creating new revisions, to provide the flow of information within the organization, to exchange the geo-data among the public institutions, and to share the responsibilities and authorities on the operation of related geo-data with other institutions, to deliver the

Table 5.1. Some examples of information systems in the public institutions (source: Taştan, 2003(b):20-23)

The name of Information System	The Responsible Institution
1/25 000, 1/250 000 and 1/1 000 000 scaled Topographic Database	General Commander of Mapping
Geological Maps (Geological Database)	General Directorate of Mineral Research and Exploration
Turkey Agriculture Information System Project	Field Crops Main Research Institute, Ministry of Agriculture and Village Affairs
Land Registry and Cadastre Information System	General Directorate of Land Registry and Cadastre
National Information System	Prime Minister
Turkey Disaster Information System	Ministry of Internal Affairs
Forest Resources Information System	General Directorate of Forestry
Highways Geographical Information System	General Directorate of Highways
1/25 000 scaled Soil Database, 1/250 000 scaled Rural and Agricultural Infrastructure Services Database, 1/1 000 000 scaled Turkey General Soil Map, 1/25 000 scaled Land Cover and Land Use Database	Soil and Water Resources National Information System, General Directorate of Rural Services
National Real Estate Automation Project	General Directorate of National Real Estate
Real Estate Information System	Construction Real Estate Department, Ministry of National Defense
National Environment Database	Ministry of Environment

requested geo-data to local government institutions and universities are the some of expectations that the system should provide (Taştan, 2003(b):38). All these expectations should carry out in the manner of achieving cost reduction and timesaving. If the establishment of national geographic information system is succeed within these principles, the effectiveness, productivity and quality will arise in the planning activities in the public administration.

The most important point during the formation of data is to use specific standards that are prepared by the supervision of General Commander of Mapping. The prepared standards are geographical information classification standard, geographical information accuracy standard, geographical information geometry standard, cartographic display (symbol) standard, and data structure standard. In order to accept these standards in the national level, it should be published by the Turkish Standards Institute, which is applied in 1998 (Taştan, 2003(a):38-39).

The architecture of system design is distributed database that the responsible institute will keep and arrange the establishment of database in his organization. The distributed database system design is the necessary factor for easy maintenance, fast update process and operation in terms of more fast speed to reach directly to the geographical data in the database. This is also essential and directly related with the available network as an infrastructure of the institute in order to obtain the high-speed rates for the system that works efficiently.

Ministerial Mapping Works Coordination and Planning Council has faced a legal problem during the implementation of Turkish National Geographic Information System (TNGIS). The Council has prepared the draft document of TNGIS Policy and Strategy Basis in February 1999. The comments from public institutions are gathered and document is finalized according to the comments as a new regulation. The revised document is submitted to the Ministry of National Defense for the approval of the Council of Ministers in May 1999. The Ministry stated that legal regulations should be done before the approval of regulation (Taştan, 2003(b):6-14). In March 2003, the Council has completed the legal works by authorizing the Committee to prepare a new regulation (Taştan, 2003(b):28). Preparing a new regulation by Ministerial Mapping Works Coordination and Planning Council Regulations Committee is still on going. Although when the legal regulations on the establishment of TNGIS will be accepted is not clear, the Committee is still continuing his works. When the regulations are accepted, it will change many things in the public administration especially it will improve the planning system.

Another problem is the share of responsibilities that which geographical data will be produced by which organization, should be defined. Table 5.2 shows the specific geographical features and public institutions that are under the task and responsibility of geographical features. Table 5.3 shows the general layers that will be produced by the responsible public institutions (National Information System, 2000:11-14).

Table 5.2 List of geographical features and its responsible public institutions (Source: National Information System, 2000:11-13)

RESBONSIBLE INSTITUTIONS	GENERAL LAYERS
Ministry of Environment	Water Pollution
	Air Pollution, Noise
	Solid Waste
	Soil Pollution
	Habitat types
	Important Environmental Protection Areas
	Lakes, pond, marsh lands
	Industry and small-scaled Industry Areas
Ministry of Industry and Commerce	Organized Industry Regions, Power Plants
	Duty Free Regions
	Electricity Lines
Ministry of Energy and Natural Resources, General Directorate of Turkish Electricity Corporation, General Directorate of Turkish Electricity and Distribution Corporation	Distribution Networks
	Natural Gas Pipelines
	Oil Pipelines
Ministry of Energy and Natural Resources, General Directorate of Botas	Vegetable Production
	Husbandry Production
Ministry of Agricultural and Rural Affairs	Agricultural Input
	Land Cover
	Agricultural Economic Structure
	Soil Maps
	Roads
	Topography
	Waters
Ministry of National Defense, General Commander of Mapping	Land Cover
	Cultural Objects
	Superhighway
	State roads
Ministry of Public Works, General Directorate of Highways	Village Roads
	Great Soil Classifications
Prime Minister, General Directorate of Rural Services	Slope Depths Combination
	Erosion Degree
	Land use
	Class of Land use Capability
	Important Agricultural Lands
	Field types
	Airports

	Airlines
Ministry of Transportation, General Directorate of Railways, Harbors and Air Fields Construction	Ship
	Maritime
Permanent Undersecretary of Maritime, General Directorate of Naval Transportation	Course of a ships
	Railways and Superstructure facilities
	Beds, Hospitals, Doctors, Pharmacists, Nurses
Ministry of Transportation, General Directorate of Turkish State Railways	Mortal Baby Rate
Ministry of Health	Contagious Disease
	Mineral, Potable and Spring Water
	Schools, students, teachers
	Cadastral Maps
Ministry of National Education	Benchmarks
Prime Minister, General Directorate of Land Registry and Cadastre	Land Registry Information
	Treasury Lands
	Shoreline Boundaries
Prime Minister, General Directorate of Building Site Office	Demographical Information
Ministry of Internal Affairs, Governorships	Out of Municipality Boundaries
	Application Development Plans
	Master Development Plans
	Base maps
	Infrastructure
	License-plate numbers of building
	Administrative Boundaries
	Application Development Plans
Ministry of Internal Affairs, General Directorate of Provincial Administrative	Master Development Plans
Municipalities	Base maps
	Infrastructure
	License-plate numbers of building
	Transportation Plans
	Public Transportation
	Municipal Roads and Facilities
	Environmental Regulation Plans
	Earthquake Risk Zoning Maps
Ministry of Public Works	Plan and Base Map Production
Ministry of Public Works, General Directorate of Disaster Works	Plan and Base Map Production
Ministry of Public Works, General Directorate of Bank of Provinces	Population Census

Prime Minister, South East Anatolian Project Institution	Lakes, ponds and dams
Prime Minister, State Statistical Institute	Rivers
Ministry of Public Works, General Directorate of State Hydraulics Works	Hydroelectric Power Plants
	River Basins
	Hydro geological maps
	Water Resources
	Irrigation Channels
	Tourism Regions, Areas and Centers
	Tourism Application Development Plans
Ministry of Tourism	Forest Maps
	Official Forest Boundaries
Ministry of Forestry	Forest Vegetation Information
	National, Natural Parks, Natural Monuments
	Natural Protection Areas
	Forestry Cadastre
	Natural, Historical, Archeological and Urban Protection Areas
	Museums
Ministry of Culture, General Directorate of Cultural and Nature Beings Protection	Monuments
	Military Facilities
	Military Maneuvers Areas
Ministry of National Defense	Off-limits area
	Geo-thermal Resources
	Geological Researches
Ministry of Energy and Natural Resources, General Directorate of Mineral Research and Exploration	Mineral Explorations
	Geo-physics Researches
	Drilling Researches
	Petroleum Researches
	Meteorology Stations
Ministry of Energy and Natural Resources, Turkish Petroleum Incorporated Corporation	Meteorological Parameters
Prime Minister, General Directorate of State Meteorology	Water Resources and Water Basin Analysis
Ministry of Energy and Natural Resources, General Directorate of Electricity Works Survey Institute	

Table 5.3 List of general layers that will be produced by responsible public institutions (Source: National Information System, 2000:13-14)

GENERAL LAYERS	RESBONSIBLE INSTITUTIONS
SOIL	Prime Minister, General Directorate of Rural Services
	Ministry of Agricultural and Rural Affairs
GEOLOGY-MINERAL	Ministry of Energy and Natural Resources, General Directorate of Mineral Research and Exploration
	Ministry of Public Works, General Directorate of State Hydraulics Works
	Ministry of Energy and Natural Resources, Turkish Petroleum Incorporated Corporation
	Ministry of Energy and Natural Resources, General Directorate of Etibank
EARTHQUAKE	Ministry of Public Works, General Directorate of Disaster Works
	Ministry of Energy and Natural Resources, General Directorate of Mineral Research and Exploration
WATER	Ministry of Public Works, General Directorate of State Hydraulic Works
	Prime Minister, General Directorate of Rural Services
	Ministry of Energy and Natural Resources, General Directorate of Mineral Research and Exploration
	Municipalities
	Ministry of Environment
	Ministry of Health
	Ministry of Internal Affairs, Governorships
	Ministry of Energy and Natural Resources, General Directorate of Electricity Works Survey Institute
POPULATION	Prime Minister, State Statistical Institute
	District Population Directorship
	Ministry of Public Works, General Directorate of Population and Citizenship Works
TRANSPORTATION	Ministry of Public Works, General Directorate of Highways
	Prime Minister, General Directorate of Rural Services
	Ministry of Transportation, General Directorate of Railways, Harbors and Air Fields Construction
	Permanent Undersecretary of Maritime, General Directorate of Naval Transportation
	Ministry of Transportation, General Directorate of Turkish State Railways
	Ministry of Agricultural and Rural Affairs
INDSUTRY AND ENERGY	Ministry of Industry and Commerce

	Ministry of Energy and Natural Resources, General Directorate of Turkish Electricity Corporation
	Ministry of Energy and Natural Resources, General Directorate of Botas
AGRICALTURE	Ministry of Agricultural and Rural Affairs
FOREST	Ministry of Forestry
LOCAL GOVERNMENT	Municipalities
	Ministry of Internal Affairs, Governorships
	Ministry of Public Works
	Ministry of Agricultural and Rural Affairs
	Ministry of Internal Affairs, General Directorate of Provincial Administrative
	Ministry of Public Works, General Directorate of Bank of Provinces
	Prime Minister, South East Anatolian Project Institution
BIOLOGICAL TYPES	Ministry of Environment
	Ministry of Forestry
	Ministry of Culture
CLIMATE	Prime Minister, General Directorate of State Meteorology
LAND REGISTRY-CADASTRE	Prime Minister, General Directorate of Land Registry and Cadastre
	Prime Minister, General Directorate of Building Site Office
BASEMAP DATA	Ministry of National Defense, General Commander of Mapping
CULTURAL STRUCTURES	Ministry of Culture
	Ministry of Environment
ENVIRONMENTAL POLLUTIONS	Ministry of Environment
DEFENSE	Ministry of National Defense
EDUCATION	Ministry of National Education
HEALTH	Ministry of Health
TOURISM	Ministry of Tourism

The list of general layers and its responsible institutions should be questioned more detailed from the planning point of view. Each item in the legend of environmental regulation plan can be accepted as a GIS layer. The largest group is formed by the integration of the legend items that exist in the several environmental regulation plans such as Bolu, Düzce Region and Düzce Metropolitan Area. Table 5.4 shows this largest group. The responsible institutions, which will produce GIS layer for each item in the legend, should match with the items in the Table 5.4. It could hardly be found that which public institution is responsible in some of legend items for the production of the GIS layer on the base of Table 5.2 and 5.3.

Table 5.4. The largest list of legend items in the environmental regulation plan

1. Boundaries
    - 1.1. Administrative Boundaries
        - Province Boundary
        - District Boundary
        - Municipality Boundary
    - 1.2. Boundary of Planning
        - Approved Environmental Master Plan Boundary
        - Approved Development Master Plan
        - Düzce Urban Development Sub-Region 1/25.000 Scaled Environment Master Plan Boundary
        - Approved Development Master Plan Boundary
        - Proposal Boundary of New Environmental Master Plan
2. Land Use
    - 2.1. Urban and Rural Settled Areas
        - 2.1.1. Urban Settled Areas
            - 2.1.1.1. Urban Planned Areas
                - High Density (250-350 km/ha)
                - Medium Density (150-250 km/ha)
                - Low Density (60-150 km/ha)
                - Very Low Density (20-60 km/ha)
                - Areas to be Preserved Density and Building Regulation
                - Areas to Improve Density and Building Regulation
            - 2.1.1.2. Urban Development Areas
                - Urban Development Areas
            - 2.1.1.3. Potential Areas
                - Potential Development Areas
        - 2.1.2. Rural Settled Areas
        - Second Residential Characteristic Settled Areas
    - 2.2. Commercial and Administrative Centers
        - Central Business Districts

2nd and 3rd Degree Centers

2.3. Area of Working Places

2.3.1. Public Facility Areas

2.3.2. Industry Areas

Small-scale Industry Sites

Organized Industry Regions

Industry Facilities

Non-residential Urban Working Areas

To be healthy corridor for place of employment

2.4. Tourism and Recreation Areas

Tourism Facility Areas

Camping

Public Education and Relaxation Facilities

Beach

2.5. Big and Open Area Uses

University Campus Areas

Regional Parks

Re-creation Areas

Urban Big Green Areas

Urban and Regional Sport Areas

Health Facilities

2.6. Agriculture Areas

Areas to be preserved agricultural quality within content of irrigation project

Areas to be preserved agricultural quality

Special Crop Areas to be preserved agricultural quality

2.7. Transportation and Infrastructure

2.7.1. Transportation

2.7.1.1. Highway

1st Degree Roads

2nd Degree Roads

Terminal

Super Highway

Village Road

2.7.1.2. Railways

Railway

Train Station

2.7.2. Infrastructure

2.7.2.1. Energy Transmission

Energy Transmission Line

Transformer

Pipelines

2.7.2.2. Irrigation Channels

Irrigation, Drainage and Evacuation Channel

2.7.2.3. Urban Infrastructure

Purification of Drinking water and Depot Places

Purification of Waste Water

Garbage Collection Facilities

2.7.2.4. Fishermen Shelter

3. Threshold
   - Vineyards and Orchards Agricultural Areas
   - Forest Areas
   - 1st and 2nd Class Lands
   - 3rd and 4th Class Lands
   - Fallowing Dry Agriculture Area
   - Dry Agriculture Areas
   - Special Crop Areas
   - Suitable for Forest Lands
   - Pasture Areas
   - Grove Areas
   - Irrigation Areas
   - Flooding Areas
4. Preservation Areas
   - 4.1. Natural Sit Areas
     - 1st Degree Sit Areas
     - 2nd and 3rd Degree Sit Areas
     - Archaeological Sit Areas
   - 4.2. Nature Preservation Areas
     - Wild Life Preservation Areas
   - 4.3. Areas to be Preserved Natural Characteristic with existing land use
     - Scrub, Heath, Thicket Areas
   - 4.4. Construction Banned Areas
     - River Basin Long Distanced Preservation Areas
5. Investments and Potentials
   - Railway Crossing
   - Proposal of Yacht Port
   - Urban Development Areas
   - Industry and Small-scale Industry Development Areas

Beside on the problems of not well-shared responsibilities among public institutions, the provision policy of geo-data for the use of planning is also not clear. The system should open to all public institutions. If any public institution needs geographical information for development, research and planning purposes, it has a right to get and use the data from the system. If the provision of data is established under this principle, it means that the system has reached to achieve one of the important aims.

The use of data for commercial reasons in the private sector can be considered in two different ways; first one is to sell the geographical data to private sector in order to recover the initial implementation cost. Second way is to provide the data with free cost to private sector in the manner of public interests. There are some examples that geographical data is open to use for everyone without any cost or with only the delivery cost. For example, geographical data about the demography of whole country (TIGER format) in the USA can be downloadable without any cost through the Internet. The second way will be the most rational method in order to increase the use of GIS in the private sector. This kind of support is needed in both public and private sector, because the use of GIS can overall be said in the transition period. Within this transition period, the availability of geo-data should become abundant and flow very easily.

The provision policy of geo-data to planning authorities is too much important and it will determine the use of GIS with the planning in the future. Planning authorities have not got any opportunity in terms of budget to produce all data that is related with the plans, because planning uses many information that comes from different fields such as geology, demography and sociology etc. Public administration should find the better way of providing this information to planning authorities in the manner of public interests. The best way of providing geographical information for the use of planning in today's technology is to establish the national geographic information system among the public institutions.

5.2. THE PROBLEMS THAT EMERGE WITH THE ESTABLISHMENT OF TURKISH NATIONAL GIS

Planning is a complex phenomenon and includes working with many different fields such as geomorphology, economics, infrastructure etc. The use of GIS in only one field, which is related with the planning, will not enhance the planning. To enhance the planning with the contribution of GIS is related with how much geo-data is available. In other words how many institutions from different application fields use the GIS in the public administration will determine the success of the system. The use of GIS should start simultaneously overall in all planning fields, which means that almost all public institutions should implement the GIS project in a coordinated way. Turkish Public Administration is overall in the transition period on using and working with technology in the public institutions. Government has started a lot of computer aided automation projects, which many of them have not been finalized yet. So, this study tries to emphasize that if national geographic information system is established, even it is hard to predict when, the study will try to explain in the following section that what will be the possible effects on the planning.

Beside the need of simultaneously start on the use of GIS among public institutions, another problem is how to overcome the initial cost of GIS implementation. Although this cost can be recovered in the near future, there are a lot of urgent problems that waiting financial support in the public administration. In many cases, the administrator does not know how to use and what will be the benefits of GIS. The existing infrastructure is another key element for the GIS implementation of enterprise solutions. The system would require network, database and a server, for the intranet applications and publishing of the maps. The initial cost covers the cost of GIS software plus to complete the missing parts of infrastructure as hardware; from plotter, scanner to printer etc plus qualified staffs plus data creation cost. The initial cost can exceed several million USA dollars for enterprise solutions. It may be very difficult to convince the administrator to invest on the technological sides.

Therefore, the best solution is to behave like Assoc. Prof. Özden in the General Directorate of Rural Services that has made during the formation of Soil and Water Resources Center, National Information System. He is charged with the duty of head of information technology department and started to implement a GIS project step by step. He has the chance of directing the computer and personnel in his way. He made his researches, found computer and get the staff educated. At the end of two years, with eighteen computers and fifteen personals, all soil maps and rural infrastructure maps is digitized and Soil and Water Resources Center is developed (interview with Assoc. Prof. Murat Özden in 2003). The most important thing is to know how to do and take the support of information technology department.

The availability of qualified staff, that knows the GIS in the public institutions, is another problem. A special training program is required in order to use and learn what the programs will do. It may be needed to work with specialized occupations on the use of GIS technology in the responsible unit for operation and maintenance of the system. The occupations, which are very new for the public, can change from GIS Manager, System Manager, Database Manager, GIS Analysts, GIS Application Programmer, Data Automation Expert, Data Entrance Officer, Hardware/Software Technical Support Expert and to Trainers. Even though the interface of programs is becoming more and more friendly, but the terminology of software changes from program to program and will be very new for the user who will work for the first time with the program. Beside on this, to know what the program can do and to know how to use the program in the work are different issues. The balance of knowing two things together will determine the implementation and usage success of the system in the whole organization.

Many public institutions have made investment on the implementation of GIS in different extents. It will change from enterprise solutions to standalone working systems. But some administrators are reluctance to share the Geo-data with external authorities, because of several factors. The most obstruction factor is to fear on the illegal change of data, which is related with the security and copyright. The work on digital copy of data brings to change the data easily and use for personnel aims. Therefore, how institutions' rights on the data will be protected, has not been guaranteed yet by any authority. For example General Directorate of Land Registry and Cadastre can give the digital copy of parcel boundaries, but the boundaries are actually the legal borders of personal rights. Privacy rights of citizenship should be protected and should not be commercialized. At that point, the size of geographical unit and information is too much important. For example demographical information or population census results should not be published on the base of building. This information should be generalized in greater geographical units like districts. According to the principles of TNGIS, Ministerial Mapping Works Coordination and

Planning Council would have enough power to work and to make a control for these issues has not been clarified yet.

Public institutions use different software. As an example, Table 5.5 shows the name of public institutions, which uses different GIS programs that are represented in the GIS Seminar in the General Directorate of State Hydraulic Works in July 1st, 2003. This creates in difficulty for geo-data to exchange among the users, because each format has different specifications and some of them do not support others. In the world, this problem is trying to solve with the Open GIS Consortium. Many software vendors at abroad are the members of this consortium and tries to find an integration mechanism for using of different format in own programs. For example, Bentley and AutoDesk have made a technological contract that Micro Station version eight can read and write (open, work, use, change and save) the formats of AutoCAD without changing the origin of the format.

Some of Turkish software like NetCAD tries to limit the export capabilities in order to be lead in the sector by creating a monopoly. Even though NetCAD works as GIS software, the only supported export format is DXF, which is the CAD format. So, all the attribute information that is linked to geographic feature will disappear with the conversion from NetCAD format to DXF.

Table 5.5. The match between the GIS software vendors and the public institutions, which uses GIS programs that is represented in the GIS Seminar

The name of Public Institutions	Software Vendors					
	Bentley	ESRI	Intergraph	MapInfo	NetCAD	TNT Mips
Ankara Water and Sewer System Institute				X		
General Directorate of Disaster Works		X				
General Directorate of Highways						X
General Dir. of Mineral Research and Exploration		X				
General Directorate of Rural Services						X
General Directorate of State Hydraulic Works		X	X			
General Directorate of Land Registry and Cadastre		X				
Istanbul Metropolitan Municipality		X				
Istanbul Natural Gas Distribution Corporation	X					
Ministry of Environment and Forestry		X			X	
South East Anatolian Project Institute		X				
State Statistical Institute		X				
Turkish Electricity Distribution Corporation		X				

In the formation of TNGIS, the Council and General Commander of Mapping try to provide a new format, namely, national data exchange format (UVDF), which should be supported with all software vendors and will be used for data exchange among the public institutions. UVDF is XML based format and has the easting, northing, elevation, type of feature and its coded. Every geographic feature on the earth is coded in systematic way in the catalog of feature and attribute table as a Geographic Data Classification Standard. Although the formation of format is developing, it is unclear that which software vendor will support and in what time the use of format will become common in the public institutions. The format would hopefully solve the technical difficulty of exchanging the data more easily.

The structure of TNGIS will be in the manner of distributed databases. The responsible institute will keep and arrange own database in his organizations. In order to reach the data, it should be known that which geo-data is stored in which databases of the institutions. This can be sustained by several ways. First one is to build a web portal that covers all information links in the database like a huge umbrella. Second way is to prepare a metadata for each database. Metadata is the description of geographical data. The most widely and internationally used standard for the metadata is the Federal Geographic Data Committee's Standard. The importance of using a metadata is explained by ESRI as "documenting your data protects your organization's investment in that data. Without knowledge of the data's accuracy, provenance, and age, you can't have a high level of confidence in decisions based on that data. Creating detailed metadata describing these qualities ensures that you can continue to use your data and make decisions based on that information for as long as it is valid" (ArcGIS Desktop Help 8.1).

5.3. THE EFFECTS OF TURKISH NATIONAL GIS ON PLANNING

Time period of plan-making process in the Bank of Provinces is too long, especially in the phase of collection of first priority public opinions is 5-6 months and preparation phase is 4-5 months. The total duration of plan-making process in the Bank for 250 ha will be approximately 1-1,5 years and for 1500 ha it will be approximately 2 years within the consideration of skipping the inquiry of upper planning decisions. The majors are elected for four years. Approximately half of election time is spent only for making one plan in the Bank. This time consumption becomes too much critic for majors. Therefore the process will speed up the collection of required data and increase the interaction between the planner and the public institutions opinions, if geographical information is provided in the use of public planning institutions.

The planning can enhance with the use of GIS, when the public institutions have completed the production of their responsible information as GIS layers and all geo-data in the databases is shared among the public institutions. By this way, the user can search and find the definitions of geographical features in the metadata and have an access to reach all geographical features in the specific server of public institutions. Responsible public institutions will continue the production of geographical data by new revisions. Local government units, non-governmental organizations and universities should have the same rights to reach the geo-data like the public institutions. In the private sector, if the private planning office has taken the plan making work that needs the use of geographical information, the office can link to the databases with the permission of the Chamber of City Planner and will get the related information from the system for worked area.

The planner has a chance to find easily which information is looking for in the databases and a chance to use the latest update geo-data in his queries. Beside on the speeding up the process with the use of GIS like in the example of General Directorate of Highways that is explained in the second chapter, the use of GIS can give more interaction between the planner and the institutions' opinions. The most important change in the plan-making process is a chance of forming feedback mechanism.

In the existing situation, planner takes all public institutions opinion as a constant variable and interprets them as inputs and finalizes his plan. In this situation the role of planner is passive. In a general sense, the planner only takes the institutions' opinions and puts in the plan. The planner has hardly chance to make a dialogue and to propose a change on the public institutions' opinions during making a plan.

After digital collection of public institutions opinion, the planner will take and interpret them, and then will have a chance to ask once more time the public institutions' opinions about the plan. The planner can take the answer in shorter time, because all bureaucratic issues are decreased, the flow of geographical information among public institutions becomes faster, and the possibility of changing the data becomes easier with the use of GIS.

Another possible change in the plan-making process with the use of GIS will be scenario building and creation of alternatives. To make a map with the use of technology, if the data is ready, becomes too much easy. To prepare plan alternatives without the computer technology is too much labor-intensive work for the planner. With the use of computer in the plan-making process, several alternatives can easily be created like in the example of Çalapverdi Plan that is explained at the end of third chapter. In the existing situation the planners eliminates all alternatives in his mind and proposes one final drawing. To prepare alternatives with the different scenarios and presenting them to authority for approval is more close to rationalize the plan making process.

The opportunity of preparing alternatives and publishing the maps during the preparation of the plan will provide participatory environment and the finalization of plan can be done in more democratically. There are hundreds of example at abroad that how collaborating or participatory planning can be done. The evaluation of alternatives can be finalized with the contribution of citizenships. All plans are made for public interests and the more citizenship should get involved during the preparation of plan, the more support will be ensured.

CHAPTER 6

CONCLUSION

In 2001, the Bank of Provinces has made a critical decision about the use of technology in the plan-making process. All plans should be prepared and submitted to the Bank digitally in the form of computer aided design format such as AutoCAD and NetCAD. This would be the starting point of implementing GIS in the organizations, because all geographical information in the plans would be digital in the computers.

The most important key element of enterprise solutions for the establishment of GIS is directly related with organizational factors. These factors can be overcome with learning the benefits of GIS in the planning. Planning can benefit from the GIS, if certain conditions are satisfied. These conditions are shown in the third chapter. These are related to technical and social infrastructures of organization such as GIS knowledge, technological capability of institute, flexibility of changing organizational structure, the availability of hardware; network, plotter, scanner and server etc, the software, the qualified staffs, knowing how to use GIS in the work.

Although these conditions are roughly provided, there is no clue whether the conditions will fully be prepared or not. At the moment, the use of GIS in the public institutions will lead to certain initial costs. The transitional period for the use of GIS will be over, if these initial costs are paid.

With the use of GIS, the planner has a chance to reach the reliable and latest updated geographical data quickly in the system. The planner can make many different analyses in a short time with the use of geographical data such as buffer, slope and 3D visualization analysis that cannot be done before because of too much labor-intensive work. The interaction between the planner and the administrator in the public institutions will increase in terms of review on discussing the planning decisions. This will provide the planner a feedback mechanism. Different alternatives can be prepared and represented very easily in terms of time with the help of GIS. The evaluation of alternatives will give more rationality to plan making process. Publishing maps and works by the GIS enterprise solutions in the institute during the preparation and approval phase of the plan will provide the involvement of more participants in a more democratic and collaborated environment. By this way, the plans seem to gain more support from the citizens.

During plan-making process, the planner should collect all geographical information, which is found in many different public institutions. Each institute produces geographical data of its own in different format. To reach this information may not be possible in some cases. The information that is not reached during the collection of data can change the whole scenario of the plan.

It is assumed that in the plan-making process, the planner should collect all relevant information and reveal the output of all information in the plan. However, we argue that this assumption is not true. Nobody attempts to challenge this assumption in Turkey, because there is no systematic tool or system, which provides to reach all update geographical data produced in the public institutions. This only seems to be changed with today's technology, GIS. Because GIS as a tool, visualizes, shares and publishes the geo-data, and integrates different formats into one structured system.

At the moment, the use of GIS in the public institutions is in a transition period. To do work with the use of GIS has newly been starting in several general directorates. The most important point for these achievements is that these examples are emerged only with their efforts. This shows the need of using GIS in the public institutions. Whether overall use of GIS for the planning in the public institutions has become into practice or not, is related with the investment that may be made on the establishment of GIS in the public administration. Feasibility for the use of GIS in planning process depends on the availability and flow of geo-data. The geographical information should be produced digitally and should be provided by the public planning institutions. The distribution cycle for the geo-data among public institutions should be established. The provision of geo-data means to restructure the whole public administration, because this will be the starting point of working with digital information and sharing the data without any limitation or restriction. The geo-data, key element for the use of GIS on planning, should be first formed and then be sustained to flow freely among the public institutions.

In the existing situation, the plan-making process in the public institutions is too slow. My analysis of the plan-making process in the Bank of Provinces shows that the plans cannot be completed earlier than 1-1,5 or even 2 years. The process can be speed up with the use of established national GIS in the public administration. It is not so clear that whether the accelerated process can change the methodology of planning or not. However, we may argue that the use of GIS may increase the quality of plans and provide a base for more effectiveness and efficiency in the plan-making process.

The Bank of Provinces is trying to adopt the organization to use GIS for the planning purposes. This progress can only be achieved when the overall use of GIS for the planning purposes has started at the same time in the public administration. Without the support of national policy, planning system cannot be enhanced with the use of GIS, because as it is seen in the third chapter, in order to finalize the plan, the Bank needs the external support from at least five public institutions, which should deliver the map as in the digital format and as it is seen in the fourth chapter, the private planning offices are not ready for the use of GIS. When geo-data is not delivered to the office, to work with the digital data for the preparation of plan creates extra costs for the office. The administrator, who wishes to use GIS in daily works in the public institution, should evaluate the comparison between the benefits of the GIS and the implementation costs of GIS. The vision of public institute will determine the result of this evaluation.

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APPENDIX A

SURVEY FORM

__ / ___ / 2003

THE GENERAL INFORMATION ABOUT PRIVATE PLANNING OFFICE

1- The name of the private planning office ______________________________

2- Adress____

3- Telephone number____

4- How long has your office been used actively?__________________________

5- Class of planning group

❑ A ❑ B ❑ C ❑ D ❑ E ❑ F

6- Education status

❑ Undergraduate (4 year) ❑ Graduate ❑ PhD (Doctorate)

7- The number of staff in your office and their distribution according to their professions

	City Planner	Architect	Survey Engineer	Engineer	Technician	Other
Number						

8- Annual earnings of your office ______________________________________
(may not be answered)

THE BANK OF PROVINCES

9- Did you win any procurement for making a plan from the Bank of Provinces?

❑ Yes ❑ No **(If no, skip to 22nd question)**

9.1- If yes, how many____

10- When did you make your first plan for Bank of Provinces? _______________

11- When did you hand over your last plan to Bank of Provinces? ____________

12- Is there any technological change between first and last plan that made to the Bank?____

12.1- If so, when did it happen? ______________

ACCORDING TO LAST PLAN YOU HANDED OVER TO THE BANK

13- In which media did you get maps from Bank of Provinces?

❑ Hard Copy / Blueprint Copy
❑ As a CAD / GIS Layers (Soft Copy) in CD / Diskette
❑ Raster Format in CD / Diskette
❑ Hard Copy and Soft Copy

13.1- If it is CD, since when have you got? ________________

14- In which media have you drawn / prepared your plan for Bank of Provinces?

❑ Manual (with a drawing pen) ❑ Computer ❑ Other ____________

15- Distribution of maps coming from the Bank according to their types;

	Soft Copy	**Hard Copy**
❑ Base map, scale ___________________		
❑ Thematic map (show a layer that is drawn on base map by a public institute)		
❑ Synthesis map		
❑ Other, name_______________________		

15.1- If thematic map exists, by which institution it is prepared?

THE NAME OF INSTITUTE	Hard Copy	Digital Copy
❑ Gen. Dir of State Hydraulic Works		
❑ Gen. Dir. of Forestry		
❑ Gen. Dir. of Highways		
❑ Turkish Electricity Distribution Cor.		
❑ Gen. Dir of Rural Services		
❑ Other_______________		

16- In which media was the plan handed over to Bank of Provinces?

❑ Hard Copy / Blueprint Copy
❑ As a CAD / GIS Layers (Soft Copy) in CD / Diskette
❑ Raster Format in CD / Diskette
❑ Hard Copy and Soft Copy

17- If it is requested, do you able to hand over the plans in CAD or GIS format?

❑ Yes ❑ No

18- In which media was the report prepared?

❑ By computer ❑ By typewriter ❑ Other______________

19- In which media was the report handed over to Bank of Provinces?

❑ Hard Copy ❑ As a text file in CD / Diskette ❑ Both

20- If it is requested, do you able to hand over the reports in the digital media?

❑ Yes ❑ No

21- Is the data given by the Bank sufficient for preparing the plan and report?

❑ Yes ❑ No

21.1- If not, which institutions do you apply? **(**Choices will not be read**)**

- ❑ Gen. Dir. State Hydraulic Works
- ❑ State Statistical Institute
- ❑ Gen. Dir of Highways
- ❑ Gen. Dir. of Land Registry and Cadastre
- ❑ Turkish Electricity Distribution Cor.
- ❑ Gen. Dir of Rural Services
- ❑ Gen. Dir. of Forestry.
- ❑ Other______________

MUNICIPALITIES

22- Have you ever made a plan for Municipality?

❑ Yes ❑ No **(If no, skip to 31st question.)**

22.1- If yes, how many____

23- When did you make your first plan for Municipality?____________________

24- When did you hand over your last plan to Municipality?_________________

25- Are there any technological changes from the first plan to last one for Municipality?____

25.1- If so, when did it happen?____

ACCORDING TO LAST PLAN YOU HANDED OVER TO MUNICIPALITY

26- In which media did you get maps from Bank of Provinces?

- ❑ Hard Copy / Blueprint Copy
- ❑ As a CAD / GIS Layers (Soft Copy) in CD / Diskette
- ❑ Raster Format in CD / Diskette
- ❑ Hard Copy and Soft Copy

26.1- If it is CD, since when have you got? ________________

27- In which media have you drawn / prepared your plan for Bank of Provinces?

❑ Manual (with a drawing pen) ❑ Computer ❑ Both ❑ Other_______

28- In which media were the plan maps handed over to Municipality?

- ❑ Hard Copy / Blueprint Copy
- ❑ As a CAD / GIS Layers (Soft Copy) in CD / Diskette
- ❑ Raster Format in CD / Diskette
- ❑ Hard Copy and Soft Copy

29- If it is requested, were you able to hand over maps in CAD or GIS format?

❑ Yes ❑ No

30- Do you apply to any private or public institution to get information about a plan prepared for Municipality?

❑ Yes ❑ No

30.1- If yes, which private or public institutions do you apply?
(Choices will not be read**)**

- ❑ Gen. Dir. State Hydraulic Works
- ❑ Turkish Electricity Distribution Cor.
- ❑ State Statistical Institute
- ❑ Gen. Dir of Rural Services
- ❑ Gen. Dir of Highways
- ❑ Gen. Dir. of Forestry.
- ❑ Gen. Dir. of Land Registry and Cadastre
- ❑ Other______________

30.2- From which of these institutions did you get geographical information in the digital form?____

DIGITAL INFORMATION RELATIONSHIP OF THE OFFICE WITH PUBLIC INSTITUTIONS

31- In which media do you get maps from other public institutions?

(Except Municipality and Bank of Provinces)

- ❑ Hard Copy / Blueprint Copy
- ❑ As a CAD / GIS Layers (Soft Copy) in CD / Diskette
- ❑ Raster Format in CD / Diskette
- ❑ Hard Copy and Soft Copy

32- Which **public** institutions that supply geographical information in the digital form do you know? **(**Choices will not be read**)**

- ❑ General Commander of Mapping
- ❑ Gen. Dir of State Hydraulic Works
- ❑ Gen. Dir of Mineral Research and Exploration
- ❑ Gen. Dir of Rural Services
- ❑ Other________________________________

33- Have you ever get digital information from any public institutions?
(Except Municipality and Bank of Provinces)

❑ Yes ❑ No

33.1- If so, from which public institutions did you get the information?

____

33.2- If so, for what purpose did you use that information?

____

33.3- If not, why? (Choices will not be read)

- ❑ No need
- ❑ Expensive
- ❑ Not applicable format
- ❑ It is hard to buy
- ❑ Other_________________
- ❑ Other_________________

DIGITAL INFORMATION RELATIONSHIP OF THE OFFICE WITH PRIVATE FIRMS

34- In which media did you get maps from other private firms?

- ❑ Hard Copy / Blueprint Copy
- ❑ Raster Format in CD / Diskette
- ❑ As a CAD / GIS Layers (Soft Copy) in CD / Diskette
- ❑ Hard Copy and Soft Copy

35- Which private firms that supply geographical information in the digital form, do you know? **(**Choices will not be read**)**

- ❑ MNG
- ❑ Mekansal Veri Sistemleri (MVS)
- ❑ NetCAD
- ❑ İşlem GIS
- ❑ Sayısal Grafik
- ❑ Başarı
- ❑ Hat GIS
- ❑ Other

36- Have you ever get digital information from any private firms?
(Except Municipality and Bank of Provinces)

❑ Yes ❑ No

36.1- If so, from which private firms? ___________________________________

36.2- If so, how did you use that information? _____________________________

36.3- - If not, why? (Choices will not be read)

- ❑ No need
- ❑ Expensive
- ❑ Not applicable format
- ❑ It is hard to buy
- ❑ Other___________________
- ❑ Other___________________

THE TECHNOLOGICAL FACILITIES OF YOUR OFFICE

37- How many computers are there in your office? _________________________

38- If more than one, do the computers have network connection with each other?

❑ Yes ❑ No

39- Do you have Internet in your office?

❑ Yes ❑ No

40- Do you have an e-mail account that is used regularly?

❑ Yes ❑ No

E-mail address (optional)____

41- Is there any plotter in your office?

❑ Yes ❑ No

41.1- If yes, how many_________________

42- Is there any scanner in your office?

❑ Yes ❑ No

42.1- If yes, how many _________________

42.2- What size of paper does it scan?

❑ AO ❑ A3 ❑ A4

43- Is there any printer in your office?

❑ Yes ❑ No

43.1- If yes, how many _________________

43.2- What size of paper does it print?

❑ A4 ❑ A3 ❑ Both

44- Which programs do you use and the number of programs?
(It is not important whether it is licensed or not.)

1- CAD programs (Number_____)	AutoCAD _______ Eghas __________	Micro Station ______ Cartocad)_________	Netcad ________ Other _________
2- GIS programs (Number_____)	ArcView ________ Map Info ________ Geographics _____	ArcInfo __________ TNT MIPS ________ AutoCAD Map ____	Geomedia _____ NetInfo _______ Other _________
3-Raster programs (Number_____)	Erdas __________ Descartes _______	Er Mapper ________ AutoCAD Raster ___	TNT MIPS ____ Other _________
4- Graphic design programs (Number_____)	Photoshop _______ Freehand ________	Corel Draw _______ Paint ProShop _____	3D Studio Max__ Other _________

45- What are the reasons for choosing that/those programme(s)?
(Choices will not be read)

- ❑ Many users
- ❑ Common data and format
- ❑ Suitability to job
- ❑ Easily learned
- ❑ Satisfactory service
- ❑ Cheapness

GEOGRAPHIC INFORMATION SYSTEM

46- When did you first have information about GIS (Geographic Information System)?____________________

❑ I do not know the exact meaning of GIS. (**Skip to question 54)**

47- Have you ever been educated about GIS?

❑ Yes ❑ No

47.1- If yes, from where? ____________________

47.2-If yes, what was the topic of this education? ____________________

48- Have you ever prepared any plan by using GIS?

❑ Yes ❑ No

48.1- If yes, in which degree did you use GIS?

- ❑ Analysis
- ❑ Synthesis
- ❑ Plan drawing
- ❑ Competition
- ❑ Urban Design Project
- ❑ Other______

48.2- What was the type of plan? ____________________

48.3- When did you make the plan? ____________________

48.4- For what purpose did you GIS? ____________________

48.5- If not, do you whish to?

❑ Yes ❑ No

49- Should GIS use in the plan as a tool?

- ❑ Yes
- ❑ No

50- Do you have opportunity to prepare the plans with the GIS?

- ❑ Yes
- ❑ No

50.1- If not, what are your defects? (Choices will not be read)

- ❑ Knowledge
- ❑ Hardware
- ❑ Staff
- ❑ Program
- ❑ Data
- ❑ Other___________

51- What benefits can GIS supply to planning operation?
(Choices will not be read)

- ❑ No benefit, only increases the cost
- ❑ I do not know
- ❑ Prepares the plan more effectively
- ❑ Makes the presentation easier
- ❑ Decreases preparation time of plan
- ❑ Other__________

52- If geographical information is presented for the use of planner by public institutions, will there be any changes in the preparation of plan-making process? **(Choices will not be read)**

- ❑ Yes
- ❑ I do not know
- ❑ I do not think so
- ❑ No
- ❑ Committed to the attitude of the Bank of Provinces
- ❑ Other___________

53- If geographical information is presented for the use of planner by public institutions, do you want to make the plan with the GIS in your office?

- ❑ Yes
- ❑ No

54- Have you ever assisted for establishing an Urban Information System in any municipality?

❑ Personally I established ❑ Yes, I assisted ❑ No

54.1- If yes, please explain____

55- Are you able to consult to municipality about establishing and operating an Urban Information System?

❑ Yes ❑ If they ask, I could invest
❑ No ❑ Other________________________________

56- Do you think that you use the technology effectively in your office in the planning?

❑ Yes ❑ No

THANK YOU!!