4.5 Noteworthy background of the Study

4.5.1 Response of Each Counterpart Agency

This Study was carried out by the technical counterparts, IGN in charge of development of the national base map database, GIS, map printing and production of orthophoto maps; INSIVUMEH in charge of production of hazard maps; and SEGEPLAN, working to coordinate between the two agencies and the Study Team.

The three agencies were each implementing very different work, but they were working on the development and application of GIS data to meet their own individual objectives, including the activity of SNIG, and playing an important role within the Government of Guatemala.

Of the three agencies, IGN and INSIVUMEH, with the effective use of the results of the Study already in mind, are actively engaged not only in study activities based on cooperative work introducing a lot of OJT, but also in the technology transfer programs.

The main activities of these counterpart agencies with regard to the development of GIS and the database will be described below.

(1) IGN

IGN consists of 5 administrative divisions and 6 technical divisions. The work of these technical divisions will be described below. Of these divisions, the Information Division will be omitted because it is involved mainly in the construction of the information network within the office and in technical support for SNIG, which is somewhat different from the actual work of IGN.

Figure 4.5-1 The IGN Logo

1) Photogrammetry：

This Division is now constructing a digital database of the 1:10,000-scale topographic maps (expected to number 62 sheets in 2002) covering urban areas other than those covered by the orthophoto maps produced in this Study, using the 1:40,000-scale aerial photos (covering the East Area of Guatemala) provided by the US NIMA (National Imagery Mapping Agency) in 2000, and the 1:40,000- and 1:20,000-scale aerial photos taken and provided in the first and third years of this Study.

If the budget for the next year is acquired, new aerial photos to cover important areas and the blank area of 10,000km^2 in the above aerial photos will be taken, to further promote the above mapping project. If this additional program is implemented, 42 sheets

of 1:10,000-scale orthophoto maps and 42 sheets of 1:10,000-scale topographic map database will be added.

2) Cartography：

IGN possesses 259 sheets of 1:50,000-scale national topographic maps as base maps covering the entire country. Of these, 22 sheets covering the North Area were digitized with French assistance in 1998, and 7 sheets covering the Metropolitan Area and its surrounding areas were also digitized independently by IGN at that time with technical guidance. In addition, 74 sheets covering the Southwest Area are due to be updated as a new database with the addition of modifications to show changes over the years.

The remaining 156 sheets are being digitized in the Cartography Division with the support of other Divisions, and the process of vectorizing contour line data is underway.

At the same time, this Division is taking the initiative with regard to the promotion of GIS and development of the database. It is also the leader in SNIG activities and is the driving force of GIS in Guatemala.

3) Geodesy：

The development and spread of the GPS applications have promoted a shift toward the world standard ellipsoid (WGS-84) in many countries. Guatemala is no exception to this, and is using the GPS equipment provided as study material by JICA to implement the resetting of first-order triangulation points.

There are a total of approximately 160 existing and new first-order triangulation points in Guatemala, and the work of marking and measuring the points has already been completed. Work is at present at the stage at which adjustment calculation of the observation network is being carried out.

4) Cadastral：

This Division's main task is to define administrative boundaries at the municipal level. In Guatemala, there are 22 Departments controlling 331 municipalities. Because of the impact of the long-running civil war, administrative boundaries remain undefined. Boundary definition is being carried out as a national project.

5) Geographical Information：

The main task of this Division is to create thematic maps of the whole country. The Division is responsible for the updating of existing thematic maps and the creation of new

maps, for which it carries out detailed field surveys based on the topographic maps produced by the Photogrammetry Division.

* As a point of reference, this year the IGN Marketing Division sold a total of approximately 1,200 sheets of contact prints and enlargements, of which about 75% were photos printed from the negatives of the aerial photos taken and made available through this Study. This provides a clue as to whether there is a shortage of aerial photos and maps showing new information.

(2) INSIVUMEH

Like IGN, INSIVUMEH belongs to the Ministry of Communications, Infrastructure and Housing, and is made up of two divisions; one Division in charge of meteorological observation not including agricultural meteorological observation that is the province of the Ministry of Agriculture, Livestock and Foods (MAGA), the arrangement and analysis of observation results, and the dissemination of daily weather information,; and the Research Division.

Figure 4.5-2 The INSIVUMEH Logo

This agency is also responsible for disaster prevention services including a) the monitoring of earthquakes, volcanoes, weather and floodgates, b) the collection and organizing of information on natural disaster risks, c) the reconstruction of observation facilities that have suffered robbery, damage or disaster, and d) the collection and analysis of basic data for hazard maps.

At the present time INSIVUMEH consists of the General Affairs, Finance and International Cooperation Divisions, as well as three technical divisions. The services of these technical divisions will be outlined below.

1) Meteorological Services

This Division is in charge of meteorological observation (rainfall, air temperature, solar radiation, clouds, wind direction and velocity, humidity, subterranean temperature, etc.), and weather forecasts, as well as the digitization of old observation data, drought forecasting, aerial meteorology, etc.

2) Hydrological Service

The main tasks of this Division are the installation and maintenance of river water-level gauging stations (water-level observation network), water-level recording and

data organization, and water quality measurement.

3) Geophysical Service

This Division is responsible for the establishment of a seismic monitoring network, seismic observation and analysis, visual observation of the Pacaya, Juego and Santiaguito volcanoes, observation and survey of volcanic earthquakes and ejecta, management of existing hazard maps, countermeasure against lahar of the Samalá River, landslide surveys, etc.

(3) SEGEPLAN

SEGEPLAN (Secretary for Planning and Programming of the Presidency), as indicated by its name, belongs to the President's Office. It is responsible for Guatemalan governmental planning and projects, and is the contact agency for cooperative projects with other countries and international organizations. One of its several organizations is Informatics, within which is a unit of the main undertaking of which is GIS.

Figure 4.5-3 The SEGEPLAN Logo

This GIS Unit handles the building of databases and the provision of analytical services in response to requests from within SEGEPLAN or from other institutes.

The Unit at present possesses two licenses for Arc/View and one license for Arc/Info, which it uses for its various activities. Working towards the common use of information, at the end of December 2002 the unit uploaded to its Website the various databases it has accumulated.

In this Study, SEGEPLAN is positioned in the role of coordinator between the counterpart bodies, i.e., the technical expert organizations IGN and INSIVUMEH, and the Study Team; but SEGEPLAN itself is also carrying out GIS-related work and is an important user of the results of this Study.

＊ The Existing Census as a Database and the New Census

① The 1994 census

10th Guatemala Population Census 1994 (INE)

The currently-available census was issued in March 1996 as the result of the Census (the 10th population census, 5th housing census) that was carried out by the Instituto National de Estadistica (INE) simultaneously throughout the Republic of Guatemala from April 17 to 30, 1994.

The 10th population census was carried out according to the "de jure" system (a system in which each citizen is registered where he or she resides, regardless of whether he or she is actually there at the time of the census). In other words, the census is the result of a population survey and registration at the geographical location where each resident was resident or intended to be resident as of April 17, 1994. The total population of Guatemala at this point in time in 1994 was 8,331,874, a yearly increase of approximately 2.5% from the population of 6,054,227 recorded in the 1981 census. Figure 4.5-4 shows the population density, based on data prepared by IGN, MAGA and INE.

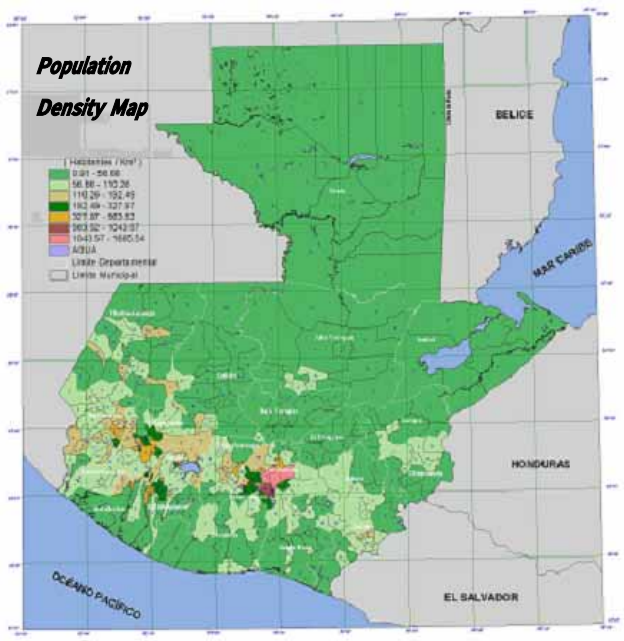

Figure 4.5-4 Population density map

② Census of projected increase in population by 2000

Estimate of Population at the Municipal Level in Guatemala 2000 – 2005 (INE)

The estimated increase in population at the basic Republic level is shown in 'Guatemala: Estimation and Projection of Population 1950 – 2050' (Estimaciones y Proyectiones de Población 1950 - 2050) that was drawn up as a joint project with the Centro Latinoamericano de Demografía (CELADE) of INE.

Based on this methodology, the data from the 1995 National Mother and Child Survey, the registrations of births and deaths 1981 - 1994 and the International Immigration Register were tempered with the results of the 1994 10th National Census to produce a forecast of population increase throughout the country for the years 2000 to 2005; and this was published in January 2001. The figures thus determined from the supposed average were deemed to have the highest degree of probability, were authorized by INE and CELADE, and thus came to be publicly announced as mentioned above.

Table 4.5-1 is a summary of the population forecast for 2000 - 2005, showing the population for each year by Department and its percentage of the national population. As is clear from this table, approximately 23% of the total population is concentrated in the metropolitan area; and it may be inferred that all of the problems common to developing countries, such as the rapid enlargement of the cities and the resulting delay in development of

infrastructure are occurring.

Table 4.5-1 Estimation of population growth made by INE

Year / Department	2000	%	2001	%	2002	%	2003	%	2004	%	2005	%
GUATEMALA	2,578,520	22.65	2,654,203	22.73	2,732,081	22.79	2,812,253	22.86	2,894,770	22.94	2,979,746	23.01
EL PROGRESO	143,207	1.26	143,193	1.23	149,435	1.25	152,667	1.24	155,940	1.24	159,283	1.23
SACATEPEQUEZ	259,260	2.28	267,877	2.29	276,769	2.31	285,904	2.32	295,386	2.34	305,115	2.36
CHIMALTENANGO	427,585	3.76	437,649	3.75	449,134	3.75	460,292	3.74	471,750	3.74	483,487	3.73
ESCUINTLA	483,773	4.25	489,227	4.19	494,734	4.13	500,314	4.07	505,958	4.01	511,647	3.95
SANTA ROSA	319,810	2.81	325,479	2.79	331,249	2.76	337,117	2.74	343,035	2.72	349,076	2.70
SOLOLA	307,792	2.70	316,629	2.71	325,742	2.72	335,107	2.72	344,656	2.73	354,512	2.74
TOTONICAPAN	361,298	3.17	369,349	3.16	377,556	3.15	385,923	3.14	394,454	3.13	403,177	3.11
QUTZALTENANGO	678,307	5.96	694,590	5.95	711,241	5.93	728,324	5.92	745,832	5.91	763,706	5.90
SUCHITEPEQUEZ	403,589	3.54	411,638	3.52	419,787	3.50	428,090	3.48	436,494	3.46	445,105	3.44
RETALHULEU	241,927	2.12	245,875	2.11	249,886	2.08	253,964	2.06	258,077	2.04	262,244	2.02
SAN MARCOS	844,474	7.42	863,164	7.39	882,207	7.36	901,654	7.33	921,453	7.30	941,662	7.27
HUEHUETENANGO	879,989	7.73	906,033	7.76	932,855	7.78	960,450	7.81	988,850	7.83	1,018,120	7.86
QUICHE	588,824	5.17	602,383	5.16	616,286	5.14	630,497	5.13	645,054	5.11	659,934	5.10
BAJA VERAPAZ	203,428	1.79	207,781	1.78	212,201	1.77	216,712	1.76	221,302	1.75	225,989	1.74
ALTA VERAPAZ	814,300	7.15	848,340	7.26	883,713	7.37	920,544	7.48	958,847	7.60	998,714	7.71
PETEN	333,397	2.93	346,805	2.97	360,738	3.01	375,215	3.05	390,263	3.09	405,888	3.13
IZABEL	333,955	2.93	340,532	2.92	347,209	2.90	354,009	2.88	360,920	2.86	367,948	2.84
ZACAPA	212,805	1.87	217,927	1.87	223,188	1.86	228,545	1.86	234,041	1.85	239,657	1.85
CHIQUIMULA	313,151	2.75	320,979	2.75	328,979	2.74	337,188	2.74	345,558	2.74	354,126	2.73
JALAPA	270,043	2.37	277,486	2.38	285,118	2.38	292,944	2.38	300,960	2.38	309,185	2.39
JUTIAPA	385,905	3.39	391,272	3.35	396,692	3.31	402,175	3.27	407,701	3.23	413,285	3.19
Total	*11,385,339*	*100*	*11,678,411*	*100*	*11,986,800*	*100*	*12,299,888*	*100*	*12,621,301*	*100*	*12,951,606*	*100*
Year	***2000***	*%*	***2001***	*%*	***2002***	*%*	***2003***	*%*	***2004***	*%*	***2005***	*%*

③ The relationship between the population growth forecast census and the area covered by the Study

The area covered by the 1:50,000-scale digital national base maps to be produced in this Study is approximately 30,000km^2 (74 map sheets). Combined with the approximately 3,500km^2 (7 sheets) for the City of Guatemala and its surrounding areas that were prepared independently by IGN, the total area covered is equivalent to approximately 30% of the land area of Guatemala (108,889km^2.)

As shown in Table 2.5-2 below, the population of this area (33,500km^2) is approximately

8,664,964, accounting for approximately 72% of the total population of Guatemala (11,986,800).

Table 4.5-2 Estimated population within the study area

Estimated Population of the Area covered by 1:50,000-scale National Base Maps (74 sheets + 7 sheets by PAABANC), 2002

	DEPARTMENT	MUNICIPALITY	Total population of MUNICIPALITY	Percentage of Plotted Area	Population within Area	Total
1	GUATEMALA	17	2,732,081		2,704,258	2,704,258
2	EL PROGRESO	2	54,113		14,387	14,387
3	SACATEPEQUEZ	16	276,769		276,769	276,769
4	CHIMALTENANGO	16	449,134		384,362	384,362
5	ESCUINTLA	13	494,734		494,734	494,734
6	SANTA ROSA	13	323,179		295,385	295,385
7	SOLOLA	19	325,742		325,742	325,742
8	TOTONICAPAN	8	377,556		377,556	377,556
9	QUETZALTENANGO	24	711,241		711,241	711,241
10	SUCHITEPEQUEZ	20	419,787		419,787	419,787
11	RETALHULEU	9	249,886		249,886	249,886
12	SAN MARCOS	29	882,207		882,207	882,207
13	HUEHUETENANGO	23	723,414		626,509	626,509
14	QUICHE	13	402,021		338,337	338,337
15	CHIQUIMULA	4	77,526		35,281	35,281
16	JALAPA	6	270,942		143,052	143,052
17	JUTIAPA	17	396,692		385,471	385,471
	17 DEPARTMENT	249 MUNICIPALITY	9,167,024	95%	8,664,964	8,664,964
*1 Population figures and names of departments and municipalities are taken from the "Estimated Census of Population 2002".				(A)	Total population of working area =	***8,664,964***
*2 Each working area was overlaid with the corresponding demographic division map in order to roughly determine the percentage of the population in each area. Cities with low populations were omitted				(B)	Total population of Guatemala=	***11,986,800***
				(A)/(B)	% =	***72.3%***

Table 4.5-2 shows estimates of the number of people residing in the area covered by this Study and data possessed by the IGN. The table clarifies the relationship between the Municipalities (the statistical unit of the national census), their estimated populations and the maps produced in the Study and establishes a rough percentage; and on the basis of this calculates the population of each Department. The table also shows the ratio of the population of the study area to the population of Guatemala as a whole.

In short, these statistical results show that over 70% of the total population of the country reside in the Study area, which is equal to 30% of the total national land area; this indicates that this is a very important area for production activities in Guatemala. The remaining 70% of the land is located in the northern part of Guatemala, and consists mainly of nature conservation areas covered in forestland, with some agriculture and stock raising. As a point of reference, the administrative organization of the country as a whole is made up of 32 Departments and 331 Municipalities, so it is obvious how large a proportion of this is represented by the 17 Departments and 249 Municipalities covered by the Study.

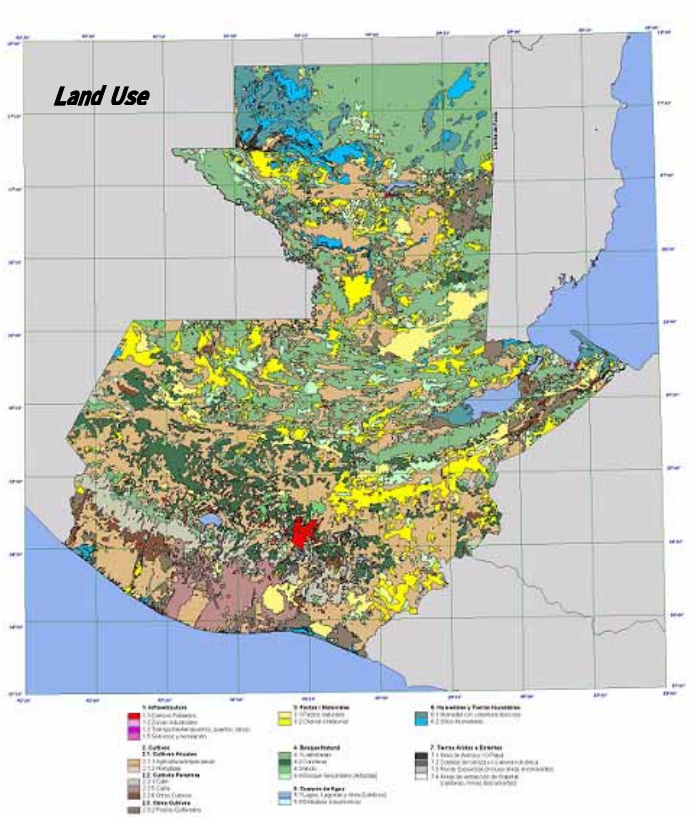

Figure 4.5-5 **Present state of land use**

Figure 4.5-5 shows the present state of land use, in which a huge contrast between North and the South can be seen. This map is based on data created by the IGN and MAGA.

④ National Census 2002

As has already been mentioned, the census currently available in Guatemala was carried out in 1994, and in order to know the present state of affairs we have to relay on the population growth forecast issued in 2001. In 1994, Guatemala was still in a state of civil war and the accuracy of the results of the census lack reliability compared with normal times. Backing up this fact, the Introduction to the 1994 Census states:

"The figures published in this document reflect the population and houses surveyed in the census. Therefore, those residents and houses omitted for various reasons (lack of reliability, refusal) are not included. In addition, 38 villages included in the Departments of Quiche, Baja Verapaz, Chimaltenango, Solola and Jutiapa are excluded, because the residents of those villages did not acknowledge the implementation of the national census."

This being the case, a new census for Guatemala (the 11th Population Census and the 6th Housing Census) was held over the period of November 24 to December 7, 2002 as originally

planned. However, as the 4th Agricultural Census was implemented in May 2003, it is expected that the results of the new Census will be published in the latter half of 2003.

This Census was implemented with the support of the United Nations and the US Census Bureau. About 21,000 researchers were dispatched all over the country, and the total cost of the census came to a huge Q175,000,000 (about US$23,000,000).

4.5.2 Expectations of Guatemala for this Study

It was characteristic of this Study that in addition to the counterpart agency, consisting of three organizations; IGN (National Geographic Institute), INSIVUMEH (National Institute for Sismology, Volcanology, Meteorology and Hydrology) and SEGEPLAN (Secretary for Planning and Programming of the Presidency), other Guatemalan administrative agencies and research institutes also showed great interest in its results.

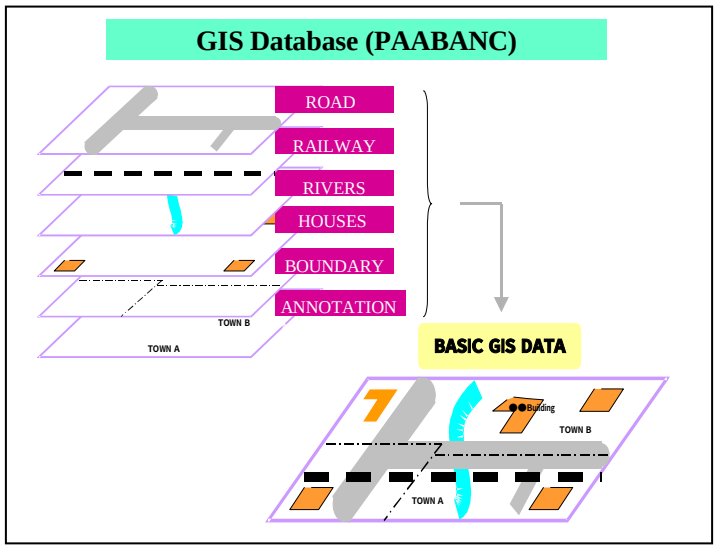

Figure 4.5-6 Overview of GIS

The growing application of GIS for work in many sectors is a worldwide trend, but in Guatemala GIS is, with the exception of a few bodies, still not widespread. As evidence of this, the only GIS database in existence in the country is a 1:250,000 scale (SUNIL *1) map covering the entire country and 7 or 8 1:50,000 scale map sheets (PAABANC *2) covering the capital and surrounding areas. Moreover, when they were digitized, none of the maps were revised to include the progressive changes occurring over the years, so that the discrepancies between actual conditions and the database were a constant problem in the application of the maps.

Photo 4.5-1 Presentation given at the Vice Pal Residence

*1 SUNIL: Sistema Unificado de

Información National

*2 PAABANC: Proyect de Asistencia A la Base National Cartográfica

Under these circumstances, the 1:50,000-scale national base map database covering the Southwest Area of Guatemala, the 1:10,000-scale digital orthophoto database and the hazard maps that will be obtained as a result of this Study will provide the latest information on topographic conditions and land use, as well as information relating to disaster risk forecasts, and are thus attracting close attention not only from the disaster-related agencies but also from many administrative agencies and research institutes.

In Guatemala, the National Geographical Information System (SNIG) has already been organized: IGN and SEGEPLAN have taken the leadership to promote the development of PAABANC and also develop and integrate the metadata showing the content of existing databases in Guatemala. They are also working to step by step to promote the building of a clearing house to take on the role of cataloguing data. In addition, they are holding regular conferences for the exchange of information and effective use of the databases.

There is no doubt that the promotion of the effective use of the results obtained from this Study, led by the counterpart agencies and the SNIG affiliated agencies, will bring out the maximum benefit of the results.

4.5.3 Recognition by the top levels of the state (Presentation to the Vice President)

A symbolic event showing the strong interest in GIS was the presentation of this Study made to the Vice President of Guatemala during the third-year work in Guatemala.

Photo 4.5-2 The Vice President (right) and the Japanese Ambassador (left)

This event was made possible through the good offices of those concerned with this Study on the Japanese side (The Japanese Embassy in Guatemala and JICA), who realized that the results of GIS development and technology transfer in this Study would be important and effective in solving many of the problems faced by Guatemala.

On July 11, 2002, His Excellency Kagefumi Ueno, Ambassador extraordinary and plenipotentiary, and First Secretary Mr. Kiyofumi Ishii, (both of the Japanese Embassy to Guatemala), Mr. Masami Shukunobe, (General Manager of the JICA Guatemala Office) and

four representatives of the Study Team were invited to the Vice Presidential Residence to explain the objectives and details of the Study and the technology transfer to be carried out in the process of implementation, as well as the various development projects and early implementation of disaster prevention programs that would be made possible through the effective use of the results of the Study. In addition, they discussed with the Vice President the concrete action to be taken by Guatemala in the future.

After these discussions, the Vice President requested the Japanese side to give the presentation once more for other governmental officers including Ministers and the directors of research institutes. It was apparent that, as the leaders of a country that faces the constant threat of natural disaster equal to or even greater than Japan, and faced with the need for the early restoration of the peace zone in the western part of the country, which has been devastated by 36 years of civil war, they strongly felt the urgency to take appropriate measures.

4.5.4 Importance of GIS for the country

Being able to use the information processing technique known as GIS not only allows many elements to be used; implementation speed is markedly faster. This enhances the objectivity, transparency and accuracy in comparison to decisions and actions that rely on human subjectivity. In addition, the reduction in the amount of time and labor required leads to lower social costs.

As regards the national administration, there is great awareness of the huge role to be played by GIS, in terms of greater efficiency and speed in activities covering a wide range of spheres, from the accumulation and compilation of data on social conditions basic to the running of the country, such as the national census, land register and fixed property surveys, through the integration of data on various natural conditions (geology, topography, soil, etc.) with survey data on weather conditions, earthquakes, volcanoes etc., and hazard maps and the construction of a database, to the formulation of various development programs, environmental

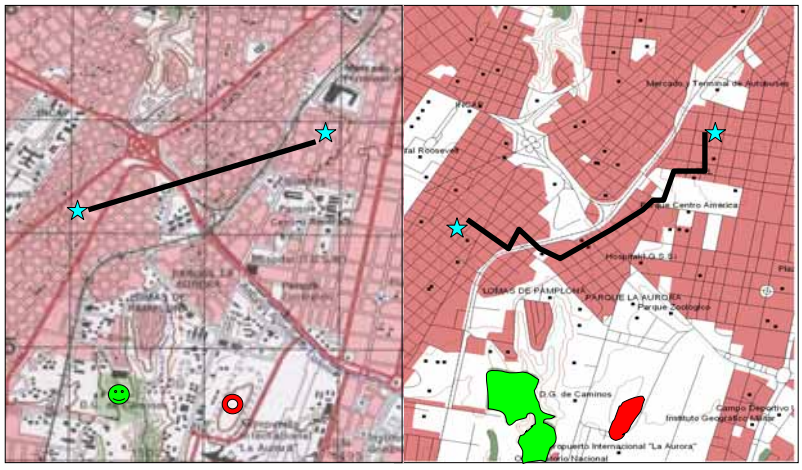

Figure 4.5-7 Difference between topographic maps (left) and GIS database (right)

conservation, measures to deal with natural disaster, and the improvement of medical care, welfare and education, resulting in reduced costs and greater reliability.

In a Guatemala where the national leaders understand the importance of GIS and the SNIG has been set up by the related agencies, the effective, practical use of the results of this Study will promote various development programs, including redevelopment of the infrastructure in major cities and reconstruction of the peace zone, and will strengthen measures against all kinds of natural disaster.

(1) The History of SNIG and Its Present Activities

Figure 4.5-8 Overview of SNIG

Figure 4.5-9 Logos of the organizations participating in SNIG

The Coordinating Commission for the Modernization of the Country's Geographic Information System (CCMSIG) was established in May 1996, in response to many requests concerning the geographic information necessary to promote and assist public investment at the national, regional, provincial, municipal and village levels with regard to social, economic and natural matters. This organization was intended to reinforce, modernize and homogenize the national geographic information system, on the initiative of the Presidential Office of the Republic of Guatemala.

In May 1999, CCMSIG was renamed the "Inter-Institutional Unit for the National Geographic Information System Development Support (UNISNIG), and in January 2000 this was renamed SNIG. The goal of SNIG is to promote inter-agency consolidation, create geographic information through the formulation of standards and guidelines, and provide a basic system for the preparation of the national cadastral records and the receipt and administration of international assistance. The agencies and organizations participating in SNIG abide by the same framework, concept and technical specifications in carrying out their activities. The national cadastral record

preparation project described here was one of the items agreed on in the Peace Accord entered into at the end of 1996.

Since then, SNIG's efforts have steadily borne fruit, and international cooperation projects (with Canada, Sweden, France and Japan) in support of modernization have been implemented.

Table 4.5-3 SNIG Member List

No	Abbreviated name of organization	Formal name of organization
1	IGN	Instituto Geográfico Nacional
2	SEGEPLAN	Secretaria de Planificación y Programación de la Presidencia
3	DGM	Departamento Geográfico Militar
4	UVG	Universidad del Valle de Guatemala
5	MEM	Ministerio de Energía y Minas
6	MINEDUC	Ministerio de Educación
7	INE	Instituto Nacional de Estadística
8	INAB	Instituto Nacional de Bosques
9	CONAP	Consejo Nacional de Areas Protegidas
10	MAGA	Ministerio de Agricultura, Ganadería y Alimentación
11	INSIVUMEH	Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología
12	FLACSO	Facultad Latinoamericana de Ciencias Sociales
13	FAUSAC	Facultad de Agronomía de la Universidad de San Carlos de Guatemala
14	INGUAT	Instituto Guatemalteco de Turismo
15	SEPREM	Secretaria Presidencial de la Mujer
16	SAE	Secretaria de Asuntos Estratégicos
17	DGAC	Dirección General de Aeronautica Civil
18	CONRED	Coordinadora Nacional para la Reducción de Desastres
19	Caminos	Dirección General de Caminos
20	EPQ	Empresa Portuaria Puerto Quetzal
21	MARN	Ministerio de Ambiente y Recursos Naturales

SNIG : Sistema Nacional de Información Geográfica

At the same time, various projects at the national level have also been implemented. Project SUNIL, to digitize the 1:250,000-scale topographic maps covering the entire country of Guatemala and develop the nation's first GIS database, was completed in October 2000. The activities of SNIG have also supported the concept of the National Infrastructure for Geospatial Data (INDE); and through the effective use of the Permanent Committee of Geospatial Data Infrastructure for the Americas (CP-IDEA) and the Global Infrastructure for Geospatial Data (GADI), SNIG has pushed forward developments and improvements both at the Central and South American level and at a global level.

At present, SNIG has formed 5 working groups (① Technology, ② Training, ③

Management, ④ Logistics and ⑤ Marketing) under the leadership of IGN and SEGEPLAN to promote its activities. The above diagrams give an overview of the organization of SNIG taken from a brochure on its activities and show the logos of the participating agencies and organizations. The agencies and organizations participating in SNIG as of November 2002 are listed in Table 4.5-3 below.

(2) Use of GIS in the Project to Combat Chagas' Disease (JICA)

1) Chagas' disease

At present, the Ministry of Public Health and Social Assistance of Guatemala is implementing a project to reduce Chagas' disease as part of the technical cooperation undertaken by the Government of Japan. Two JICA experts have been dispatched to work in tie-up with JOCV volunteers.

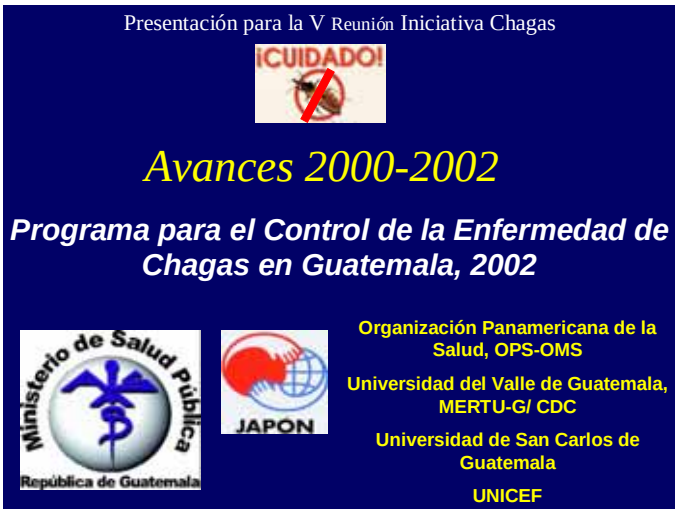

Figure 4.5-10 Overview of the Project to Combat Chagas' Disease

The reduviid bugs that are responsible for the disease are parasitic on humans and domestic animals, living on their blood and inhabiting adobe or thatched houses. Blood sucking alone does not cause infection; the pathogens exist in excrement and invade the body via a skin wound. Sometimes fatal in humans, this is a dangerous infectious disease. Depending on the species, from 100 to several thousand bugs may inhabit one house. If even one bug is found in a house, the house must be disinfected to ensure annihilation. The eradication of the disease in Uruguay and Chile has already been announced by the WHO, but in other Central and South American countries countermeasures are behind schedule.

2) Details of the implementation of projects using GIS

First of all staff members from the Department or municipality and JOCV volunteers visit the local area, conduct a detailed, house-to-house study and record what they find. Then as soon as the distribution of bugs in each municipality has been ascertained, spraying is carried out twice. While one spraying will wipe out all the adult bugs, the eggs survive, so that a second spraying has to be done after an appropriate interval.

This information on "distribution", "implementation of first and second spraying" and "distribution after spraying" is used to construct a database by province. The GIS is used to grasp an understanding of actual conditions and this is used as an indicator of the activities. However, because existing digital topographic map data is the low-scale (1:250,000) Guatemalan SUNIL, there are some limitations on the use of GIS at the Department level. A 1:50,000-scale database is essential for management at the municipality, where the information is more detailed , but at the present time there are only paper-based topographic maps to rely on. Here too, the early development of a 1:50,000-scale database is hoped for.

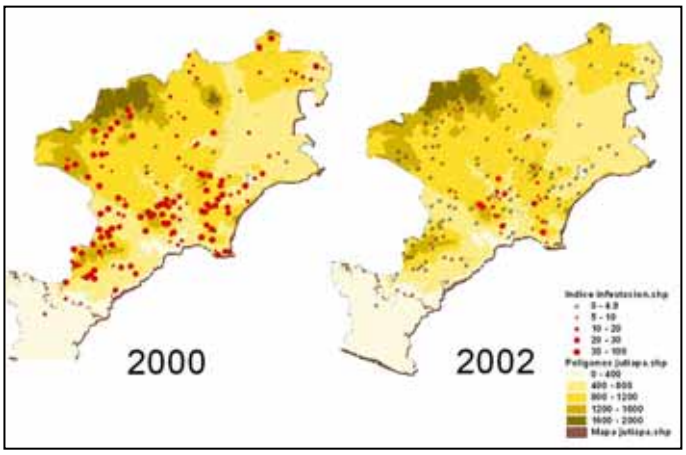

Figure 4.5-11 Distribution of the disease, drawn up using GIS

3) Future development

As it is presumed that the distribution of the reduviid bugs is at heights of from 400m to 1,800m, an analysis will be carried out combining satellite images, DEMs, meteorological data and census, to try defining the extensive range of distribution. Further, since Chagas' disease in Guatemala is prevalent in Chiquimula Province, appropriate measures will be necessary to collect data from the neighboring countries of Honduras and El Salvador. As described above, Chagas' disease is rampant throughout Central and South America, and it is clear that, as with anti-disaster measures, tie-ups with other countries are needed in order to cope with this problem at the regional level. If it becomes possible in the near future to operate GIS via Website, it is thought that these measures will become still more effective, leading to the improvement of health and welfare throughout Central America.

4.5.5 Database required for an early recovery of the Peace Zone

The Guatemalan civil war that broke out in 1960 lasted as long as 36 years until 1996 when a peace agreement was reached under the observation of the U.N.

The Study was undertaken initially because the country urgently needed a national land

development, especially the "establishment of national base map" contributing thus to an early recovery of the "Peace Zone" impoverished in the civil war. With the disaster caused by Hurricane Mitch in 1998, with great damages to Guatemala as well as to other Central American countries, the Japanese Government decided to develop also the hazard maps in an emergency assistance project.

This civil war, the longest in the history of Central America, has destroyed completely the infrastructures in most of the concerned zone. In other words, roads, bridges, electricity, telecommunications, water supply and sewerage systems, and cultivated land became dysfunctional. Furthermore, disaster spared no medical, educational, or other facilities required for normal life of people living in this zone.

Under such circumstances, SEGEPLAN released the poverty maps in 2001 that accurately reflect the conditions of poverty in Guatemala. The maps also show the percentages and numbers of people in the categories of "general poverty" and "extreme poverty," respectively, indicating that many of these categories are concentrated in the Peace Zone. One typical example is San Macros Department, located in the Peace Zone in the western part of Guatemala.

The poverty maps constitute an example for utilizing the world's highest-level GIS, which is exceedingly valuable and indispensable for any national development. We would like to express our deep respect to those who participated in this publication under the assistance of the World Bank and UNDP; people concerned at SEGEPLAN (Secretariat of Planning and Presidency), INE (National Institute of Statistics), and Universidad Rafael Landívar (Rafael Landívar University).

However, the poverty maps, currently available, were produced based on the database of small-scale 1:250,000 maps and do not accurately represent the relationships between the detailed positions of cities, towns, villages, and settlements and the poverty levels.

The 1:50,000 national base maps and their databases that can be acquired from the Study shall cover only about 30% of the entire land of Guatemala and not all the Peace Zone. However, we may improve drastically their accuracy through statistical processing by combining the data on the developed area and the social condition data used to create the aforementioned poverty maps.

The poverty maps are very important for the implementation of the National Development Plan. The poverty maps, whose objective was not to create it, shall act as highly effective tools if they are used to implement the appropriate measures based on the facts revealed in the creative process. The more accurate the tool, the more waste we would eliminate. The result will allow us to determine the appropriate distribution of public investment required for future recovery, content of investment, and identification of target areas, according to the objective criteria.

The alleviation of poverty, i.e., the recovery of the Peace Zone is not a simple problem that can be solved in the short term and a financial assistance will not be useful. Poverty would be

wiped out in the future if the governments (central and local) and local residents participate in continuous activities toward this goal and carry out their responsibilities.

In other words, it is essential to improve the standard of living until local residents are economically independent. To this end, we must understand the characteristics of the areas, identify the causes of poverty, and take appropriate measures. The GIS will be indispensable for this process.

The database of national base map created in the Study will lay the foundation for development. The full use of GIS will establish an accurate objective development plan without arbitrariness and the plan will be implemented with positive effects, if a database containing the natural conditions of the project areas (such as maps related to soil, headwater and water system, current road state, forest resources, and slope classification) and the social conditions including the latest census (population, households, incomes, and agriculture) are developed. The investments in the next phase must be made on electricity, telecommunications, water supply and sewerage systems, medical care, and education to further improve the standard of living.

Poverty is one of the main factors in the outbreak and infection of Chagas' disease, which is apparent in the reports of the project to combat infectious disease to which JICA provides assistance in Guatemala. Additionally, the vulnerability to natural disasters is closely related to poverty. In conclusion, it is not exaggerated to say that many of the social problems come from poverty.

With the specific case of early recovery of the Peace Zone being related to the poverty problem at its core, it will be difficult to achieve this goal by simply meeting the physical conditions.

The vulnerability against natural disasters and infectious diseases resulting from poverty cannot be considered separately from the Peace Zone.

Fortunately, various hazard maps have been developed from the Study and the hazard levels for various disasters have been defined. The review of land uses according to these data should be undertaken as early as possible.

On the other hand, the project to combat infectious disease (Chagas' disease) already uses GIS in its operations and the database accumulated so far (such as structures of houses in the Study Area). These are great treasures. We think that a still more effective development promotion plan can be obtained if the results of different projects are brought together, integrated, and analyzed using GIS.

Currently, the Japanese Government is engaged in bilateral cooperation as well as extensive cooperation across several countries. Good examples are CEPREDENAC and CDERA related to disaster prevention. The Chagas' disease prevention project, though implemented country by country, has started in the neighboring countries, El Salvador and

Honduras, and is taking now a form of extensive cooperation.

If we bring this concept into Guatemala, it is quite possible to carry out cooperation between projects. In other words, the Chagas' disease database, agricultural database developed by MAGA, Hazard Map database obtained in the Study, and the national base map database may be integrated and analyzed efficiently.

We understand that the basic data for this purpose were developed in the Study. With the current instability in economic climate in the world, it is an important task to avoid duplicated investments and we must promote information sharing.

The driving force in this case is the National System for GIS Information (SNIG) and the leader of this organization, SEGEPLAN, is expected to be actively involved in the future. Naturally, IGN and INSIVUMEH which develop important databases as their key business should continue their operations.

4.5.6 Holding of the GIS and hazard map seminar

On June 19 and 20, 2003, a technology transfer seminar was held, introducing the objective, background, products of the Study, and uses of the products, etc.

Photo 4.5-3 Seminar (1)

This seminar was attended by about a total of 300 persons, including not only Guatemalan people but also seventeen guests from CEPREDENAC, as a joint organization for disaster prevention in Central America, organizations related to CDERA (Caribbean Disaster and Emergency Response Agency), and their member states.

On the first day of the seminar, a plenary meeting was held, attended by staff from many governmental ministries and agencies that understood and appreciated the importance of the Study and the wide range of its applications. As a representative of the Japanese Government, Mr. Kagefumi Ueno, the Ambassador Extraordinary and Plenipotentiary, attended the meeting himself and delivered an opening address. Mr. Flora Ramos, Minister of Ministry of Communications, Infrastructure and Housing, delivered a congratulatory address as a representative of the Guatemalan Government. Finally, the presentations by the domestic and international organizations followed.

Many of the speakers came from GIS or departments related to disaster prevention gave

presentations demonstrating enthusiasm for future development, disaster prevention, and medical care and education in Guatemala, as well as comprehensive disaster prevention activities in the Central American region.

We could listen to the presentation by the U.S. National Imagery & Mapping Agency (NIMA), which undertakes mostly the same support operations as the development of the national base map and GIS databases in the Study, and check about the avoidance of duplicated assistance and reciprocal cooperation.

Photo 4.5-4 Seminar (2)

On the second day, we focused on the technical know-how and held group seminars divided between GIS and Hazard Maps. This arrangement allowed us to discuss technologies in great details. Also, it is true that some engineers who were interested in both of these presentations complained that they had to choose from both items. It is a problem that remains to be solved in future seminars.

Holding a seminar will not solve all the pending problems but will allow knowing how the study results were, where they are available, and how they can be used.

The seminar was attended by the staff of the central government and guests from remote local governments, universities and other research institutes as well as assistance agencies from various countries and consisting of presentations by many of the participating organizations. In the seminar, participants were effectively and successfully instructed in a wide rage of applications of the GIS and hazard maps.

The most important task of databases such as topographical and hazard maps, and orthophotomaps is not to create them but to effectively use them. The seminar gave many of the participants useful clues to how the digital databases, much different from paper maps, can be used efficiently in Guatemala in the future.

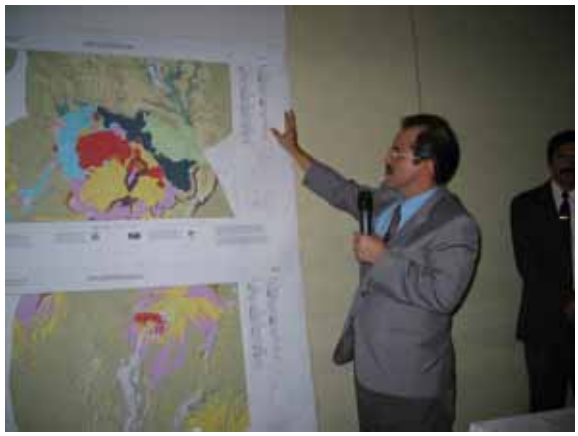

Photo 4.5-5 Seminar (3)

While many people in the world misunderstand GIS as a tool to be used only

for engineering such as "land development" and "construction," SEGEPLAN showed in the seminar how GIS can be actually used in a plan for proper placement of medical and educational facilities and an actual medical project, i.e., the Chagas' disease prevention project. This allowed the participants to draw new inspirations.

The examples of GIS being actually used were more popular than any presentation made by the Study Team, which might have been well-conceived but one-sided, and are likely to attract increasingly more inquiries from many fields. We have suggested that people who are interested in GIS should visit the Web site of SEGEPLAN at www.segeplan.gob.gt to learn more about it.

The counterpart organizations for the Study included IGN related to mapping and GIS, INSIVUMEH related to hazard maps, and SEGEPLAN related to coordination between various organizations. However, SEGEPLAN including the GIS department that developed the aforementioned poverty maps is actually a technical counterpart, which generously provided assistance to many of our operations including the setup of a Web site on the seminar. We would like to thank them for their efforts.