CHAPTER 8

HOW TO PREPARE AND UPDATE

FLOOD DISASTER MAP

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF WATER AND IRRIGATION (MWI)
WATER RESOURCES MANAGEMENT AUTHORITY (WRMA)

THE STUDY
ON
INTEGRATED FLOOD MANAGEMENT
FOR
NYANDO RIVER BASIN
IN
THE REPUBLIC OF KENYA

A MANUAL ON

FLOOD DISASTER MAPPING

MARCH 2009

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CHAPTER 1 INTRODUCTION

The lower areas of the Nyando and Nyamasaria rivers are at high risk of flooding. One of the main causes for this is the insufficient and unsystematic structural measures adopted. Flood management structural measures are not always an inclusive solution to flood problems. For example, the intended effects of structural measures have the limitation to mitigating flood damages when intensity of flooding exceeds the design standard. Vulnerability of society to flooding also accelerates the catastrophic consequences. Therefore, there is a need for building resilient communities and strengthening the social mitigation capacity against flooding: preparedness for,   response to, and recovery from flooding.

1.1   WHAT IS THE FLOOD DISASTER MAP

A Flood Disaster Map is a tool for communicating the impact of a specific flood event in a particular community. A Flood Disaster Map provides information on spatial distribution of inundation areas and its associated depth during the heaviest and annual average flooding. Being a communication tool, it is important that the message, which needs to be communicated, and language used must be understandable for all of the users and should therefore be effectively and efficiently designed.

On the other hand, a Flood Hazard Map, in general, is a tool for the presentation and dissemination of information on flood hazard (intensity, spatial range, inundation depth, frequency, etc.) and evacuation options (location of evacuation centres, evacuation routes, dangerous spots, etc.) in aid of quick and safe evacuation in the event of flooding. A Flood Disaster Map serves as a basis for developing a Flood Hazard Map, which is one of the most important outcomes based on a Flood Disaster Map. Therefore, when developing a Flood Disaster Map, various information relevant to Flood Hazard Mapping should be taken into account and collected as much as possible.

In order to prepare a Flood Disaster Map and, at the same time, contribute subsequently to Flood Hazard Mapping, the following data/information should be prepared:
- Water depth during flooding;
- Duration flooded;
- Flow direction and velocity; and
- Status of evacuation facilities (e.g., location of evacuation centres, evacuation routes,

dangerous spots) and other infrastructures (e.g., schools, hospitals, churches).

Those information above can be utilized for formulation of regional planning, which includes: road improvement planning for evacuation, drainage improvement, selection of sites for new evacuation facilities, prioritisation of communities to be strengthened against and prepared for flooding, etc. In brief, the following are some of overall objectives of a Flood Disaster Map to be achieved:

- To define areas likely to be inundated by flooding and their hydrological behaviour;
- To understand past flood incidence
- To provide basic information on evacuation planning
- To assist in land use planning
- To simulate emergency drills
- To assist in developing disaster prevention and preparedness countermeasures
- To provide basic inputs to developing a Flood Hazard Map

1.2 OBJECTIVES AND TARGET GROUPS OF THIS MANUAL

This manual is primarily directed to staff of the WRMA Regional Office and related other pertinent bodies, who are responsible for flood management in the Nyando river basin. This manual aims at providing guidance on how to effectively develop a Flood Disaster Map with special reference to the Nyando river basin, where available data is limited. It also explains how to update an existing Flood Disaster Map and accumulate data, in order to build resilient communities by own responsibility of the target groups in a sustainable manner.

Although this manual has been prepared primarily for the Nyando river basin, it also aims at applying methodologies described in this manual to other basins.

1.3 FLOOD DISASTER MAP FOR THE NYANDO RIVER BASIN

In the JICA study in 2006, a Flood Disaster Map on a scale of 1:50,000 were prepared based on the results of the flood damage surveys, satellite images, and GIS data in a lower reach of the Nyando river. Other maps: depicting duration flooded; flow direction and velocity; and status of evacuation facilities and other infrastructures, have also been prepared accordingly.

In the developing process, various characteristics of floods: 1) at the heaviest flood water level and 2) at average annual flood level that occurs almost every year; were obtained from the interview survey results. In addition, public hearings were held three times with 340 participants in total to verify their accuracy with community-based experience from residents, and to feedback for future elaboration. Figure 1.1 shows an image of utilising a Flood Disaster Map for regional planning.

The procedure depicted in this manual is an actual procedure adopted by the JICA study in 2006 to prepare a Flood Disaster Map in the lower reach of the Nyando river. Therefore, while introducing general methods in brief, this manual explains how alternative methods can be adopted when data is not always available or insufficient, taking an example of the JICA case study in the lower Nyando river.
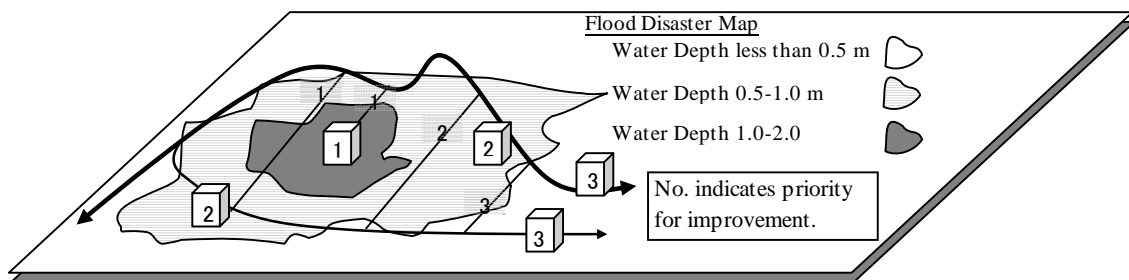
Figure 1.1 Image of Utilization of Flood Disaster Map for Regional Planning

CHAPTER 2   A PROCESS OF PREPARING A FLOOD DISASTER MAP

2.1   KEY STEPS TOWARDS DEVELOPING A FLOOD DISASTER MAP

Figure 2.1 shows key steps towards developing a Flood Disaster Map.

Figure 2.1 **Process of developing a Flood Disaster Map**

2.2   DATA COLLECTION AND SETTING-UP OF BASIC CONDITIONS

(1) Data collection

It is desirable to collect the following information for developing a Flood Disaster Map.

Table 2.1　Information to be collected

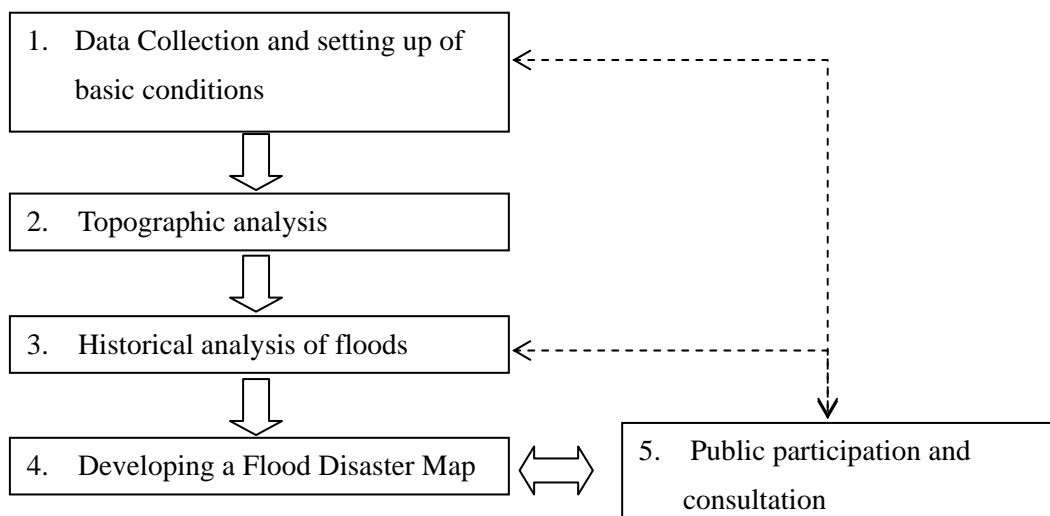| Category		Description
Base maps		-Base maps (topographic maps in scales of 1:2,500, 1:10,000 and 1:25,000) -General-purpose maps
Information on inundation	Previous study results	-Spill overtopping and levee-break spots, inundated areas, inundated depth -Damage suffered -Hourly water level and hourly rainfall on major spots of the river
	Flood damage survey results (Interview survey results)	-Flood conditions, such as flooded areas, inundation level, inundation depth, etc. -Flood flow direction and velocity -Flood inundation duration
Information on evacuation facilities	Areas to be evacuated	-Boundaries of jurisdictional districts and blocks, school districts and neighboring associations' territories
	Number of residents to be evacuated	-Population by district -Households by district
	Evacuation refuges	-Refuges -Public facilities (kindergartens, elementary schools, junior and senior high schools, colleges and universities, civic centers, assembly halls, gymnasiums, etc.)
	Dangerous spots on evacuation routes	-Spots with potential steep-slope collapse, mud flows and debris torrents -Roads blocked by past inundation -Past landslide spots -Underpasses -Bridges
	Communication channels	-Communication channels and appliances for use in emergency
	Evacuation criteria	-Evacuation criteria -Past evacuation activities (issuance and communication channels of advisory and imperative evacuation warnings, refuges set up, number of refugees accommodated)
	Facilities for those vulnerable in the event of emergency	-Number of residents to be assisted -Facilities for the vulnerable (hospitals, homes for the elderly and handicapped, and other facilities concerned)
Other information to be collected	Bodies and agencies concerned	-Local municipal facilities -Prefectural facilities -National facilities -Firefighting facilities -Police stations and call boxes
	Disaster prevention facilities and equipment	-Administrative wireless radio stations for disaster prevention, loudspeakers, sirens -Disaster prevention centers -First-aid stations, information-display facilities on flood damage -Water level stations and rain gauge stations
	Medical facilities	-Emergency hospitals -Public health centers -Hospitals, doctors' offices and clinics
	Lifelines	-Water supply and sewerage plants, gas works, power plants and substations -Telecommunication facilities (telephone exchange offices)
	Other information to be collected Social welfare	-Homes for the elderly and handicapped

(Source: MLIT and IDI, 2003. Flood Hazard Map Manual
for Technology Transfer, based on which this table was slightly modified.)

(2) Setting-up of basic conditions

The following basic conditions shall be set up beforehand, taking into consideration past inundation records and evacuation activities, as well as the existing circumstances of possible inundation areas and topographic features:

- Magnitude of a target flood
- Extent of areas to be mapped
- Scale and size of base maps

Magnitude of a target flood

The target flood shall, in principle, be specified among the following floods:

1) Design flood
2) Largest flood previously recorded
3) Largest flood occurring once in several years

However, in the many areas where flood analysis has not been sufficiently conducted, it is admissible to select from the largest flood recorded, historically severe flood, or the largest flood occurring once in two years.

Extent of areas to be mapped

The extent of areas to be mapped shall, in principle, be the entire areas of local municipalities subject to flooding. If the potential flood areas are only a part of the municipalities, these areas and their outskirts shall be properly mapped.

The neighbouring territories shall be incorporated and produced in the map in an integrated manner, when the potential flood areas extend to neighbouring municipalities. Evacuation to other municipalities shall be planned and incorporated accordingly.

Scale and size of base maps

The standard scale of base maps shall be 1/10,000 to 1/15,000 in order to enable to identify not only individual houses, but also evacuation routes and extent of inundation. Topographic maps of 1/25,000 to 1/50,000 are generally undesirable because they do not allow identification of individual houses to be mapped.

The standard size of base maps shall be the size of A0 to A1. If these sizes are not appropriate, specify alternate appropriate sizes, taking into consideration relevant factors such as proper scale, number of subdivided maps, cost, ease of use, etc.

2.3　TOPOGRAPHICAL ANALYSIS

(1) Required data

Various maps, air photos, satellite images are used for topographic analysis. Determine the relief orientation of the area, taking note of the lowest elevation and geographic setting (whether area is near to sea and subject to tidal aggressions).

It is ideal at least the following topographic maps should be collected to be used as a base map.
1. 1:50,000 , contour interval is 20 meters.
2. 1:10,000, contour interval is 2 meter or 10 feets

Those maps include point elevation surveys at selected sites.

Reference-1 Topographic data collections in the case of JICA study in 2006

The contour lines in the lower Nyando river basin indicated on existing available topographic maps (Map scale: 1/50,000. published for the Kenya Government by the French National Geographic Institute, 1997) are at 20 m intervals. Therefore, it was impossible to read spot elevations. Spot elevations were needed for a Flood Disaster Map, which shows inundation depths ranging from 0.5 to around 1.5 m.

To address this constraint, the Advanced Space-borne Thermal Emission and Reflection Radiometer (ASTER) satellite image was employed to read spot elevations (average spot elevations in a 15 m square area). Figure 2.2 shows the topographic map close spot elevations.
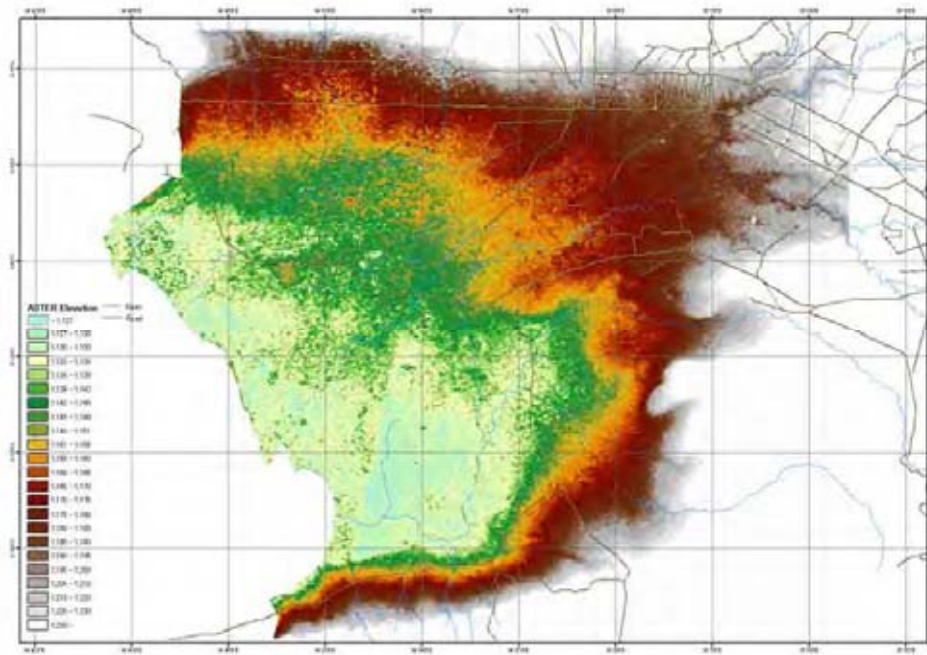
Figure 2.2 Topographic Map

(Source: ASTER satellite image in 2003 and 2004)

(2) Topographic analysis

Based on the collected topographic and other related maps, topographic features of flood prone area should be classified to estimate the flood conditions (such as extent of inundation area, duration of an area that would be submerged, direction of flood flows, changes in the river course, etc.).

The reason why such analysis helps indicate flood types is because the relief features of a flood plain and its sandy and gravely deposits have been formed by and resulted from repeated floods. Thus, a micro-topography on flood plains represents the history of past floods.

<u>Reference-2 Method of preparing geo-morphological survey map for alluvial plains</u>

To classify an area, aerial photographs must first be collected. Preferably the photos will be of a larger scale than that of the map. For example, if the map scale is 1:50,000, the scale of the photograph should be around 1:40,000.

In some developing countries, it is difficult to obtain such photographs. In such cases, satellite images of relatively high resolution (such as LANDSAT, CORONA, SPOT, ICONOS and Quick Bird, etc.) may be substituted. Maps should be collected chronologically.

Geo-morphological land classification (i.e., classification of topographic features) can be easily defined by older aerial photographs, which are less cluttered with urbanization and artificial works. Secondly, as many topical maps as possible should be collected. Those maps include those displaying soil, geology, vegetation and land use. In the topographic analysis, the target area is first classified into major geo-morphological units such as mountains, terraces and land use.

Subsequently, mountains are classified by altitude, structure, form, gentle slops on the mountain ridge, mountain flanks, piedmont gentle slopes and steep slopes. Volcanoes must also be classified by craters, mudflow, flow mound, volcanic fan, etc. Terrace are classified into lava plateaus, pyroclastic plateaus, and upper, middle and lower terraces, based on such factors as their altitude, structural form and continuity. Lowlands are classified into dissected fans, alluvial fans, natural levees, back-marshes and deltas. Man-made topography, such as reclaimed land and artificial fills, is also classified. Regulations have been established for the classification of geomorphology. As well, there are several other standards of classification.

When creating a geo-morphological land and classification map from photographs and some other maps, it must be confirmed by actual fieldwork. The results of the topographic analysis are then checked with information related not only to geo-morphology but also floods. The relationships between geo-morphology and features of floods are shown in Table 2.1. An example of the classification map is also shown in Figure 2.3.

Table 2.1   Relationships between topographic elements and state of flood

Geomorphic Elements	State of Flooding
Terrace	Remains unsubmerged during floods.
Valley plain	When submerged, high velocity of current. Good drainage.
Fan	When submerged, erosion, deposition and change in watercourse occurs. Good drainage.
Natural levee	Submerged during extraordinary floods. Good drainage.
Back-marsh	Remains submerged for long period. Deep water.
Delta	Submerged for very long period. Experiences frequent tidal waves.
Former river course	Water flows along it during periods of extraordinary flooding.
Sand spit	Submerged during extraordinary flooding. Good drainage.
Sand dune	Remains unsubmerged.
Lowland between sand dunes	Submerged during torrential rainfall.
Reclaimed land	Submerged for very long period. Experiences frequent tidal waves.
Artificially filled field in shallow sea	Experiences tidal waves and tsunami but the water drains off well.

(Source: M. Oya, 2001. Applied Geomorphology for Mitigation of Natural Hazards,
Kluwer Academic Publishers, Dordrecht.)

Figure 2.3   An example of a geo-morphological classification map

(Source: Yuzawa River and National Highway Office, MLIT, 2006. The Geomorphologic land classification map of

the Omono River basin)

2.4   HISTORICAL ANALYSIS OF FLOODS

Determine the flood history of the area (either through old flood maps, news, reports, personal experiences, etc)

<u>Reference-3 Historical analysis of floods in the case of JICA study in 2006</u>

(1) Results of the previous study

In the JICA study in 2006, the following data was used as the reference for preparation of the Flood Disaster Map:

a)   Inundation maps prepared in the 1983 Pre-investment Study for Water Management and Development and the 1992 Feasibility Study on Kano Plain Irrigation Project ,

b)   Inundation map prepared in the 1990 Study on the National Water Master Plan, and

c)   Inundation areas by means of MODIS Satellite Images photographed in 2003 and April 2004, Dartmouth Flood Observatory.

(2) Implementation of flood damage survey

The hydrological characteristics and information of inundation depth, duration, flow direction, etc., were analysed. Flood damage survey was launched addressing two flood events: one recorded the heaviest flood water levels in the past and the other occurs almost every year. Results of the survey can be the basic inputs to preparing detailed Flood Disaster Maps.

Flood damage survey can be launched in the following three steps:

1.   To launch actual flood surveys during flooding events;

2.   To prepare flood survey questionnaires and distribute them to the affected communities in the area (unless sufficient data are obtained at the step1); and

3.   To organise interviews with the communities (to complement gaps identified in step 2).

These sets of data are collated and correlated and, then, plotted on the base map.

In the JICA study in 2006, in order to obtain quantitative information on flooding in addition to the results of previous studies, a flood damage survey was conducted by the Study Team in August and September 2006. Flood damage survey, making an interview with residents based on questionnaires prepared, was adopted. Assistant surveyors were employed for this purpose.

The survey team was organized into six parties with 2 persons each and carried out the survey for about 3 weeks.

The sampling number was 350 spots in total, which covered frequent inundation areas in the lower Nyando and Nyamasaria river basins. The following were the main components of the questionnaire.

1)   Inundation depth, duration, flow direction, etc., during the heaviest flood water level in the past and the annual average flood water level;

2)   Availability of evacuation centres and resident behaviour,

3)   Countermeasures requested by residents; and

4)   Others.

Figure 2.4 and Figure 2.5 show the survey area and sites where interviews were made (plotted in red) in the lower Nyando and Nyamasaria river basins.
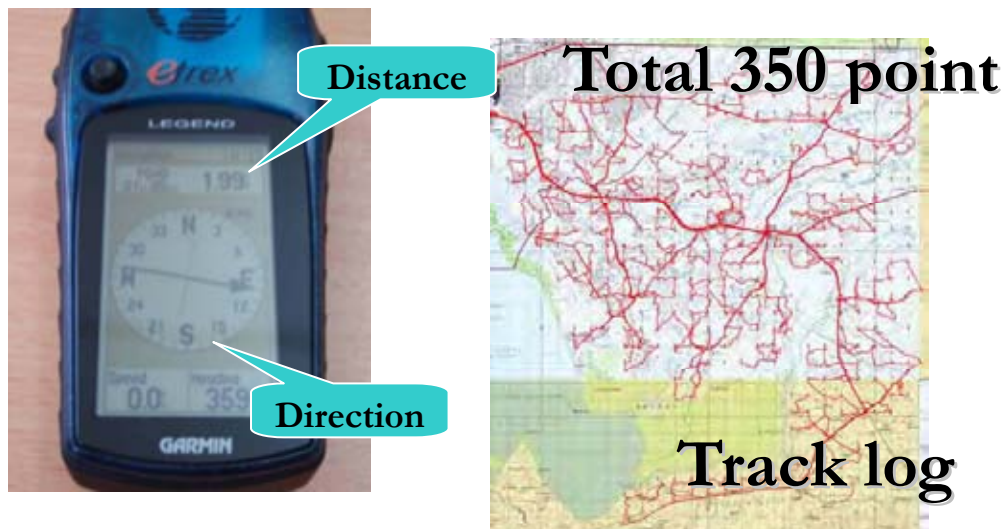

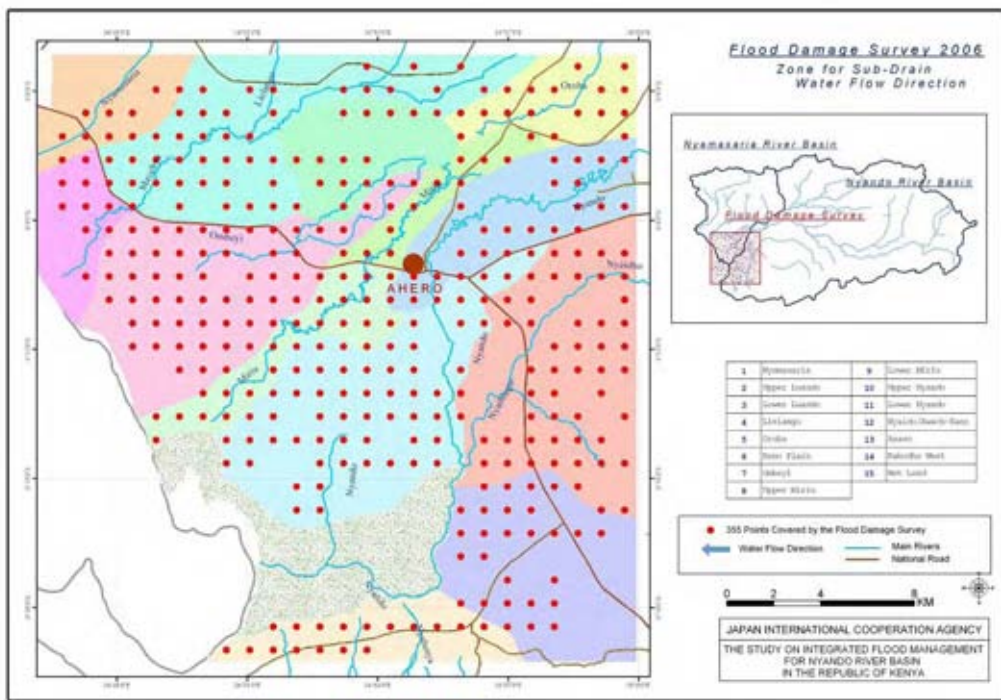**Figure 2.4**   urvey area and interview sites in the Flood Damage Survey (1)

Figure 2.5   Survey Area and Interview Sites in the Flood Damage Survey (2)

2.5 PREPARING A FLOOD DISASTER MAP

(1) Data input

In order to overlay the collected data that can be used for developing a Flood Disaster Map, it is desirable that the data be put and stored in the GIS.

If collected data are outdated or low-resolution, the acquisition of current digital satellite imageries should be highly considered. These imageries can be good sources especially in the following data themes: roads, streams, ponds, land use, etc. If collected data is not available in a digital format, additional resources may be required to vectorize the raster data obtained from satellite imageries or the analogue map.

Examples of such input data are shown in Figure 2.6.
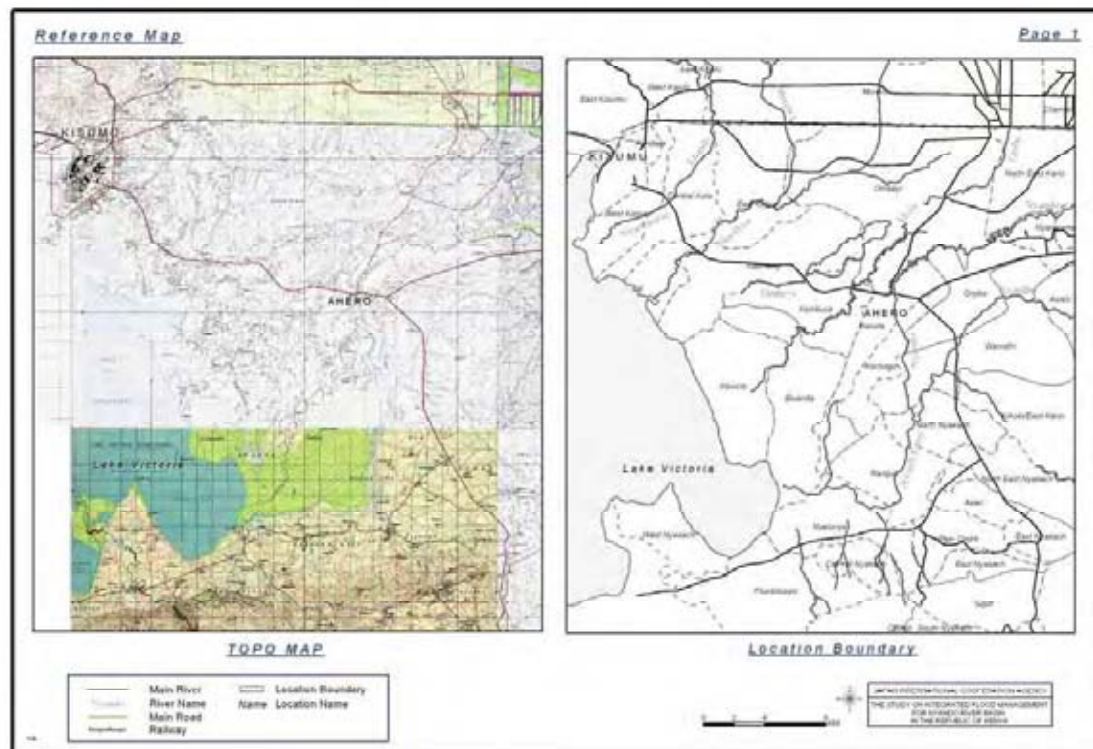
Figure 2.6   Sample of inputted data (1/7) – Reference map –

Figure 2.6 Sample of inputted data (2/7) – Existing survey result 1 on flooded area –

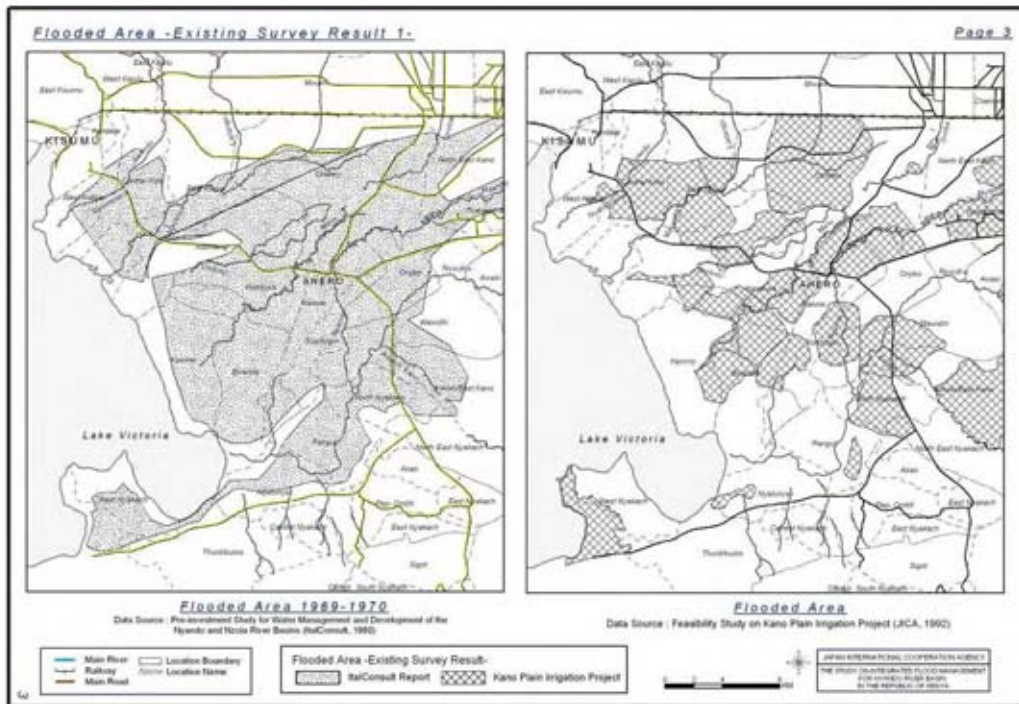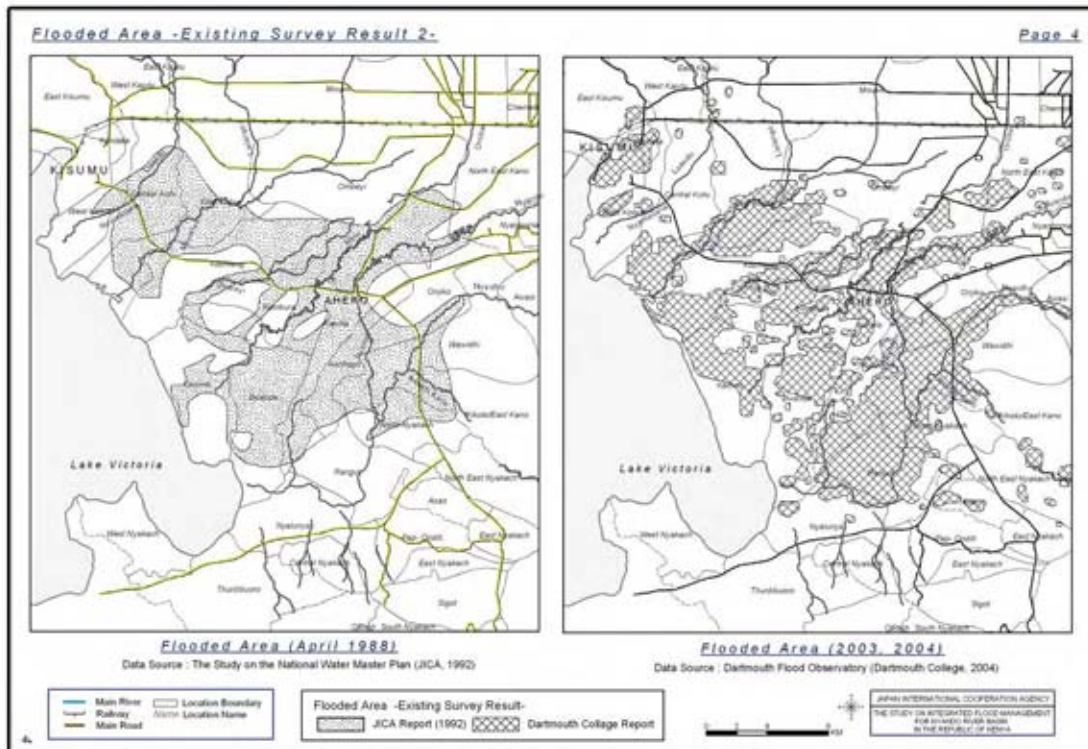**Figure 2.6 Sample of inputted data (3/7) – Existing survey result 2 on flooded area –**
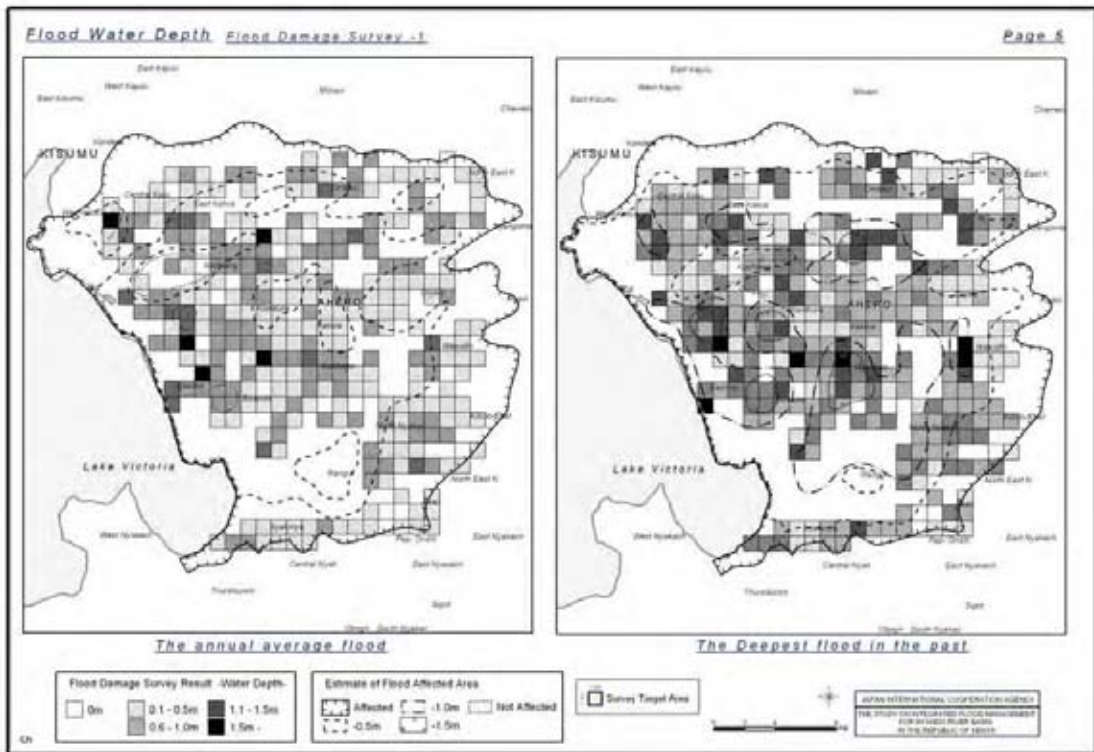
Figure 2.6 Sample of inputted data (4/7) – Flood water depth –
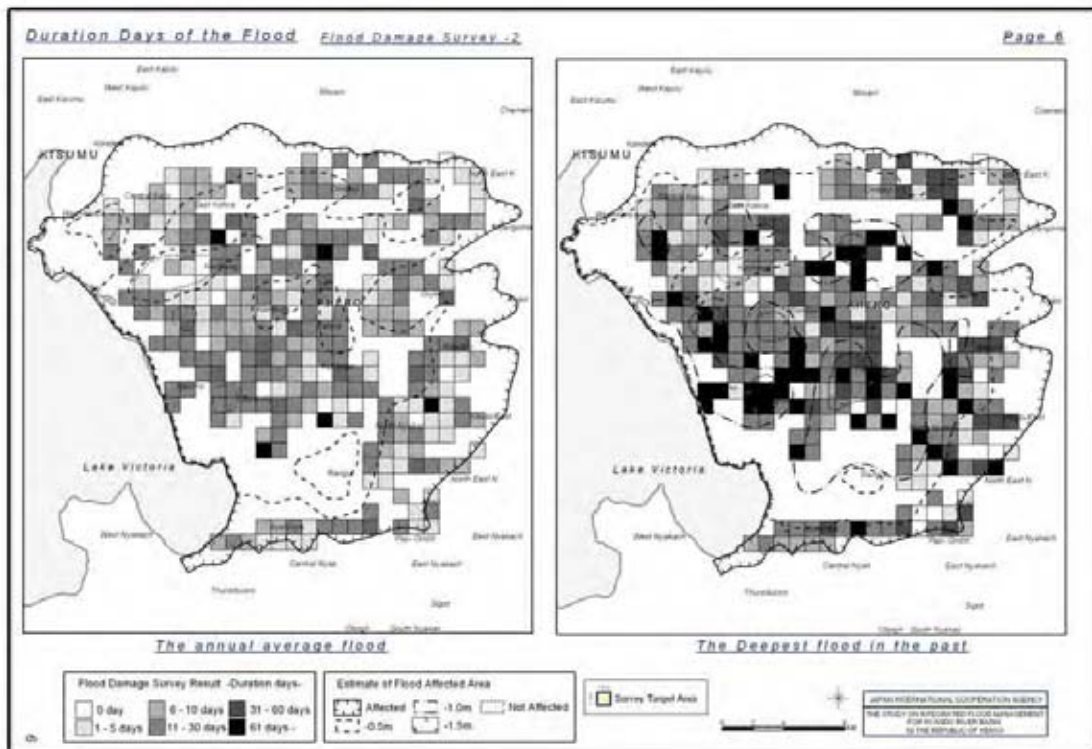
Figure 2.6 Sample of inputted data (5/7) – Duration of the floods –
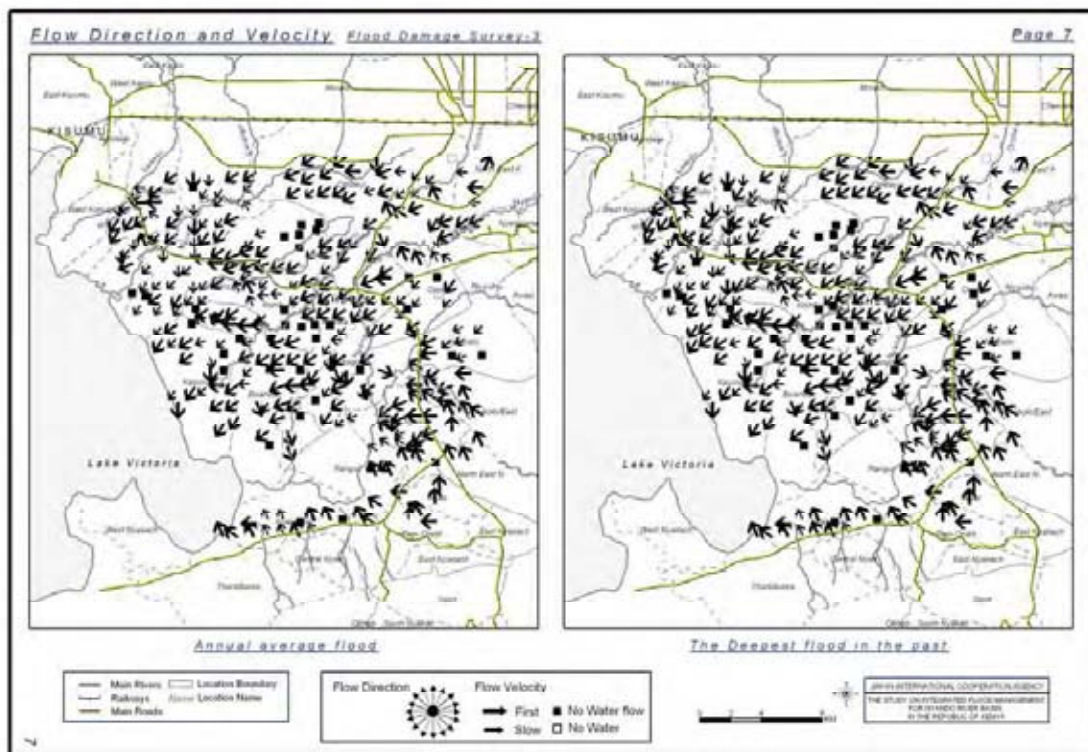
Figure 2.6   Sample of inputted data (6/7) – Flow direction and velocity –
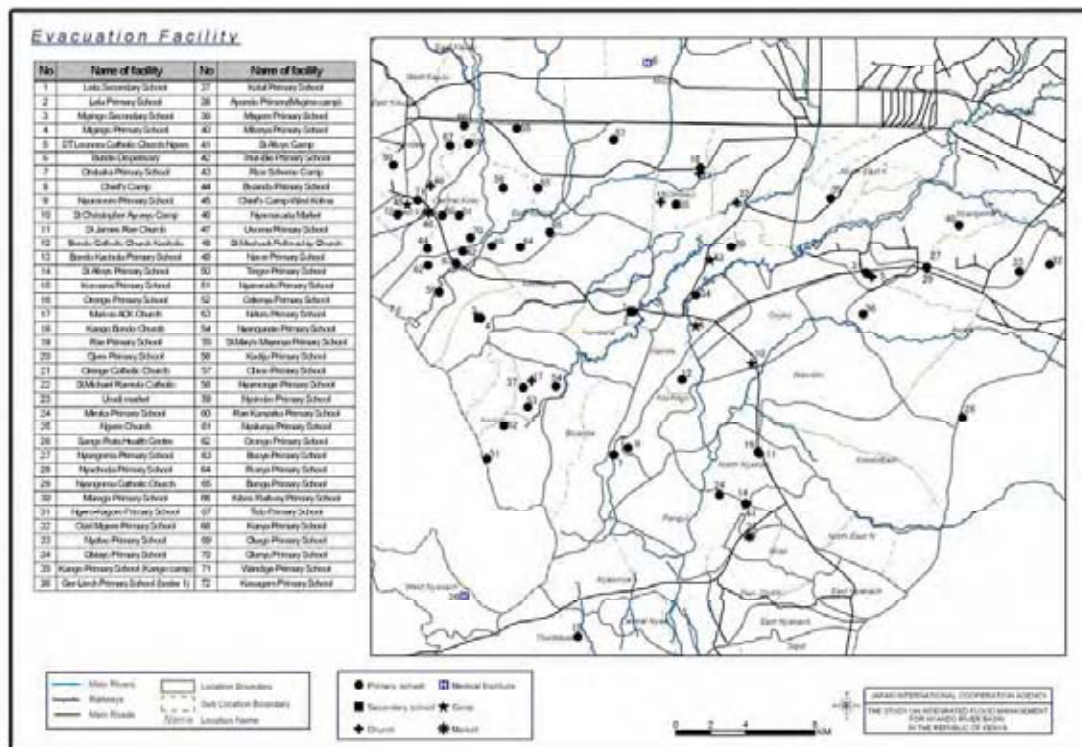
Figure 2.6   Sample of inputted data (7/7) – Evacuation facility –

(2) Developing a Flood Disaster Map

The Flood Disaster Map is developed based on various data which are stored in GIS. Various data such as previous survey result, topography, interview survey results (flood water depth, inundation duration, flood flow direction, etc.) are overlaid. Taking into consideration the relevant factors such as existing continuous structures and micro-topographic features, areas and contours of flood inundation are compiled and defined. (see Figure 2.7).

Flood damage survey result (2006)

Topography:
Lower than surround area
Inundation depth:
Deeper than surround area

Topography:
Higher than surround area
Inundation depth:
Shallower than surround area

Previous study result (1969-1970)

Previous study result (2003-2004)
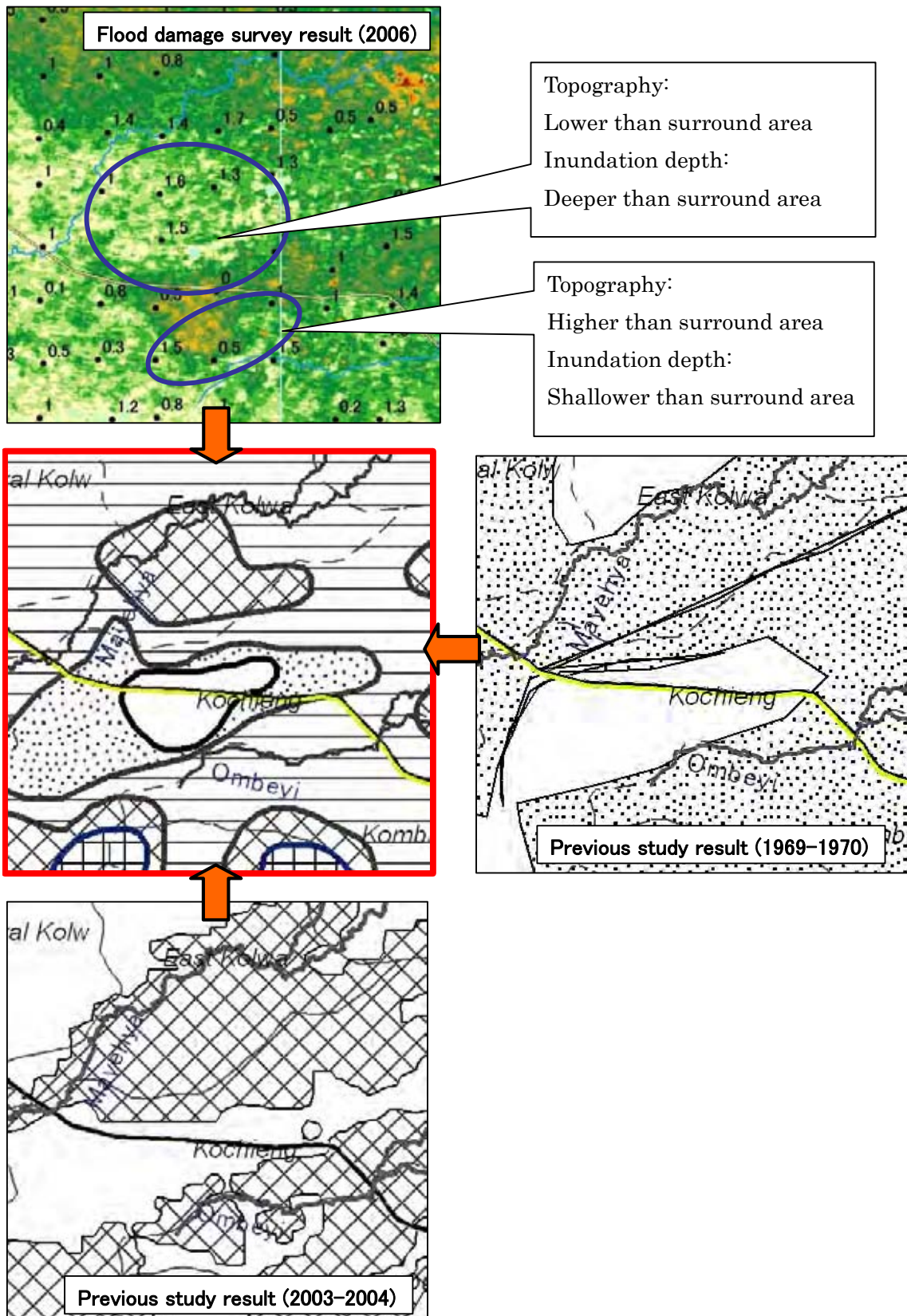
Figure 2.7 Describe boundary of inundation area

Designation of inundation depth

Designate by colour the inundation depth, so that the local residents are able to easily understand accurate inundation information. Inundation depth is normally classified into five ranks, as shown in Figure 2.8. Whenever necessary, other ranks such as 2.0 to less than 3.0 m, 3.0 to less than 4.0 m and 4.0 to less than 5.0 m are acceptable.

Category of inundation depth	Reference description
0.0m	no inundation
0.5m	around the level of the knee of an adult
1.0m	around the level of the waist of an adult
2.0m	around the level of the eaves of the first floor
5.0m	around the level of the eaves of the second floor
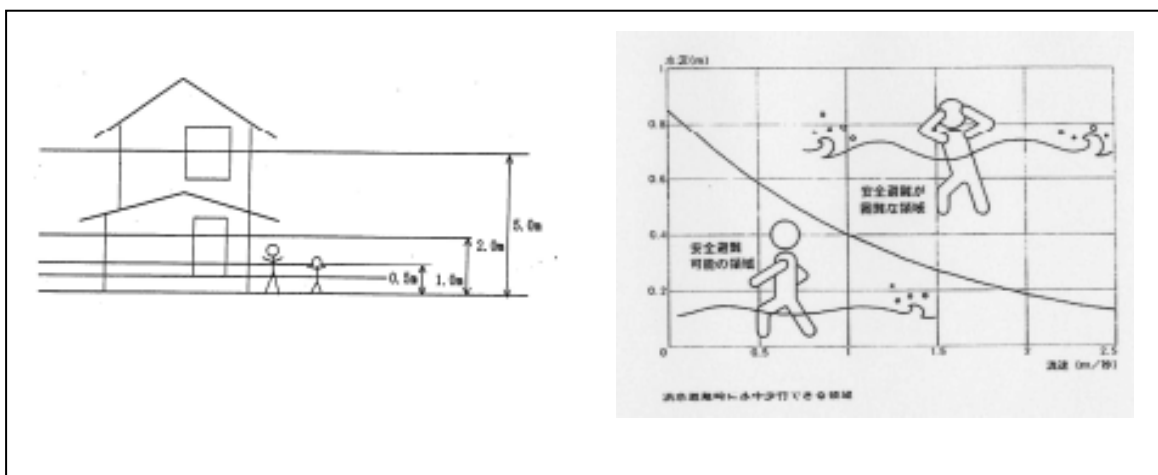
Figure 2.8 Designation of inundation depth

If a water level reaches at around 20 cm, it is difficult and dangerous for people to evacuate by foot in the flowing water. Accordingly, evacuation should be started well in advance before a flood situation gets too worse and turns into disasters.

2.6 PUBLIC PARTICIPATION AND CONSULTATION

(1) Implementation of public hearing

Once a Flood Disaster Map is prepared, it shall be presented to all stakeholders for comments at a public hearing if necessary. Feedback on the adequacy of the following issues shall be solicited: the depth and extent of inundation, evacuation information, names of places and their spellings, colour codes size and scale of the map. Records of the feedback provided should be kept and these should be used to further elaborate the map.

In the case of the JICA study in 2006, a Flood Disaster Map for the lower Nyando river has been prepared by using various data from the flood damage survey, previous studies and existing reports from the sites. The original map has been presented and subsequently discussed fully with participants in the public hearings held in three places, Rabuor, Ahero and Ombeyi in the subject area. The public hearings with participants in the respective divisions are outlined in Table 2.2. Figure 2.9 shows pictures taken at the public hearings.

Table 2.2   Outline of Public Hearings

Date	Place	Target Division	No. of Participants
Nov. 7 (Tue) 9:00-11:00	Rabour	Winam, Kadonbo	100
Nov.08 (Wed) 9:00-11:00	Ahero	Nyando, lower Nyakach	100
Nov.09 (Thu) 9:00-11:00	Ombeyi	Miwani	50

Source: JICA Study Team

Source: JICA Study Team

Figure 2.9   Public Hearing at Rabour (November.07, 2006)

In the hearings, various valuable suggestions and opinions were raised, some of which are the following:

  1) Naming of local ditches;
  2) Clarification of boundaries (location and sub location);
  3) Local flow direction;
  4) Brief history of floods in the past;
  5) Lack of drainage channels (as request), etc.

With due consideration to the suggestions and comments, the Flood Disaster Map is presently considered as a draft (as of July 2007). The current version of the Flood Disaster Map and such comments received will be used for preparation of the detailed community flood hazard maps in a coming stage of this JICA Study.

(2) Reflecting results from public consultations to the Flood Disaster Map

Through reflecting the results from the public hearing and other information about flood conditions, Flood Disaster Map shall be finalized.

The finalized Flood Disaster Map is shown in Figure 2.10.
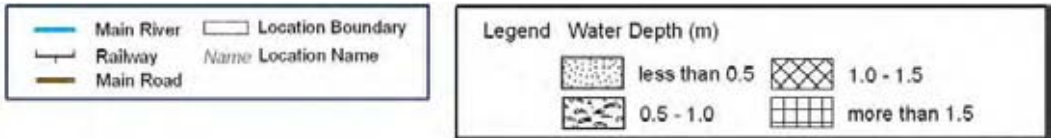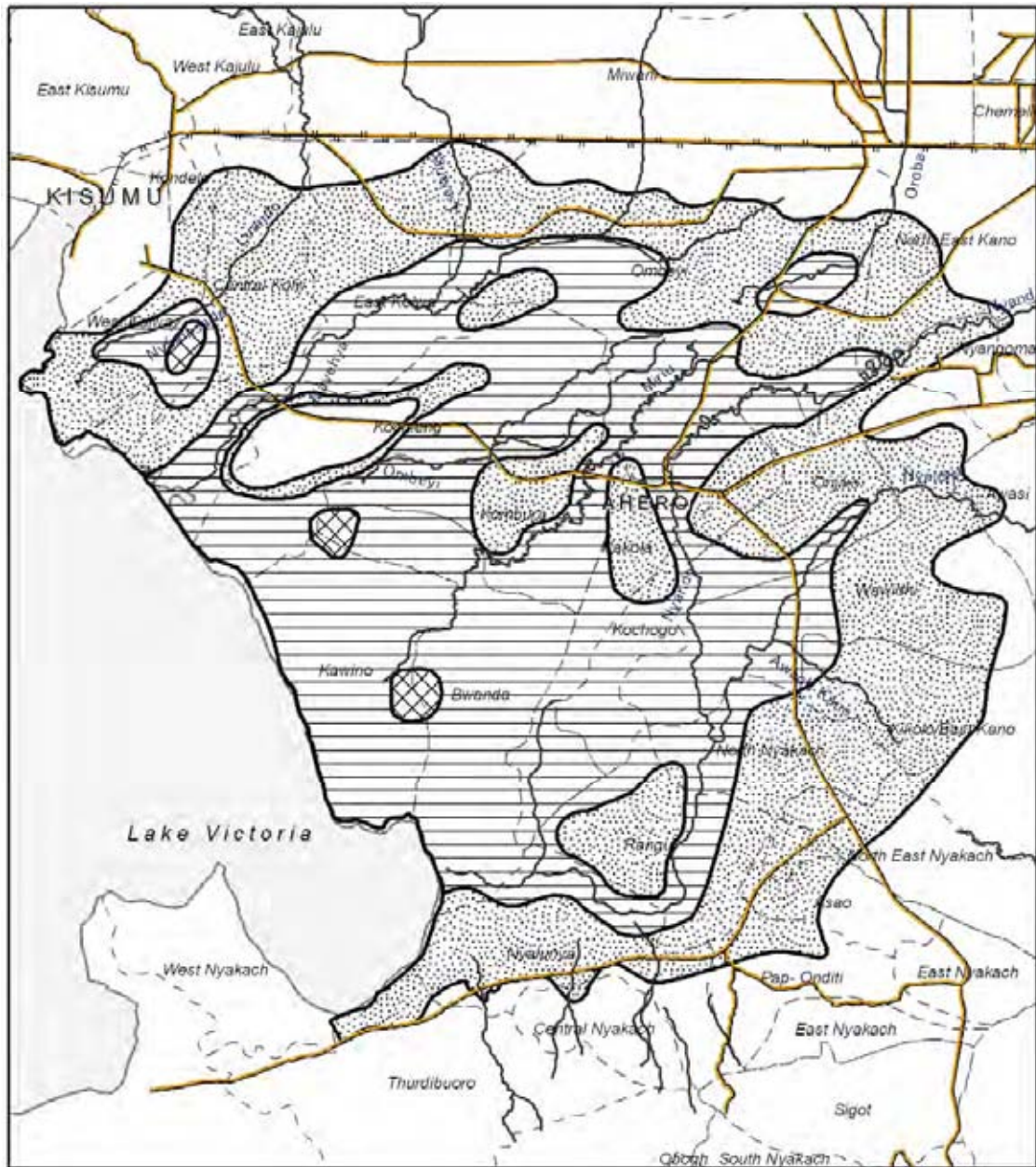
Figure 2.10 Flood disaster map (1/2) – Maximum flood water level recorded in the past –
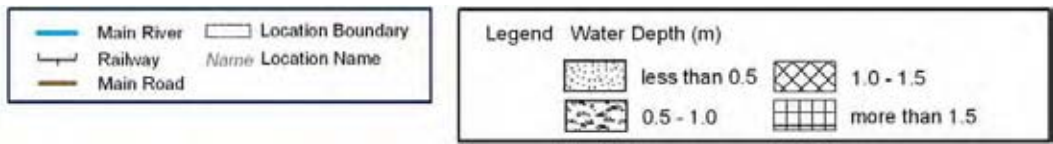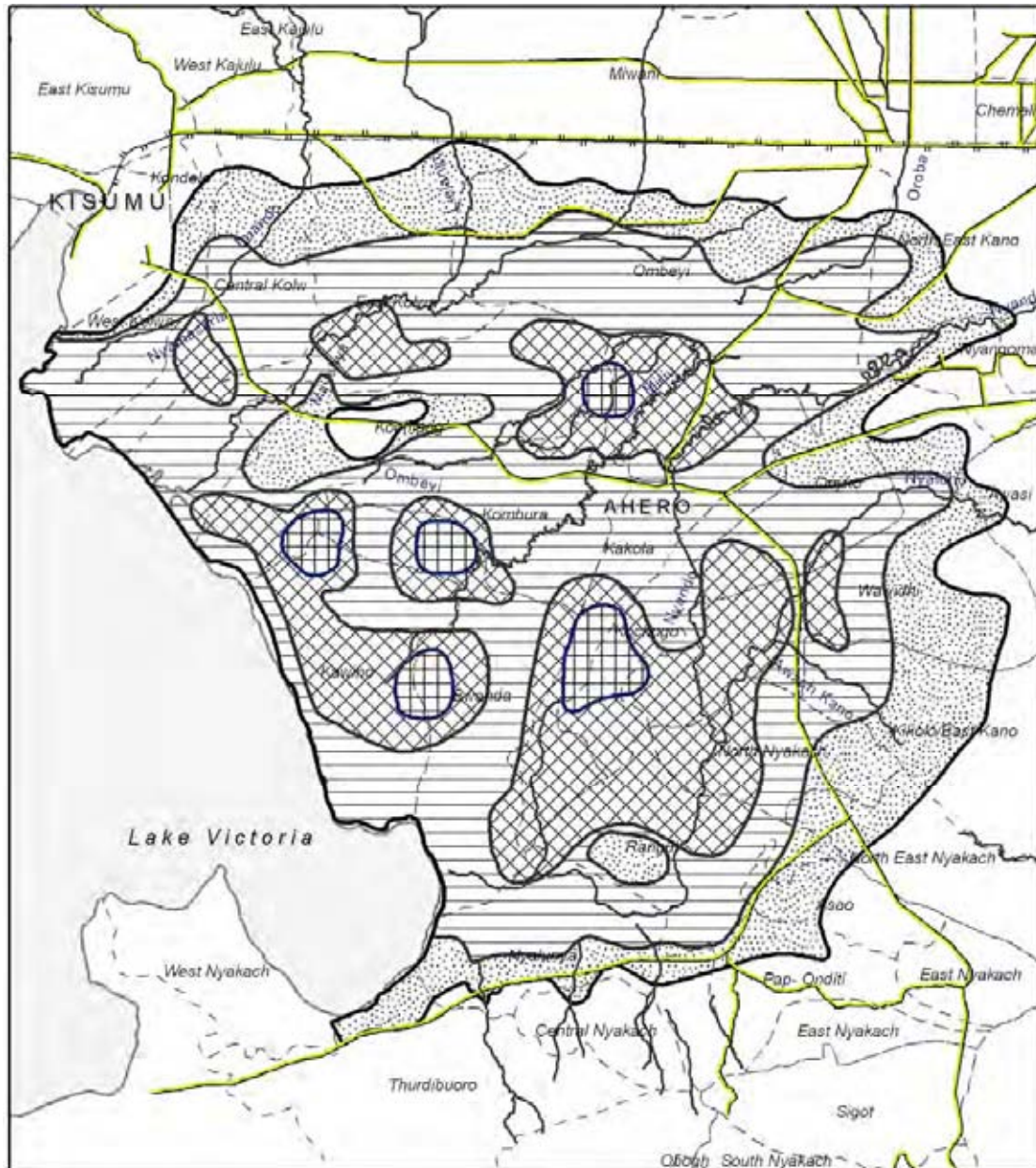
Figure 2.10 Flood disaster map (2/2) – Annual flood water level –

CHAPTER 3   SUSTAINABLE USE OF A FLOOD DISASTER MAP

3.1   THE NEED FOR UPDATING AND ACCUMULATION OF DATA

Since flood management is a long-term and on-going process, activities taken pre-, during, and post- flooding should be reviewed and evaluated to improve the flood management system for future flooding. A Flood Disaster Map can serve as basic data for the flood management system. In order to keep and enhance accuracy of flood information, a Flood Disaster Map should be updated time to time. Whenever a sever flood event occurs, it must be verified by measurements of flood depth and duration. These activities lead to greater accuracy of the flood forecasting system through the calibration of parameters of forecast modelling. Public hearings for the communities are also to be held for the improvement of the relief and evacuation systems in the flooded areas. Figure 3.1 depicts an updating cycle of a Flood Disaster Map.

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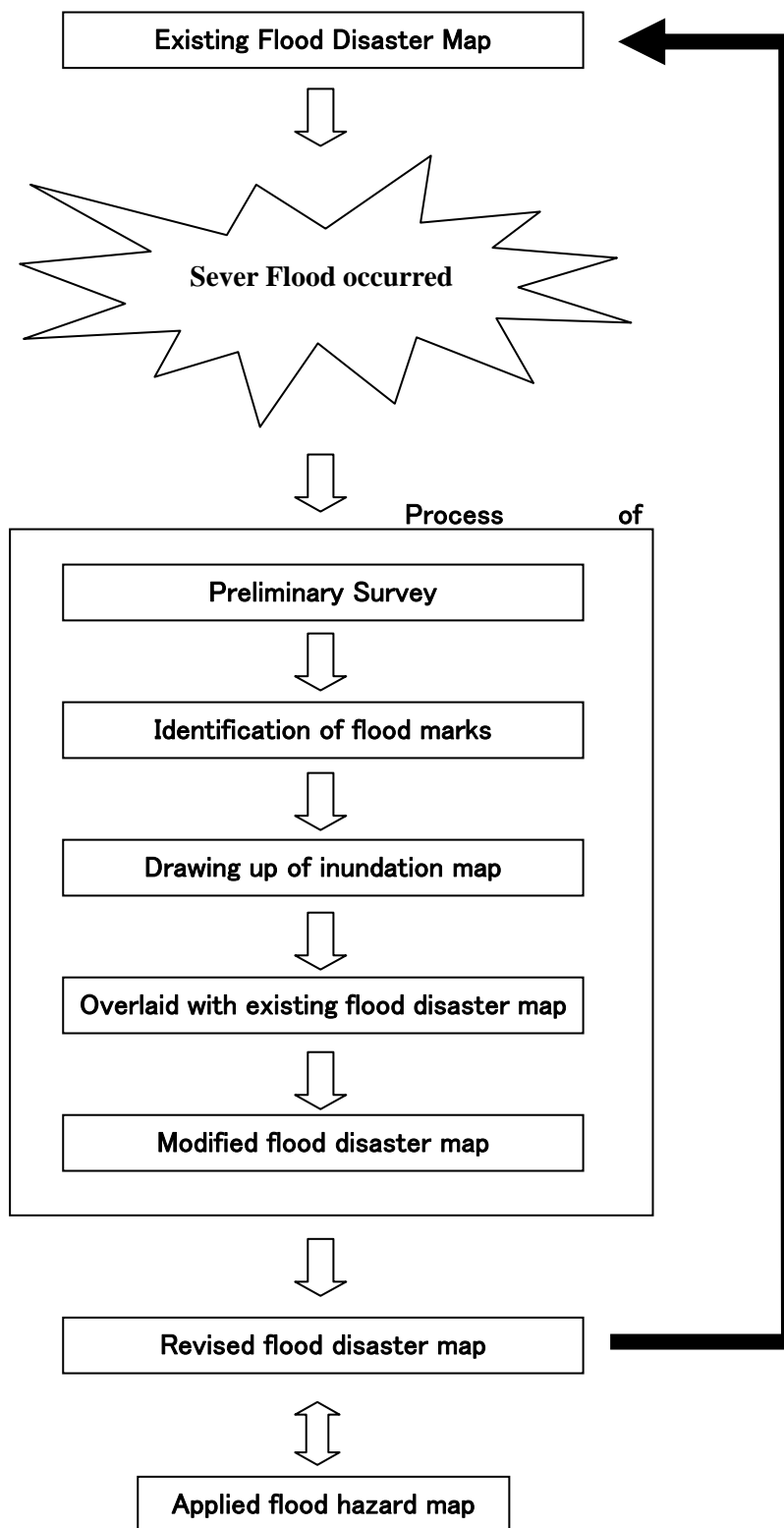
Figure 3.1 Updating cycle of flood disaster map

3.2 PROCESS OF UPDATING AND ACCUMULATION OF DATA

(1) Preliminary Survey

In the case when long time has passed after flooding meaning that no flood marks remain, the following actions can be taken:

1) On the map, identify the place names recorded in past newspapers and literature, and estimate the approximate extent of inundation on the basis of topographic features.

2) Interview elderly residents in the pertinent areas, to collect information on the extent and depth of inundation.

(2) Identification of flood marks

When identifying flood-level marks, the following actions can be taken:

1) Identify the mark levels as soon as possible after the flood event reaches its peak.

2) Specify the flood marks, preferably based on mud marks. Mud marks fade out in the meantime, or disappear within a short time, particularly after rain. Even if they do not disappear, they might be worked into a lower level by rain.

3) In the case of specifying flood marks based on trash, look carefully and extensively around the spots beforehand, and exclude those trash levels unusually lower than the surrounding ones. Trash often slides down by its own weight, or might otherwise be moved unnaturally, such as by wind. Mud marks seem to offer more accurate marks than trash. Draw up a proper level-line, connecting the reasonable marks, and define its level by surveying.

4) Compare the mark levels with the peak flood levels recorded at the nearby water-level stations, if any, in order to verify them.

5) Sample flood marks in the flow direction at intervals of 50-100 m in a straight river channel, preferably ensuring the collection of at least one set of reliable data from both sides of the channel.

Figure 3.2 shows an example of flood marks identified.

Figure 3.2 An example of flood marks identified

APPENDIX 1   An example of interview sheets for flood damage survey

Name of Interviewer: _____

QUESTIONNAIRE FOR FLOOD DAMAGE SURVEY IN NYANDO RIVER BASIN

1. **Place of Interview-Community** : Location _____

Sub-location _____

Village _____

Latitude :_____ Longitude :_____

Altitude in meter :_____ Site No. _____

2. **Date : August ____, 2006**

3. **Time begin : _____ Time End : _____ #Min : _____**

4. **Name of Respondent : _____**

 a) Sex of respondent : a. Male b. Female

 b) Marital Status: a. Single b. Married

 c) Age of the respondent : _____ years old

5. **QUESTIONNAIRE**

Q1. Have you ever affected by flooding around your community?

 a. Yes b. No

Q2. How many times a year does flood occur?

 a. Once b. Twice c. Three times or more

Q3. How do you get information on flood in advance?

 a. Cloud b. Torrential Rain c. River Water level

 d. Radio e. TV f. Neighbors

 g. Government info. h. Others (_____)

Q4. Did somebody inform you of flooding?

 a. Yes (by _____) b. No

Q5. Do you turn on a TV or radio to get more information about the flooding?

 a. Yes b. No

Q6. Did you remember of the deepest flood water level in the past around your community.

 a) Deepest (biggest in the past)_____ meter in the year _____, Duration ____ days

 _____ flow direction, _____ velocity (meter/sec)

 b) Annual average deep (a scale which occurred every year)

 _____ meter in the year _____, Duration ____ days,

 _____ flow direction, _____ velocity (meter/sec)

Q7. When you expected flooding around your house, what was the very first action you did?

      a. Stay in your house.   b. Escape to hilly area.   c. Escape to Kisumu

      d. Escape to somewhere else (where _____)

Q7-1. What did you lose by flood?

      a. House was washed away (around value Kshs _____)

      b. Properties (around value Kshs _____)

      c. Livestock (around value Kshs _____)

      c. No.

      d. Others (_____ sround value Kshs____ _____)

For the respondent who answered as a. in Q7

Q8.   Why did you stay in your house ?

      a. no. time to escape   b. to guard properties   c. to stay house is safety

      d. Others (_____)

For the respondent who answered as b. c. or d. in Q7

Q8-1. Did you remember the destination for escaping and the route to destination from your home.

      a. Government building b. Church   c. School

      d. Hilly area   e. Others (_____)

(Geographic location)

Q8-2. How did you escape to your destination?

      a. on foot   b. Motorbike   c. Vehicle

      d. Others (_____)

Q8-3 How many minutes/hours did it take to the destination?   _____ minutes/hours

Q8-4. Did you escape safely to the destination?

      a. yes

      b. no,   its reason   b-1. Road is submerged   b-2. Access route was washed away

                    b-3. Others (_____)

Q8-5. How long did you stay there (evacuation place) ?

      a. within a day   b. 1-2 day   b. 3-4 days   c.   a week   d. more than a week

      e. more than month

Q8-6 Did you get food there ?

      a. yes   please specify agency or group in the following

      a-1. Local government   a-2. Community   a-3. NGO   a-4. Others (_____)

      b. no

Q8-7 Did you get health care?

      a. yes   please specify agency or group in the following

      a-1. Local government   a-2. Community   a-3. NGO   a-4. Others (_____)

      b. no

Q9. What do you want the government agency and community based organization to do against flooding?

Please select 5 options with priority order in the later option list.

      Government   CBO

      a). Dry season :   by putting 1. 2. 3. 4.5   same as the left

      b). Rainy season :   by putting 1. 2. 3. 4.5   same as the left

10. What kind of information do you need during flooding

      a. Forecasting (weather condition)   b. Evacuation order   c. Emergency food

      d. Medical care

      e. Others   (_____)

Q11. What infrastructures (such as school, hospital, road, bridge, etc.) exist in your village?

      a. Evacuation center   b. School   c. Hospital/clinic

      (name _____)   (name _____)   (name _____)

      d. Bridge

      (name _____)

      e. Others (name _____)

      f. No.

Q11-1. Who is an administrator in charge of operation and maintenance for the facility selected in the above Q11.?

      a. Operation and maintenance by (_____)

Q11-2. How about is its work performance, working well or not?

      a. Good   b. fair (frequently occur accident)   c. Damaged and no function

      d. Others   (_____)

Q11-3. In case of damaged and no function, how do you do?

      a. inform to whom ?_____)

      b. repaired by community/village itself

      c. others (_____)

Q11-4. What is action taken for the above damaged and no function?

      a. repaired (by _____)

              (cost in Kshs_____)

      b. abandoned

      c. others   (_____)

For Question 9, please select the options in the following table.

Condition	Preparedness and/or Countermeasure	
	Government Agency	Community-based
Dry season	Construction of dike	Construction of dike
	Repair of destroyed dike	Repair of destroyed dike
	Removal of sediment	Removal of sediment
	Repair of destroyed structures/other infrastructures	Repair of destroyed river structures
	Construction of drainage channel	Construction of drainage channel
	Raising of trunk road	Raising of trunk road
	Reforestation	Construction of riverbank tree zone
	Land use regulation	Construction of small scale reservoirs
	Flood proofing measures	Flood proofing measures
	Secure evacuation places	Community based operation and maintenance
	Skill up of staff against flooding	Skill up of community against flooding
	Information, education and communication against flooding	Information, education and communication against flooding
	Risk management drill	Risk management drill
If any options, please write it down		
Wet season	Temporary repair of destroyed dike	Temporary repair of destroyed dike
	Temporary repair of destroyed river structures/other infrastructures	Temporary repair of destroyed river structures/other infrastructures
	Information of early warning	Information of early warning
	Flood fighting	Flood fighting
	Risk management drill	Risk management drill
		Emergency food
		Health care
If any options, please write it down		

CHAPTER 9

HOW TO UTILISE

GEOGRAPHIC INFORMATION SYSTEM

(GIS)

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF WATER AND IRRIGATION (MWI)

WATER RESOURCES MANAGEMENT AUTHORITY (WRMA)

THE STUDY

ON

INTEGRATED FLOOD MANAGEMENT

FOR

NYANDO RIVER BASIN

IN

THE REPUBLIC OF KENYA
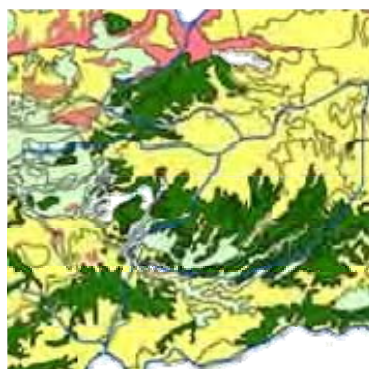
GIS Database Manual

JULY 2007

Nippon Koei Co., Ltd.

IDEA Consultants Inc.

Introduction

The making purpose of this manual is operation and maintenance of the GIS database which data was collected and created through the project. The operation and maintenance of the GIS database means;

1. Understand GIS data format and this database structure
2. Access to the database, and according to the necessity
3. Edited and update the GIS data

The target users of this manual are engineers of WRMA and LVSWSB. However concerning about edit and update of the GIS vector data, persons who were participated in the GIS training executed in June 2007.

-Caution-

1   This GIS Database must be copied under " C:¥ " on your computer
2   Instration of this GIS Database requires 40 giga bytes (GB) of hard disk space
3   The software of this GIS Databasde is "ArcGIS Desktop Version9 (ArcGIS 9) with Spatial Analyst extention
4   Instration of this software requires at least 700 mega bytes (MB)
5   Database manager of this database must read carefully this manual and GIS training text that excuted in June 2007.

Introduction

Table of Contents

CHAPTER 1

OPEN GIS Data

In this Chapter, you'll learn how to display GIS data in ArcMap. You'll learn how to navigate maps and get information from the attribute table.

1   Start ArcMap by double-clicking the ArcMap icon on your computer desktop. Alternatively click the Start buttom on the Windows taskbar -> Programs -> ArcGIS, and click ArcMap.

2   When ArcMap opens, you see the ArcMap dialog on top of the application windows. In the ArcMap dialog, click the option to start using ArcMap with "A new empty map".

Main menu toolbar

Standard Toolbar

Tools Toolbar

Table of Contents

Map Display
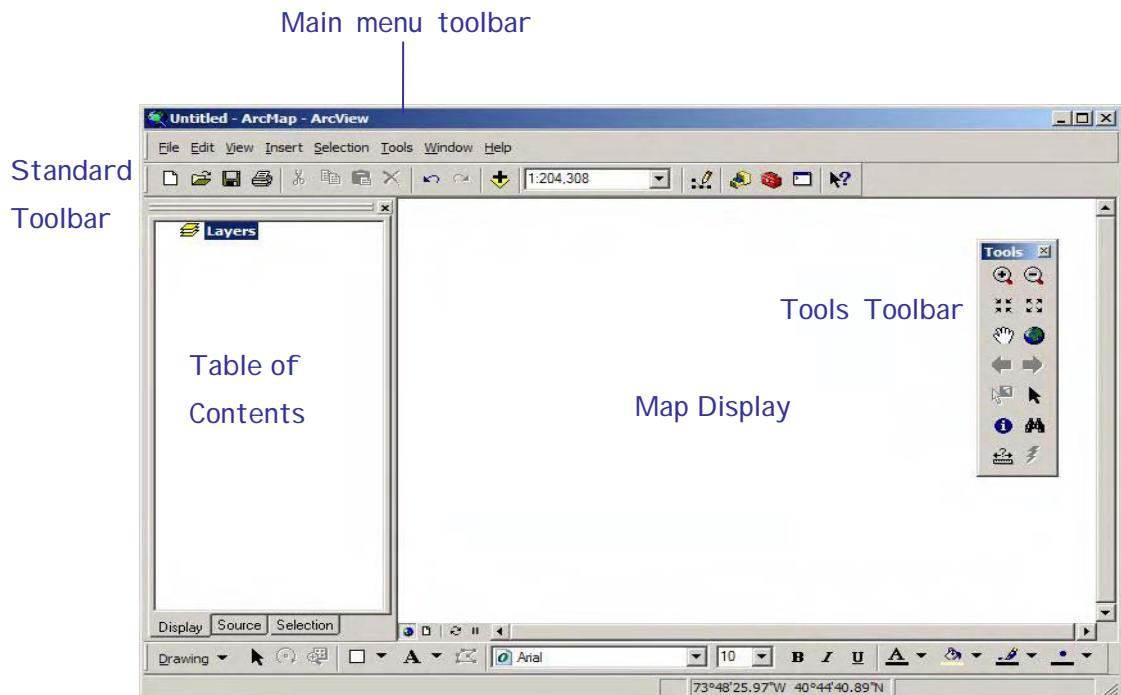
3 In the Open dialog, navigate to *C:¥ GIS DataBase¥ 06-GIS*

On the Standard toolbar, click the Add Data button. Select the data which you want to open and click Add.
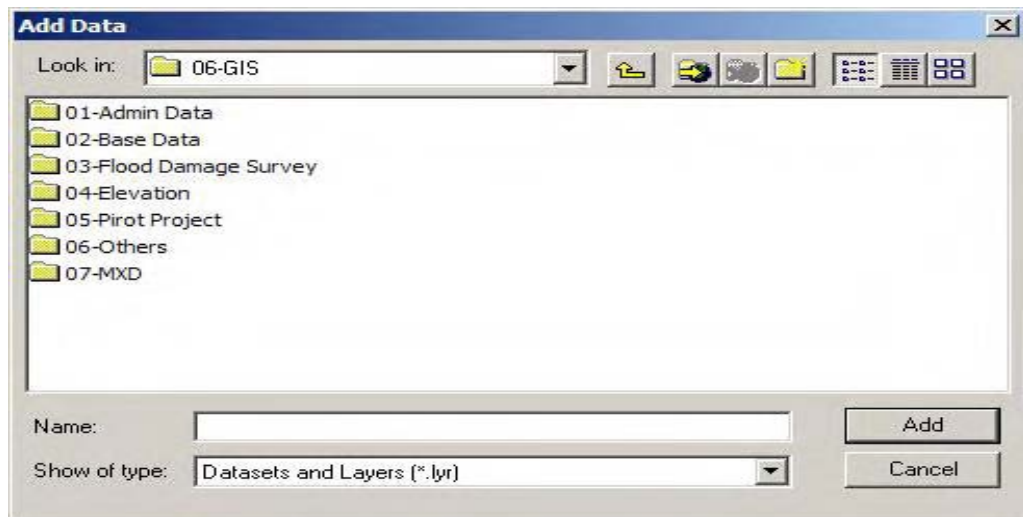

4 The following graphic shows, Point data, Line data and Polygon data on the "Map display", and you can identify types of data on the "Table of Contents".
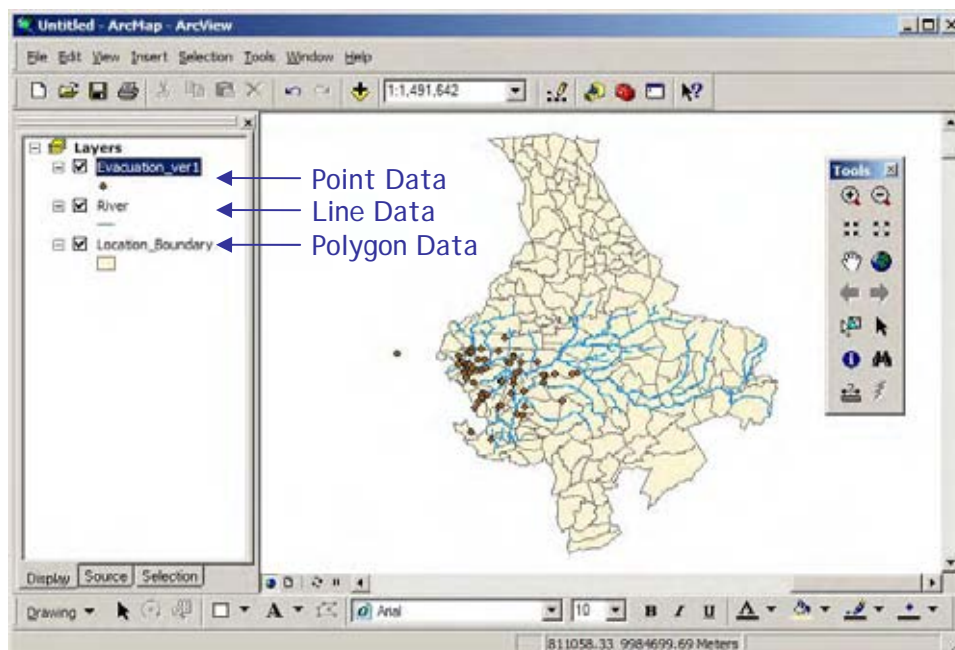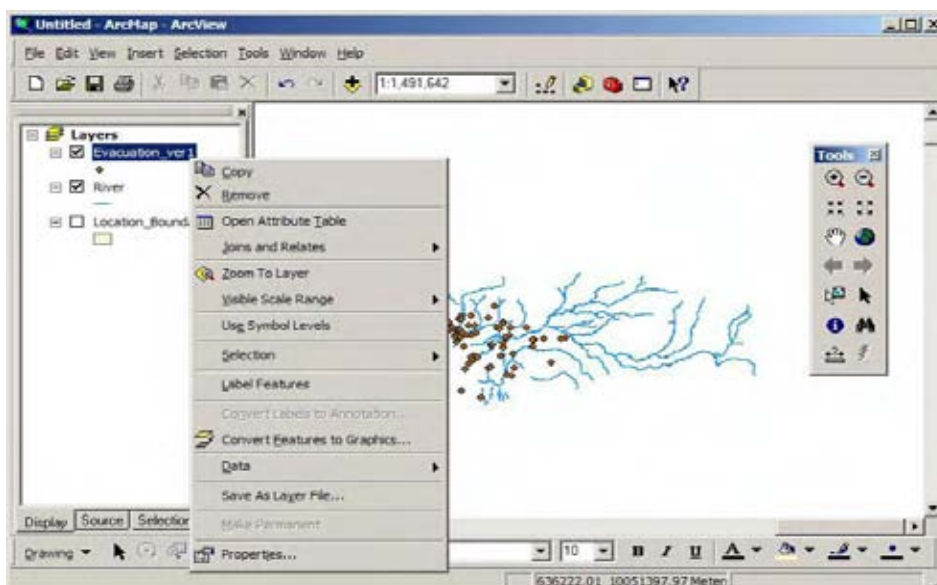
5   In the table of contents, click on the check box next to the layer name to turn if off. In the map display, selected layer disappear from the map.

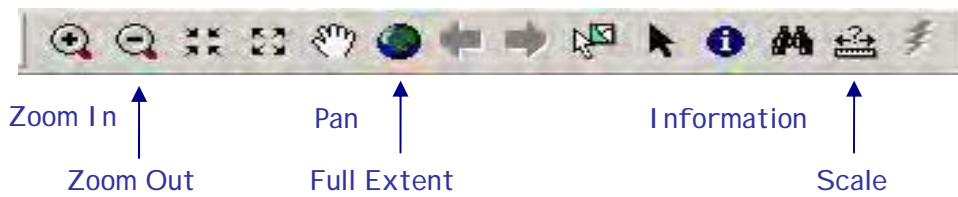In the table of contents, click on the check box next to the layer name to it on as well.
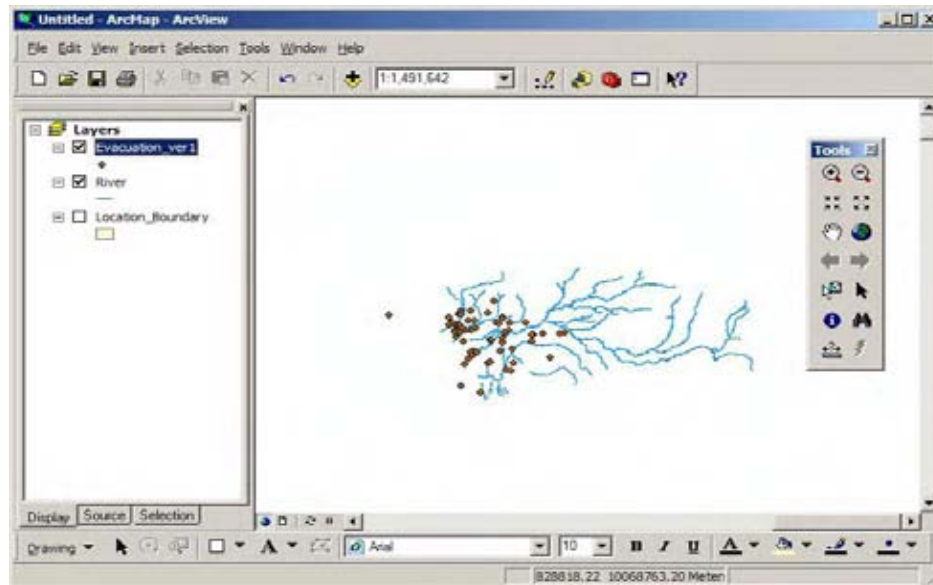
6   In the table of contents, right-click on the layer name. A context menu opens. Many ArcMap operations are started from context menu.

7

On the "Toolsbar", there are many menus. For example, you can select the Zoom In tool, then drag box where you want to zoom in, approximately you can see the detailed scale map on the "Map display". If you make mistake, click either the Full Extent or Go Back To Previous buttons and try again.

Zoom In   Pan   Information

Zoom Out   Full Extent   Scale

8

In the table of contents, right-click on the layer name and click "Zoom to Layer". You can see a full extend data of your selected layer.
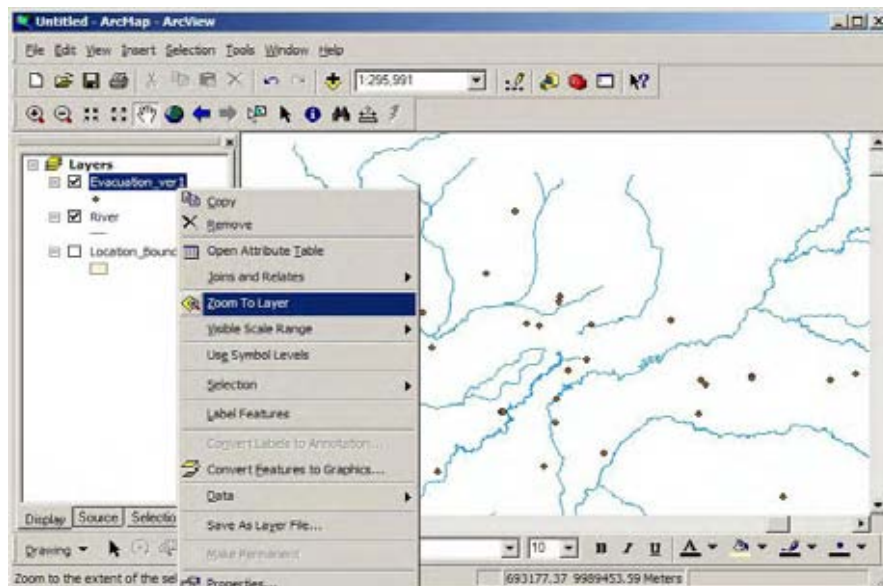
8   ***Check the attribute table data***   On the Tools toolbar, right-click on the layer name and click Open Attribute Tables. On the graphic, you can see records, one line for each data (feature).

10   ***Change the symbols***   In the Table of contents, right-click the layer and click Properties. The Layer Properties dialog opens. Click the Symbology tab.

11 ***Change the symbols according to the attribute table*** Make sure the Value Field drop-down list is set to the selected Field. At the bottom of the dialog, click Add All Values. If you want to change color, you can select "Color Scheme" bar or directory select each value then double-click and change color.
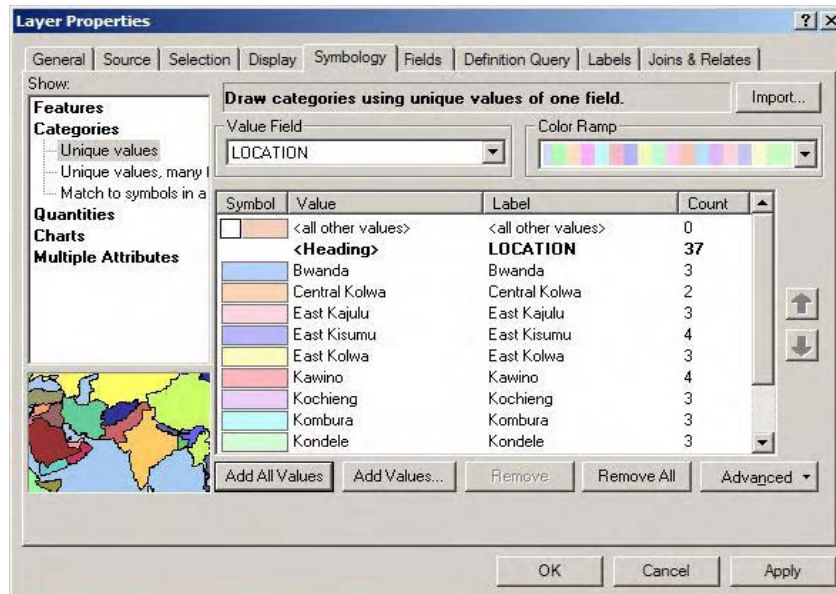
CHAPTER 2

Open Existing GIS Map

In this Chapter, you'll learn how to display GIS maps in ArcMap. A lot of GIS maps made for this study are included in this database.

1 Start ArcMap by double-clicking the ArcMap icon on your computer desktop. Alternatively click the Start buttom on the Windows taskbar -> Programs -> ArcGIS, and click ArcMap.

2 When ArcMap opens, you see the ArcMap dialog on top of the application windows. In the ArcMap dialog, click the option to start using ArcMap with "An existing map".

3　In the Open dialog, navigate to *C:¥ GIS DataBase¥ 06-GIS¥ 07-Mxd*

On the Standard toolbar, click the Add Data button. Select the mxd file which you want to open and click Open.
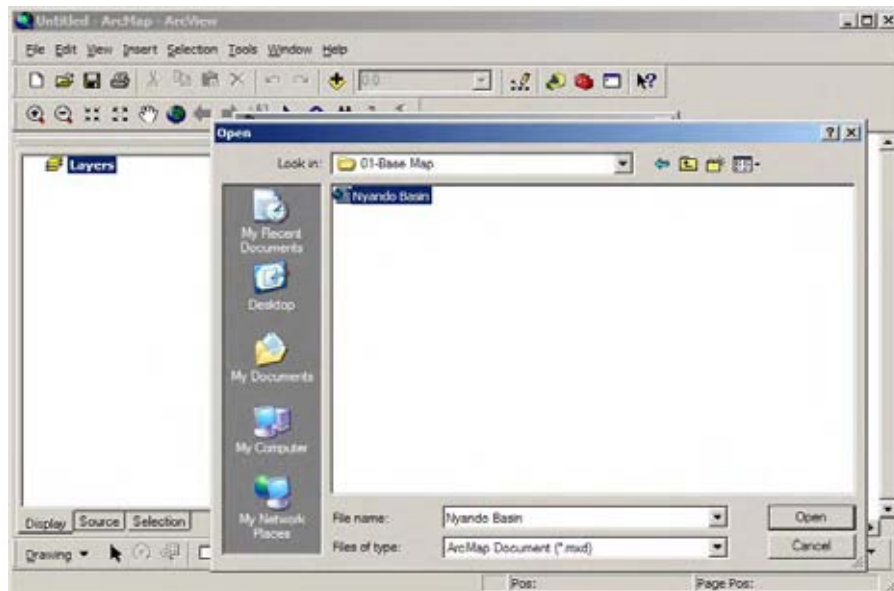
4　The map document opens. The table of contents lists the names of the layers in this map. It shows the color or symbol used to draw each layer
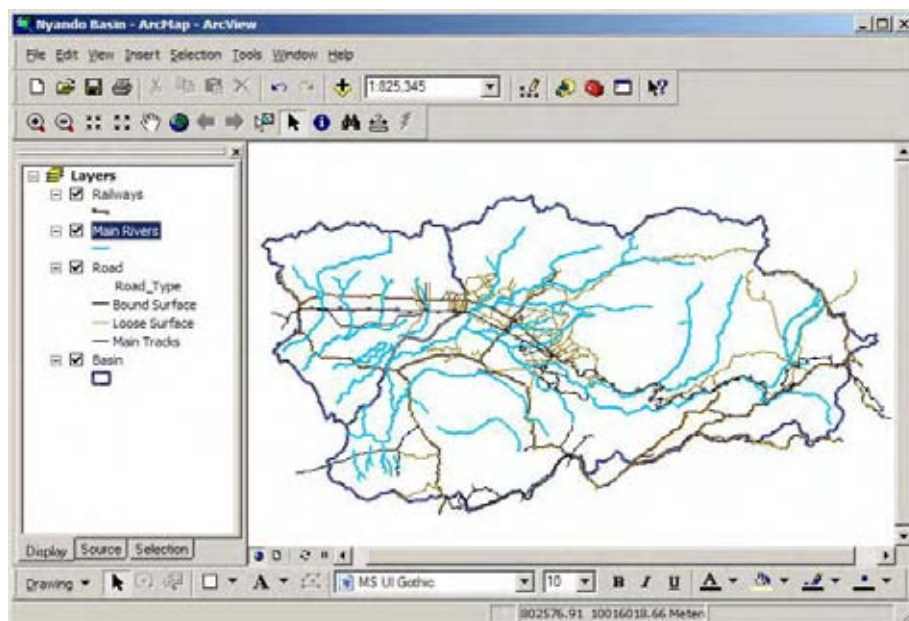
CHAPTER 3
Print GIS Map and Export to the Image format

In this Chapter, you'll learn how to print out GIS maps in ArcMap, and export GIS Maps to the image format.

-Notice-

If you want to distribute the map that you made in ArcGIS to the person who doesn't have GIS software, you can prepare as a paper map or digital image data. You can export GIS map to the multipurpose image format such as jpeg, gif, tiff, etc. this image data you can also use as a presentation material.

| **1** | ***Printout GIS Map***   Start ArcMap. In the ArcMap dialog, click the option to use an existing map. In the list of existing maps, double-click Brows for maps. Navigate to ***C:¥ GIS DataBase¥ 06-GIS ¥07-Mxd*** and select the mxd file which you want to open and click Open. |
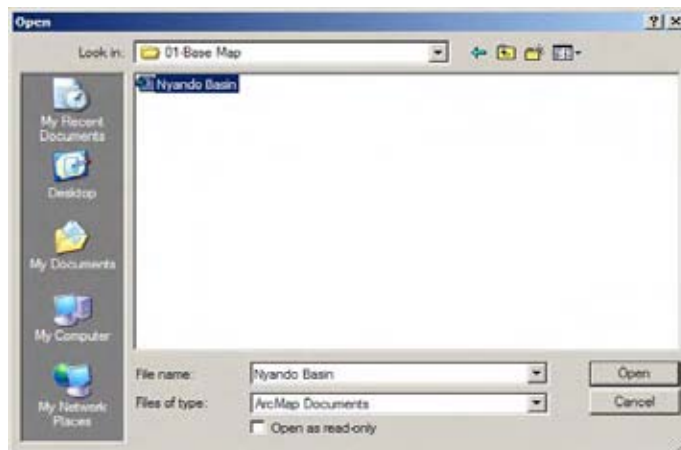
Chapter 3
Print and Export GIS Map to the Image format

2   The map opens in the layout view. If you click Data View, you can back to the normal window.
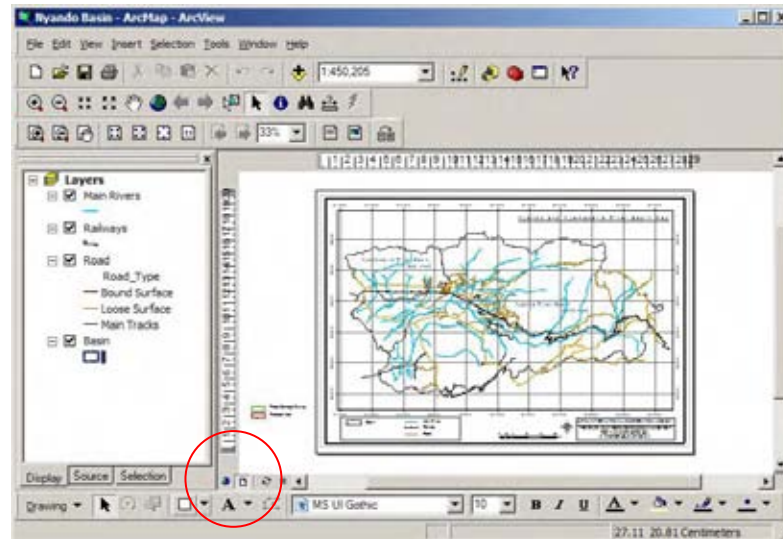
3   In the layout view window, you can see the existing maps which uses in this project. These maps are already set up the map layout such as colors, scale, paper size, etc.
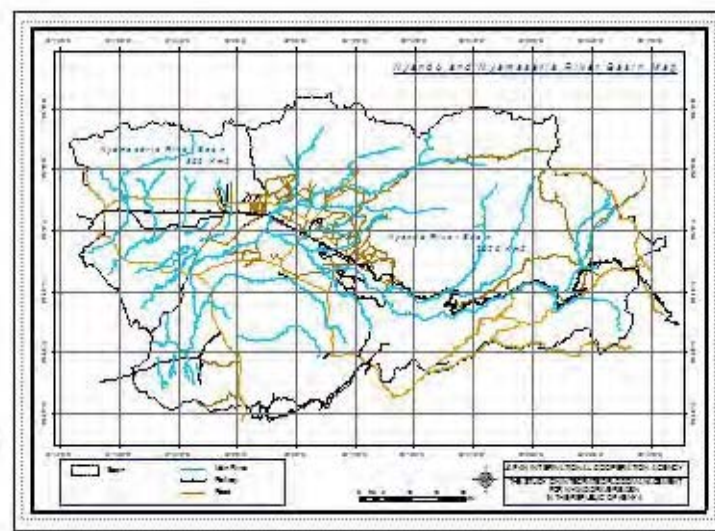
4 Select File on the tool bar, click the Printer. Before start printing, check the paper size, and Portlate or Landscape. It is better to check the preview window to confirm the finarized map.

5 ***Export GIS Map to Image file*** Using ArcMap, you can export your map to the image data. In the Main tool bar, select file -> Export Map.

6 Select the folder where you want to save your map image and type the image map name. The default name is the same with mxd file name. After type the name, you can select image format. Using the pull down menu, you can select the image format, such as jpeg, tiff, gif, etc.
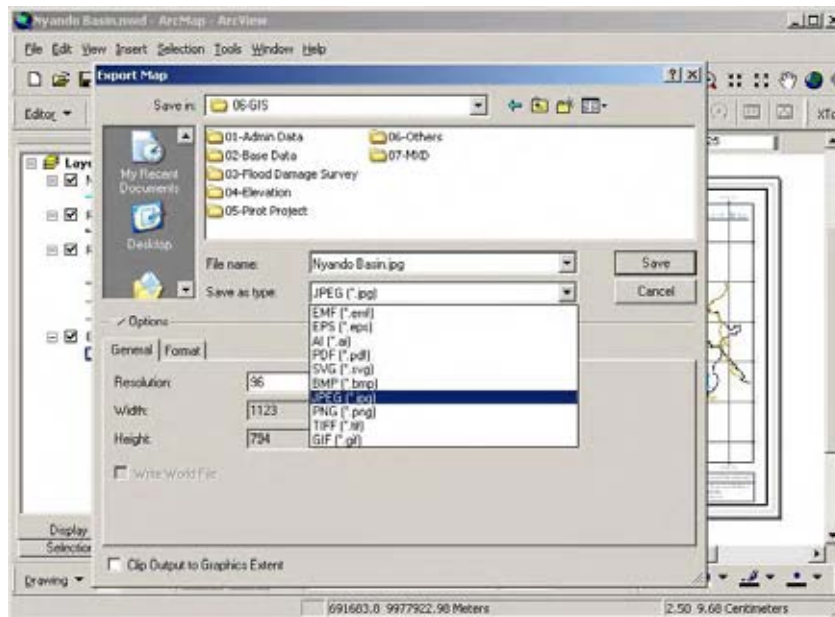
7 After selection of the image format, you can select the map quality such as resolution, Color mode, etc. Depends on such functions, exported image size is decided.
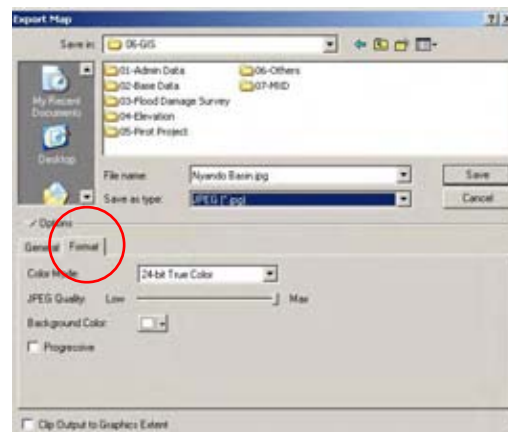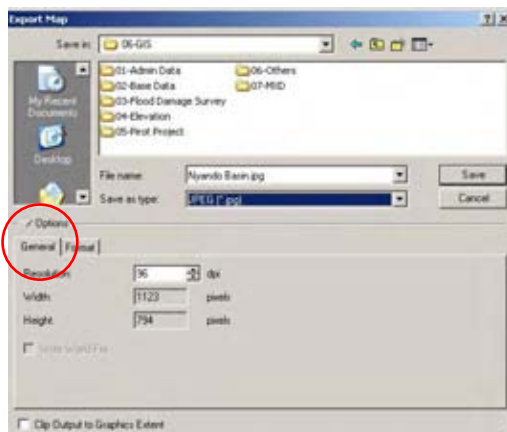
CHAPTER 4
Edit and Update GIS Data

In this Chapter, you'll learn how to modify GIS vector data in ArcMap. You'll use line and polygon data as an example of editing, and learn the usage of the Editor tool.

-Notice-

This database was created in June 2007. If users need to modify data or create new data, users must be follow this manual and GIS training text.

-Maintenance of GIS Database-

Creating new features is one part of maintenance of the database. Another part, equally important, is updating to existing features. Features can be changed in several ways according to the time passage. They can be added, deleted, shifted, and merged, etc. When futures are edited, their attributes data must to be updated as well.

-Rules of Edit data-

1   Do not edit the Original GIS data
2   Before edit the Original GIS data, it is necesarry to make the copy of data
3   A comprehensible name is applied to the new data

| 1 | Start ArcCatalog by double-clicking the ArcCatalog icon on your computer desktop. Alternatively click the Start button on the Windows taskbar -> Programs -> ArcGIS, and click ArcCatalog. |

2 In the ArcCatalog dialog, navigate to *C:¥ GIS DataBase¥ 06-GIS* and select the shape file which you want to edit.
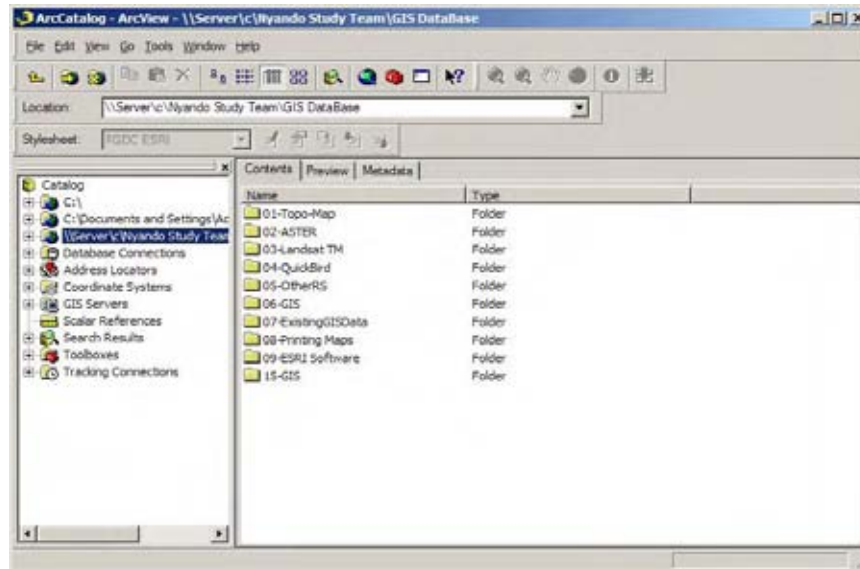
3 In the Contents window, right-click the selected layer and click Copy. Alternatively click the Edit button on the Standard Tool bar and click Copy.
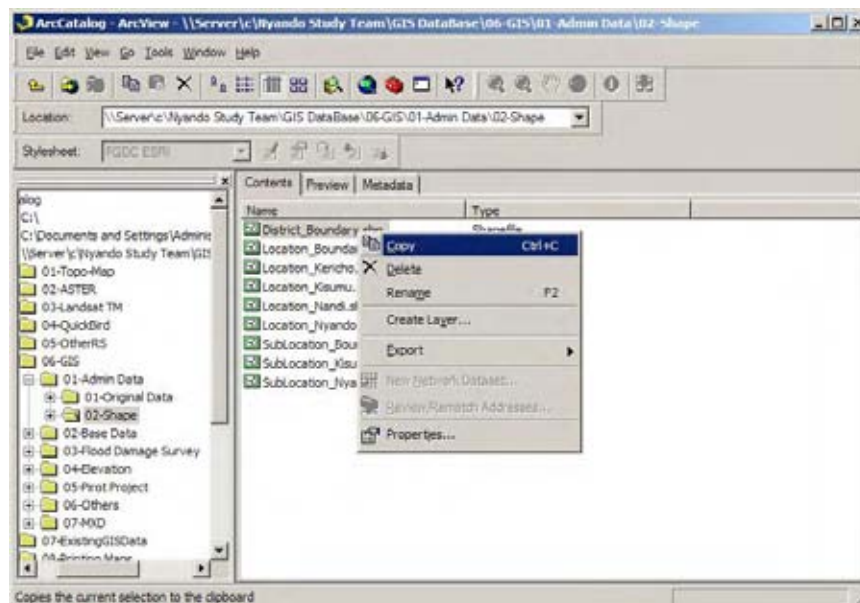
4　In the Contents window right-click and click Paste. Alternatively click the Edit button on the Standard Tool bar and click Paste to make a copy shape file. Original Copied file name is "Original Name+Copy.shp" (ex; Road.shp -> RoadCopy.shp).
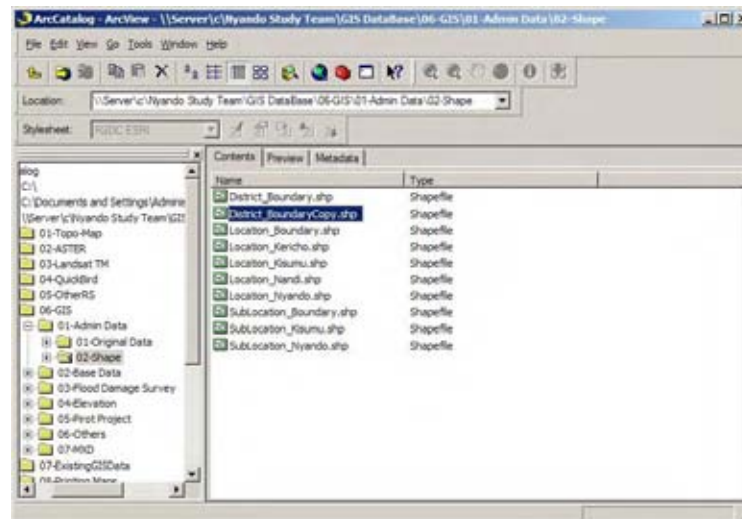
5　In the Contents window, select the copied file. Right-click and click Rename. Users can input the new name. If users do not input the extension (shp), ArcCatalog automatically input the extension.

6 Start ArcMap. On the Standard Toolbar, click the Add Data button. In the Add Data Dialogm navigate to *C:¥ GIS DataBase¥ 06-GIS* and select the copied shape file which you want to edit and click Add.
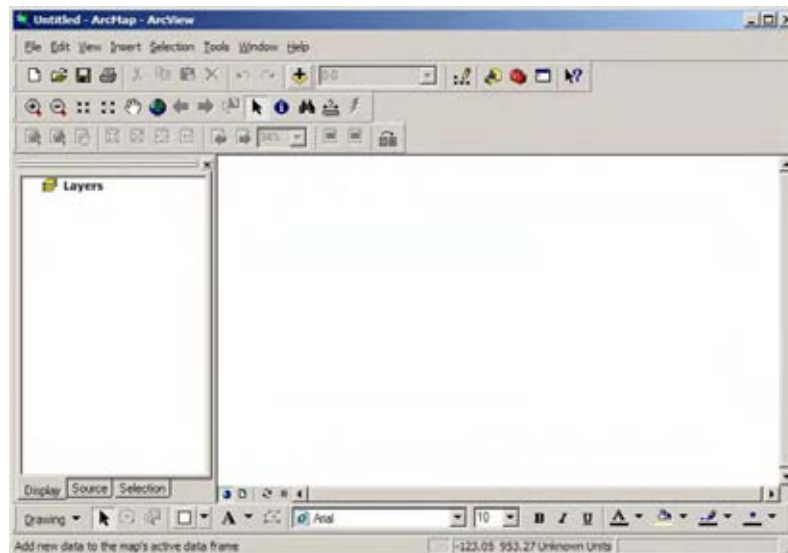
7 On the Editor toolbar, click the Editor menu and click Start Editing. This manual shows samples of editing the line data (Road.shp) and polygon data (Admin.shp). First you have to check Task window. The shape file which you want to edit is must be selected on this window.
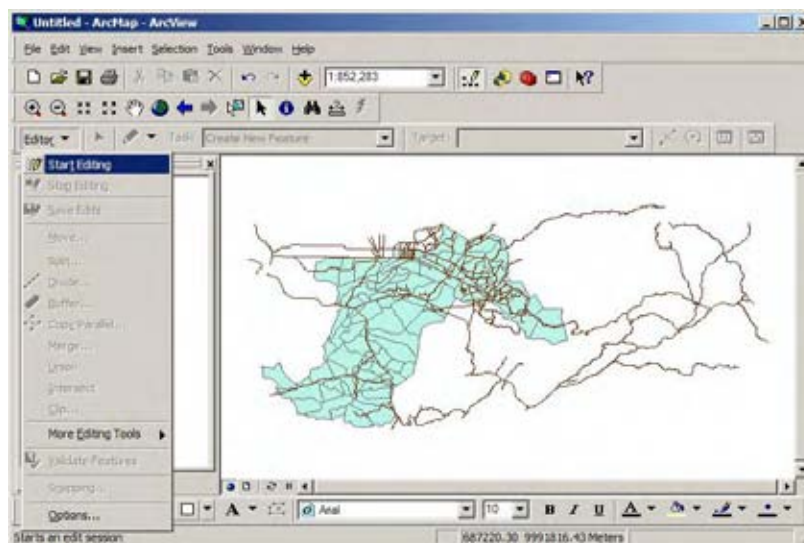
8 Select "Road.shp". The following graphic shows 3 types of line data editing methods. Vertex move, Delete vertex and Add new vertex.

Select Target Shape file
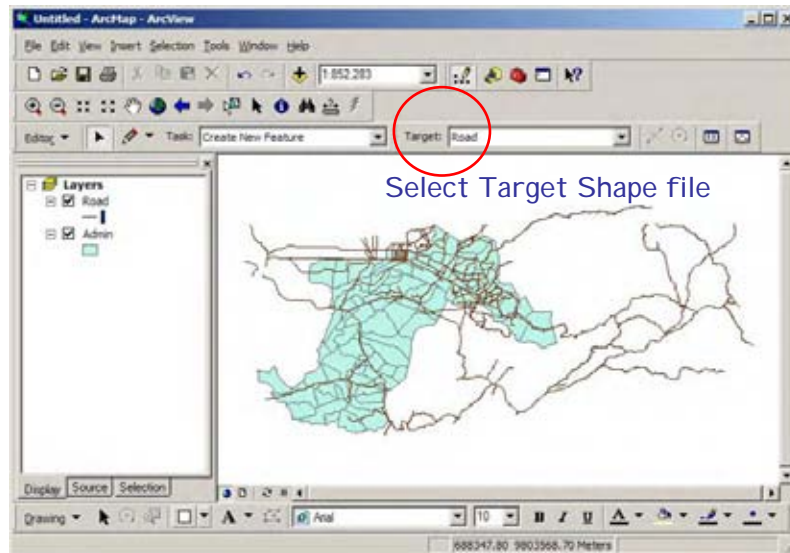
9 *Vertex move* Double-click anywhere on the line to select it and display its edit sketch. On the edit sketch, the vertices are green squares. Place the cursor over the vertex to be moved. The cursor change to a four-headed arrow. Drag the vertex where you want to set and release the mouse button.

Sketch Tool
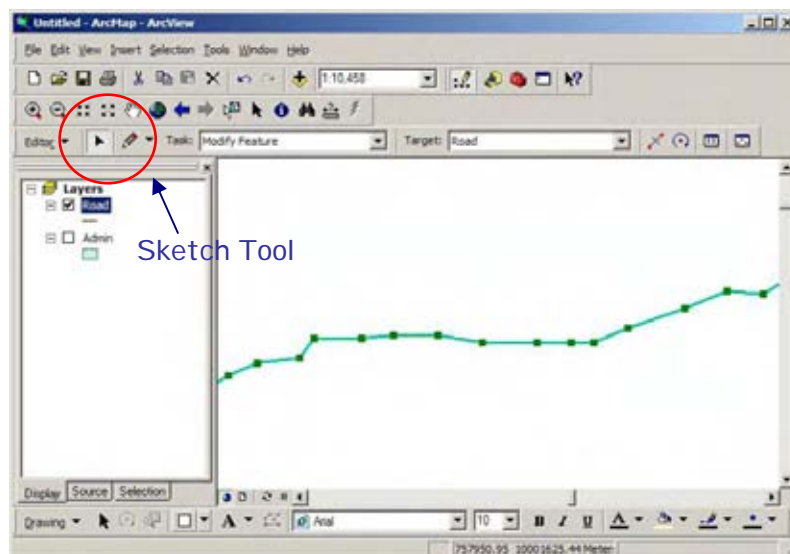
10	*Delete Vertex* Double-click anywhere on the line to select it and display its edit sketch. Right-click on the vertex which you want to delete. On the context menu, click Delete Vertex.
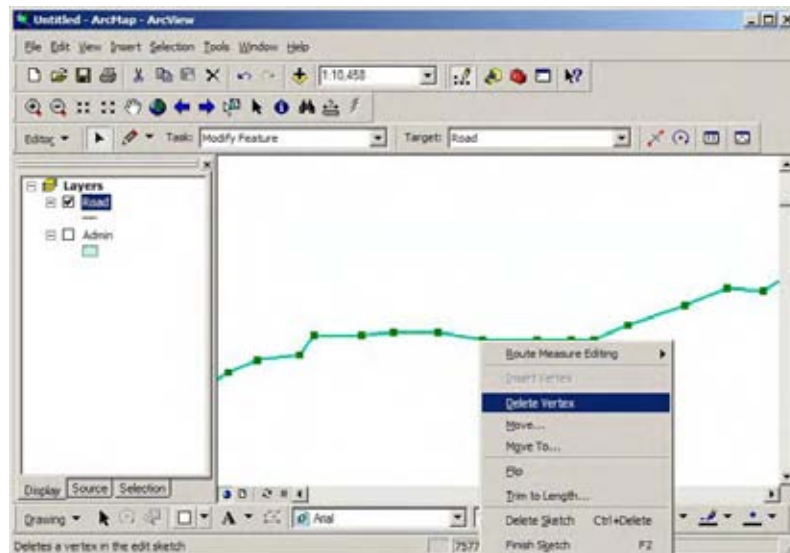
11	*Add New Vertex* Right-click on the green line about where the arrow is in the following graphic. On the context menu, click Insert Vertex. A new vertex is added where you clicked.
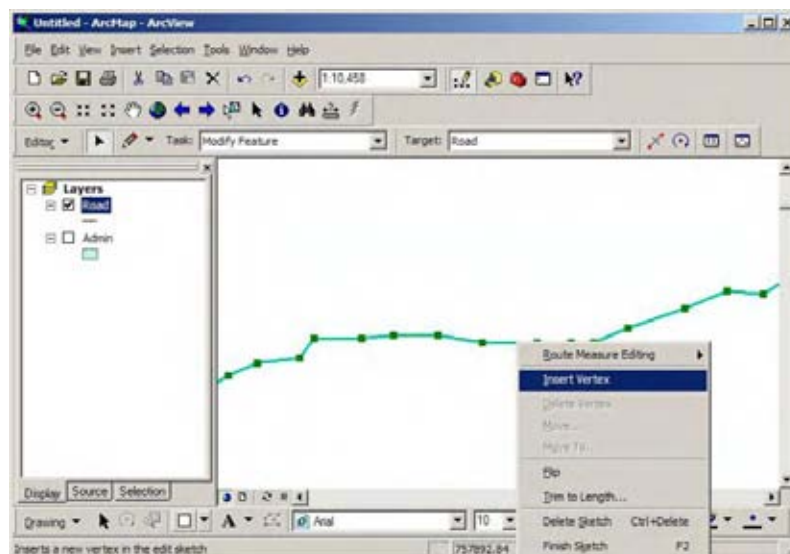
12 Select "Admin.shp". The following graphic shows 2 types of polygon data editing methods. Merge and Split features and edit attribute tables.
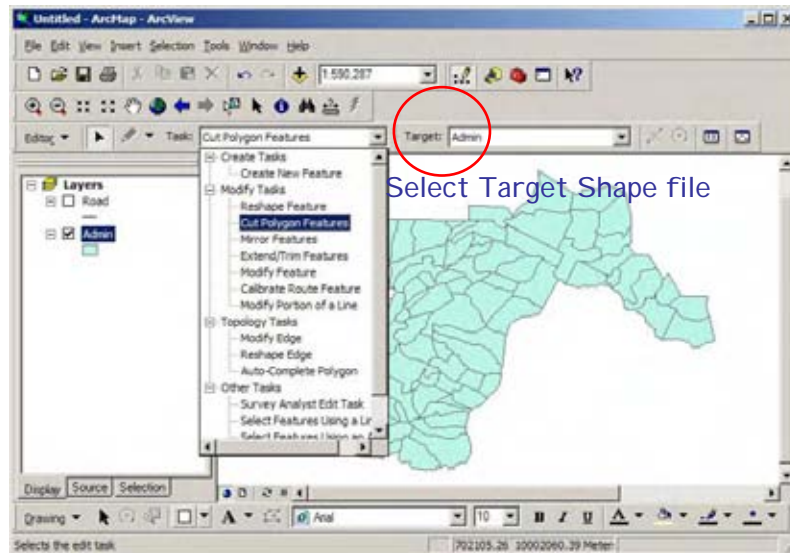
13 *Merge Polygon* On the Editor toolbar, click the Edit tool. Click anywhere on one polygon to select it. Hold down the Shift key and click on the adjoined polygon to select it as well. On the Editor toolbar, click the Editor menu and click Merge. The two polygon become one.
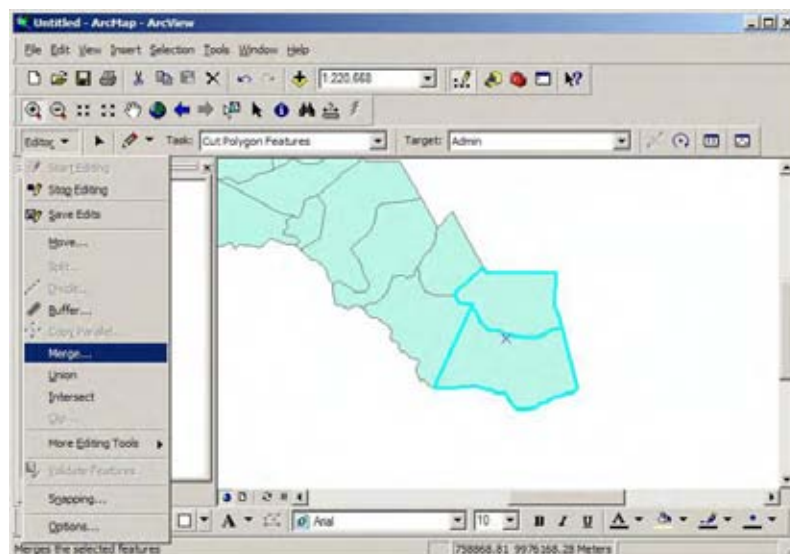
| **13** | **Split Polygon**   Click anywhere on the polygon to select it and display its selected color. On the Editor toolbar, click the Task drop-down list and click Cut Polygon Features. Click the Sketch tool. The parcel is split in two. Each polygon has the same attribute data. In the next step, you'll update the attribute table for the new polygon. |

| **14** | **Edit Table**   On the Tools toolbar, right-click on the after split polygon and click Open Attribute Tables. You can find two same ID data. After split or merge polygon, you have to assigne new OBJECTID number and need to update other attribute data. |
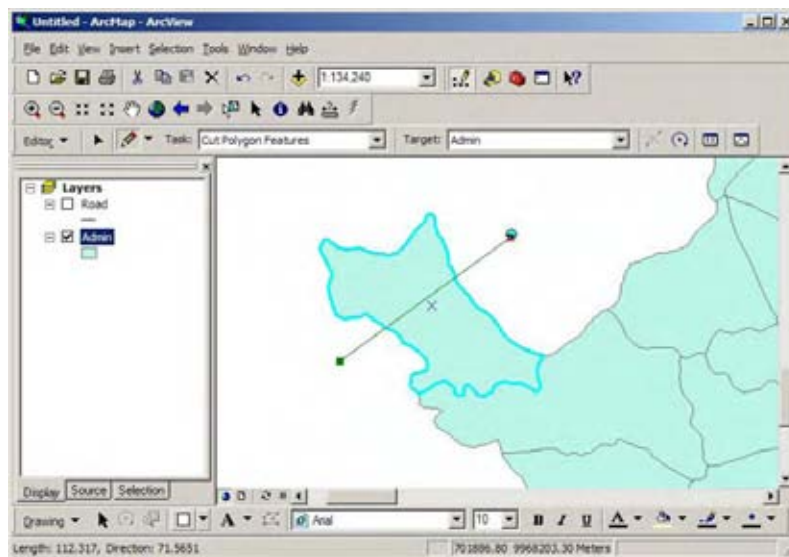
Same ID
-> Split polygon

15   ***Edit Table***   Click on the new polygon which you create to select it. In the Attribute Table, click Selected at the bottom of the table of the table to display selected two records. Click in the cell for the ID field. Highlight and delete the existing value and type new ID and press Enter.
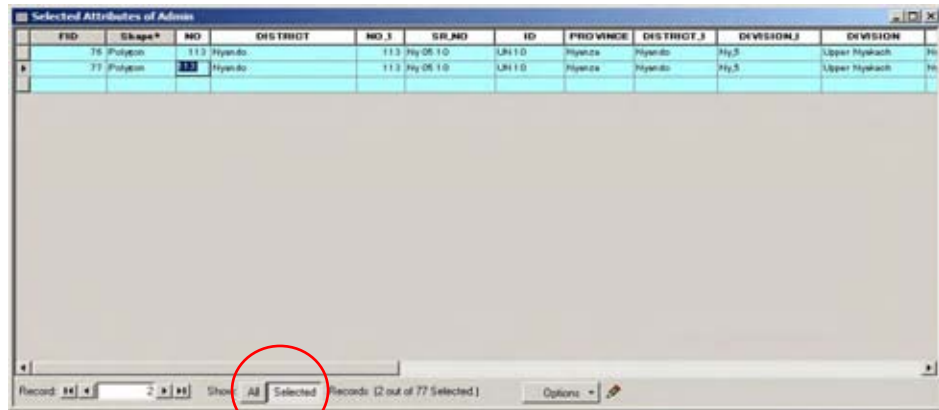
16   ***Save Edit***   On the Editor toolbar, click the Editor menu and click Save Edits and Stop Editing. Click Yes to save your edits, which include feature editing and attribute table editing.
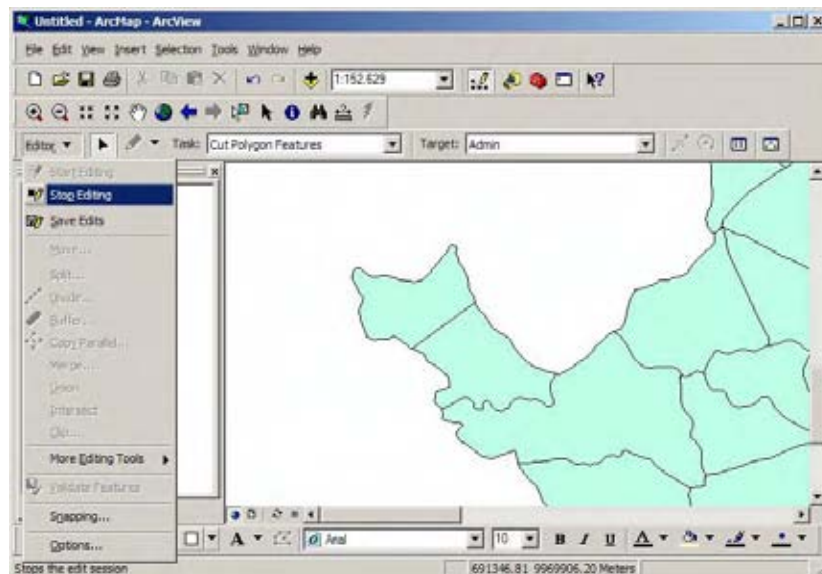
| 17 | At the bottom of the Selected Attributes table, click All. You can see all the data attribute table of selected polygon. |

CHAPTER 5
Create New GIS Data

In this Chapter, you'll learn how to create a new GIS vector data in ArcMap. You'll learn the usage of ArcCatalog and adopt the coordination system to new GIS data.

-Rules of Creating New GIS data-

1. New vector data must be attached the same coordination system with the existing data (UTM 36S WGS1984)
2. It is necessary to apply the attribute information to the new vector data.
3. A comprehensible name is need to apply to the new data

| 1 | Start ArcCatalog by double-clicking the ArcCatalog icon on your computer desktop. Alternatively click the Start button on the Windows taskbar -> Programs -> ArcGIS, and click ArcCatalog. |

| **2** | In the ArcCatalog dialog, navigate to **C:¥ GIS DataBase¥ 06-GIS** and select the folder where you want to create a new GIS vector data. In the ArcGatalog Tree, Right-click selected folder, point to New, and click Shapefile. |

| **3** | Create New Shapefile box opens. You will give the comprehensible name in the name tub, then select Feature Type Point, Line, Polygon or MultiPoint data. |
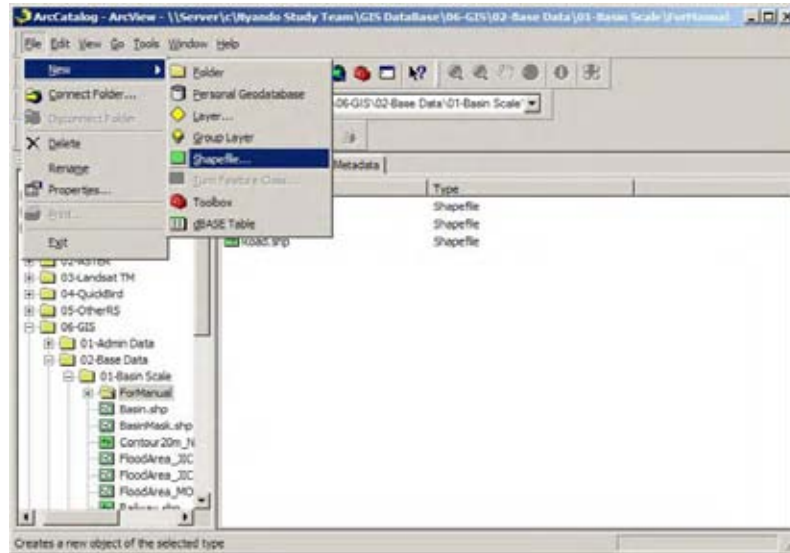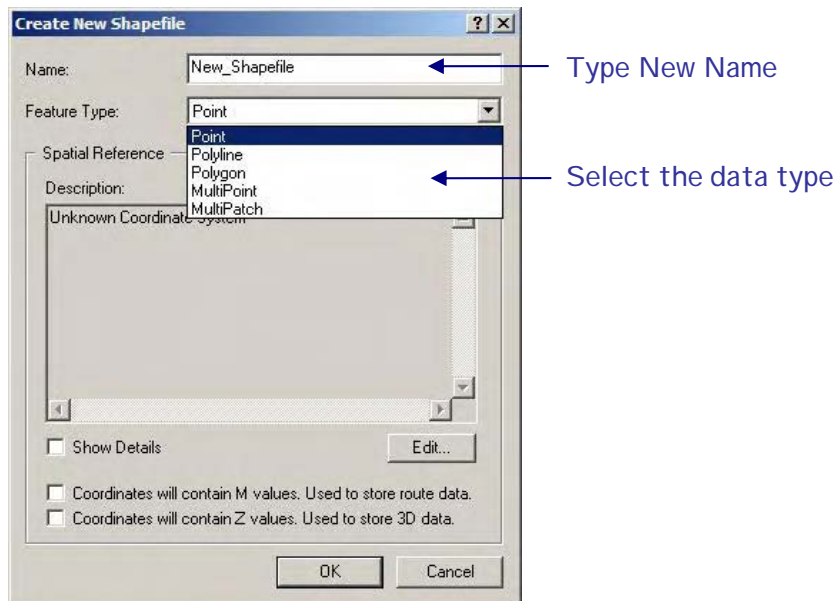
4 The Spatial Reference field property is set to Unknown. New shape file should have the same spatial reference with the existing GIS data. You will apply the spatial reference in two ways.

Method 1;
Select new Spatial Reference -> See step 5

Method 2;
Import coordination system -> See step 7
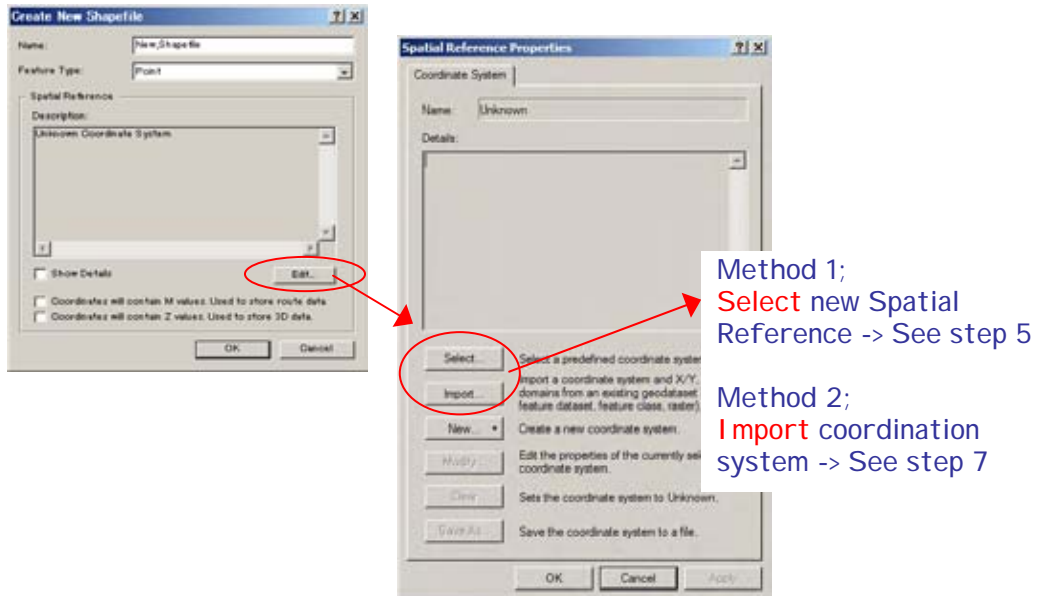
5 *Select new Spatial Reference* In the Create New Shapefile dialog, click "select" tub to set new Spatial Reference.

5 Click Select tub and select Projected Coordinate System -> Utm -> Wgs 1984 -> WGS 1984 UTM Zone 36S.prj and Add. In this database, all GIS data set have the same coordination System, therefore new data should follow the same coordination system.
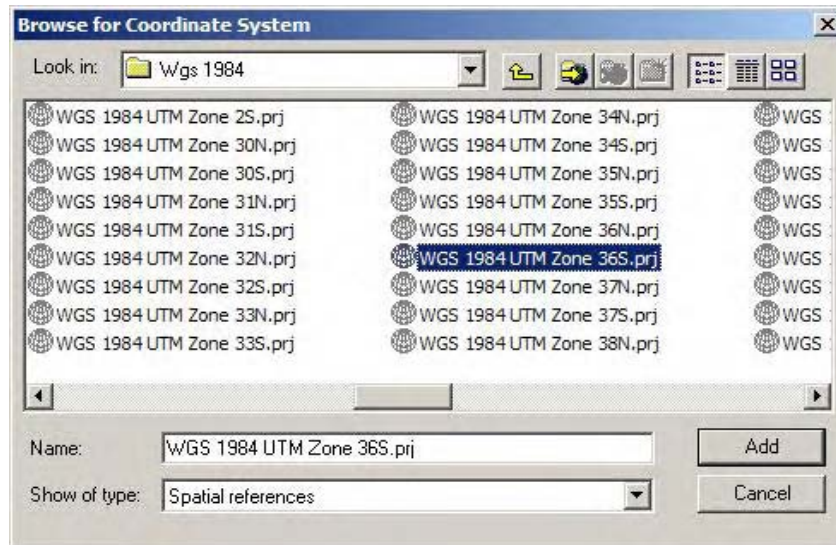
6 The Spatial Reference Properties Dialog is updated with the coordinate system information.

7	***Import coordination system from existing data*** Select "Import" tub and select existing GIS shape file from database and Add. .
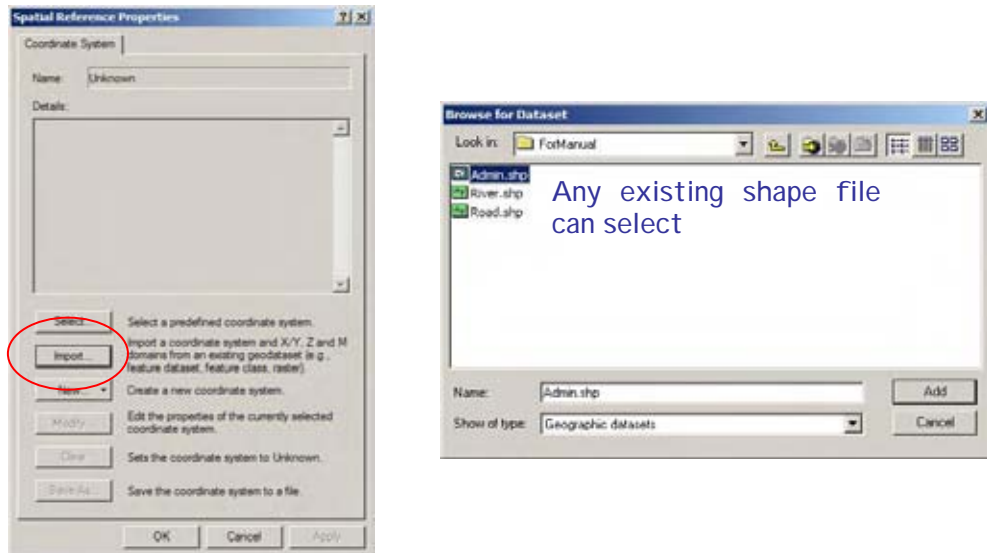
8	Spatial Reference Properties dialog is updated with the coordinate system information. This coordinate system information is the same with the existing shape file.
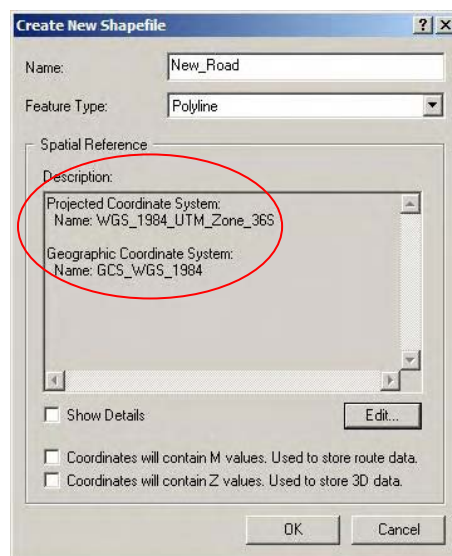
9   Click OK in the Create New Shape file dialog. New Shape file is created in the ArcCatalog contents window..
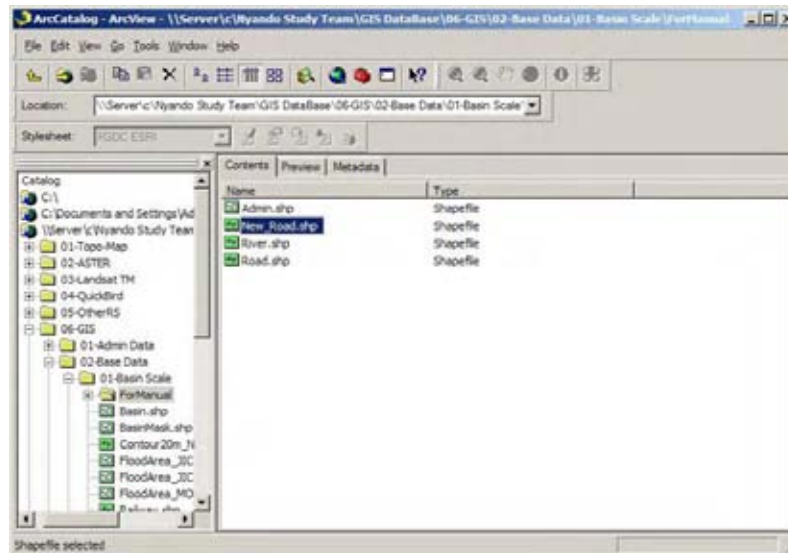
10   *Add New Shape file*   Open ArcGIS and Click the View menu and click Data View. On the Standard toolbar, click the Add Data button. In the Add Data dialog, navigate to *C:¥ GIS DataBase¥ 06-GIS* and select the new shape file which you want to edit and click Add.
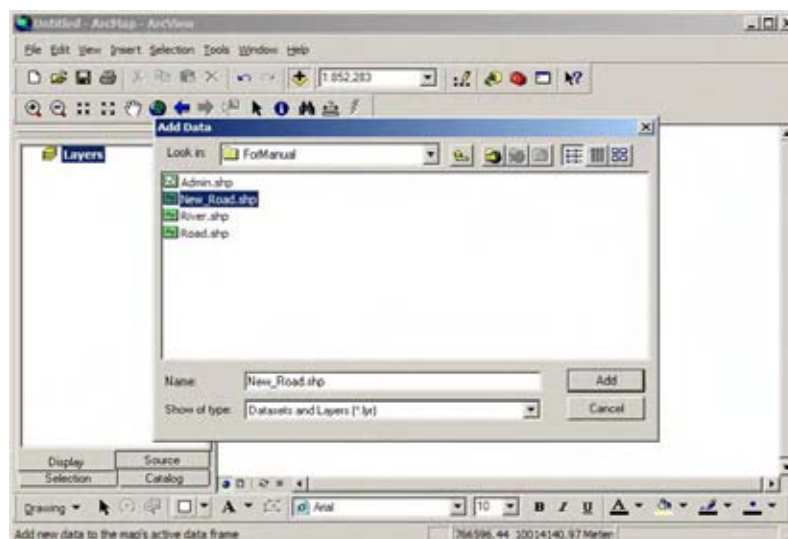
11 New empty shape file opens. If Editor tool bar is not open, Click on the View -> Toolbars -> Editor. Editor tool bar opens.

12 Click on the Editor bar, select Start Editing to create the new feature. Click the Sketch tool, you'll create new feature.
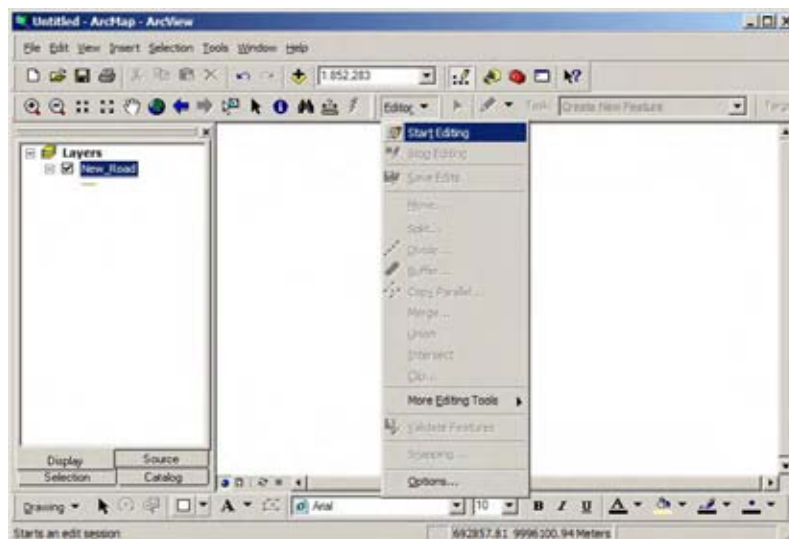
13   **_Stop Editing_**   On the Editor toolbar, click the Editor menu and click Stop Editing Click Yes to save your edits.
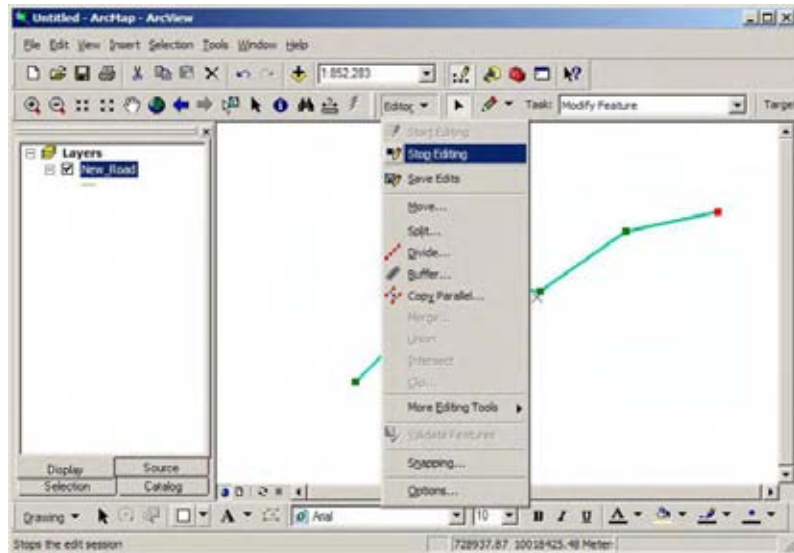
Edit the attribute table is refer to the Chapter 4, Step 14 to 17 (Page 20 to 22)

CHAPTER 6
Edit and Update Existing GIS Map

In this Chapter, you'll learn how to edit an existing GIS map in ArcMap. Here five (5) methods of editing and update the mxd file are shown as an example of updating the map.

-Rules of Update GIS Map-

1 Do not edit the Original GIS Map (msd file)

2 Before edit the Original GIS data, it is necesarry to make the copy of existing mxd file

3 A comprehensible name is need to apply to the new mxd file

| 1 | Start ArcMap by double-clicking the ArcMap icon on your computer desktop. Alternatively click the Start buttom on the Windows taskbar -> Programs -> ArcGIS, and click ArcMap. |

| 2 | When ArcMap opens, you see the ArcMap dialog on top of the application windows. In the ArcMap dialog, click the option to start using ArcMap with "An existing map". |

3

In the Open dialog, navigate to *C:¥ GIS DataBase¥ 06-GIS¥07-Mxd*

On the Standard toolbar, click the Add Data button. Select the mxd file which you want to update and click Open.
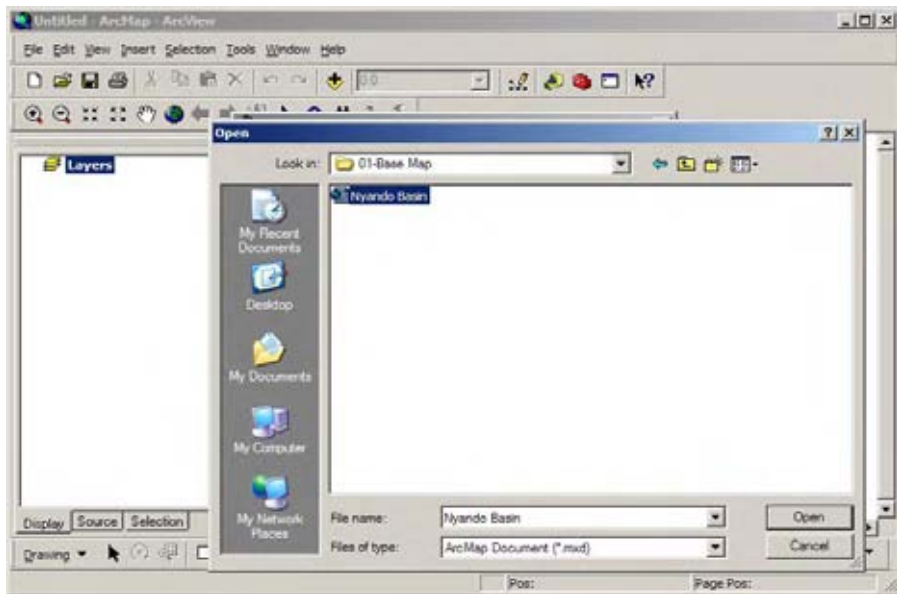
4

1. Delete the displayed data   If you don't use the feature on the existing map, you can remove features from maps. Select the feature on the Table of contents, Right-click and select Remove.
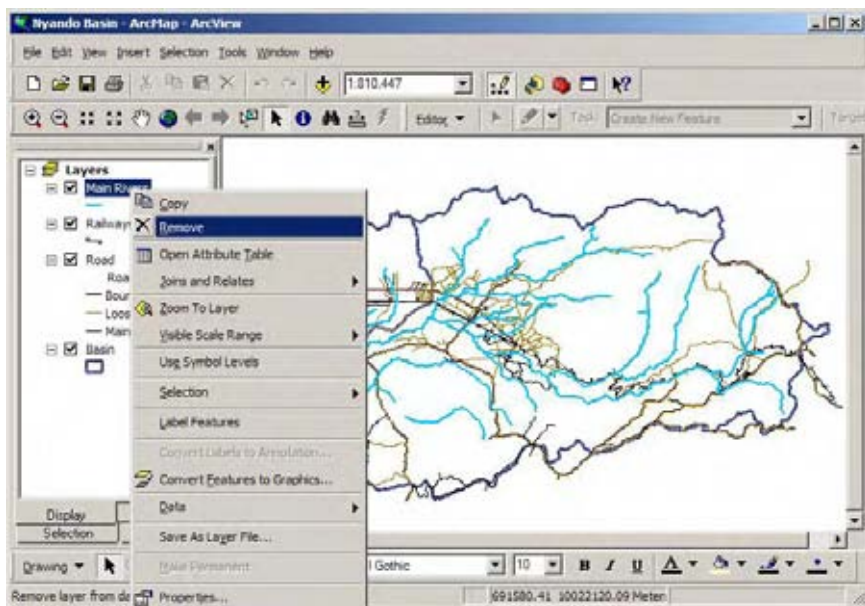
5

2. Add new feature to the map   If you want to create new thematic maps, add some features to the existing map and create new maps. On the Standard Toolbar, click Add Data button. In the Add data dialog, navigate to *C:¥ GIS DataBase¥ 06-GIS*, select shape file you want to add on the map, then click Add.
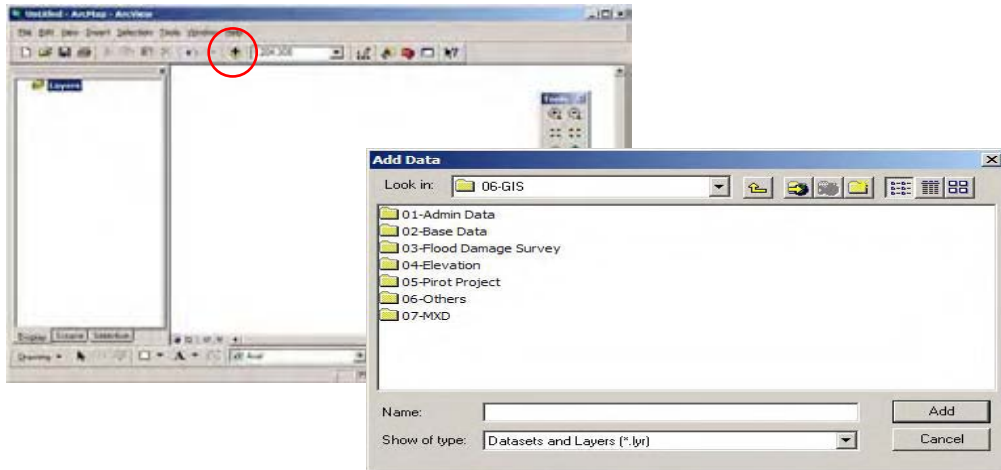
6

3. Change Scale   If you want to change the map scale, you can use Zoom In / Zoom out tool on the Standard toolbar. You also can use Map Scale to change the scale of existing maps, directory type the new scale or select the scale from the pull down menu.
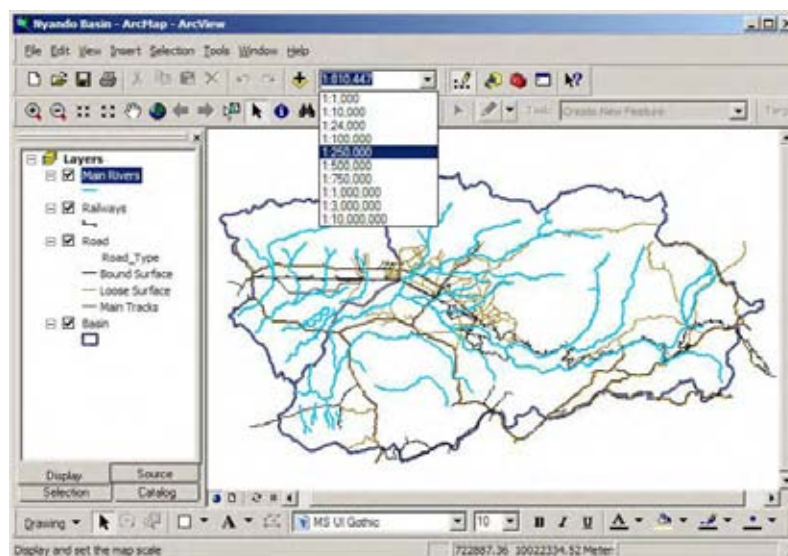
7

4. Change symbols One feature has many attribute data (ex, Flood damage survey result, etc.) If you change symbols of the feature using attribute table, you can create new thematic map.
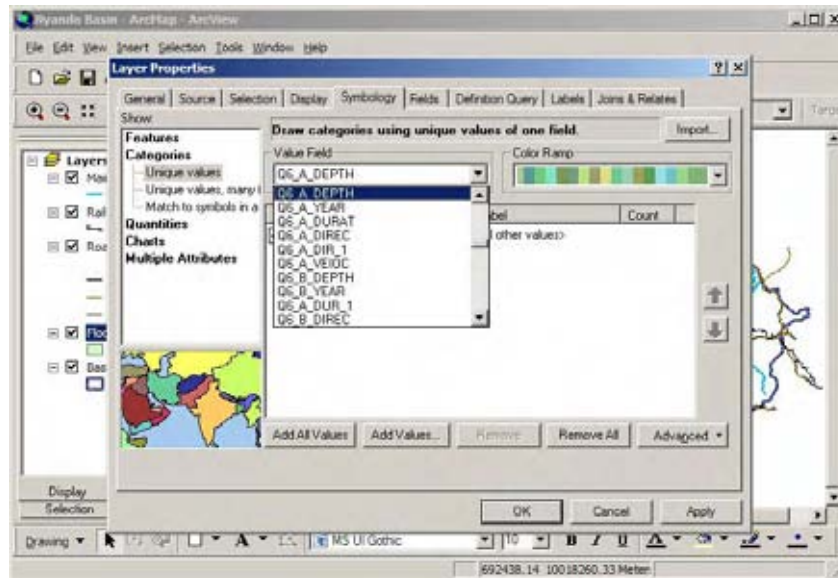
8

5. Save as Whenever making the map layout is finished, you must not select save. It is necessary to select save as. It is necessary to apply an appropriate name to new maps that the content of the thematic map is easily understand.
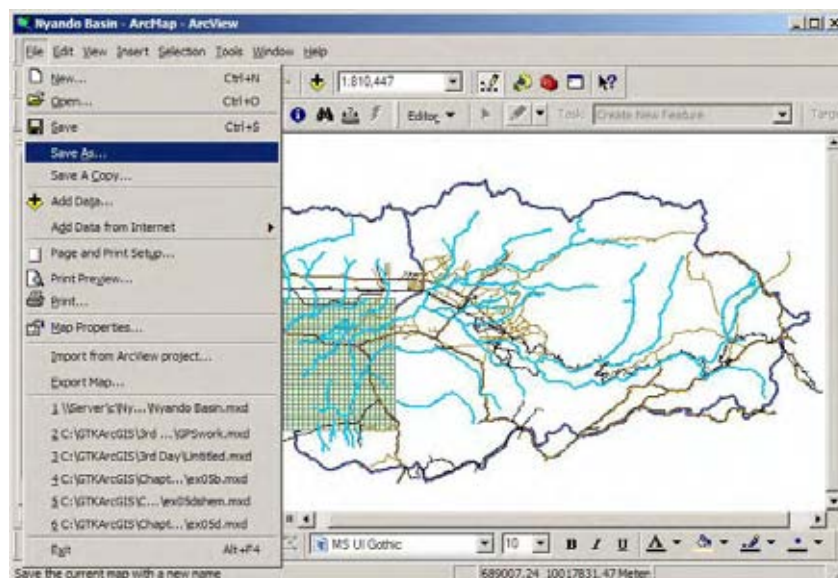
CHAPTER 7
GIS Database Structure

This chapter shows the database structure of this study.

This database has eight (8) main folders, 1-5 are the raster dataset (Topographical map, ASTER, Landsat TM, QuickBird, and SRTM satellite), 6 is vector data (Point, Line and Polygon shape format data), 7 is mxd file (Map layout file), and 8 is exported image (jpg format) maps. The total volume of this dataset is 40.6 giga bytes (GB)

If the user does not have GIS software, they can use only 8 (image) folder data. The volume of exported image dataset is 4.8 giga bytes (GB).

-Rules of Edit database-

1 Do not change the existing database structure including the name of the folder. (Mxd files doesn't open when the database structure including the name of the folder is changed)

2 If the user adds a new folder to the database, the user should add it to the Excel file (GISDatabase.xls) that shows the database structure.

The database structure at the time of June, 2007 is shown from the subsequent page (the same data with "GISDatabase.xls").

Chapter 7
GIS Database Structure

C¥ GIS DataBase¥

Folder		Data Name	Data Descriotion
01-Topo Map	01-Original Data	BELGUT-117-3.jpg	Scanned original Topographical map
		KAIMOSI-102-4.jpg	Scanned original Topographical map
		KAPSABET-103-3.jpg	Scanned original Topographical map
		KERICHO-117-4.jpg	Scanned original Topographical map
		KERINGET-118-3.jpg	Scanned original Topographical map
		KISMU EAST-116-2NEW.jpg	Scanned original Topographical map
		KISUMU EAST-116-2.jpg	Scanned original Topographical map
		KISUMU WEST-116-1.jpg	Scanned original Topographical map
		LONDIANI-118-1.jpg	Scanned original Topographical map
		LUMBWA-117-2.jpg	Scanned original Topographical map
		MUHORONI-117-1.jpg	Scanned original Topographical map
		NORTH TINDERET-103-4.jpg	Scanned original Topographical map
		NYAKATCH-116-4.jpg	Scanned original Topographical map
		TIMBOROA-104-3.jpg	Scanned original Topographical map

Folder		Data Name	Data Descriotion
02-ASTER	01-Original Data	PRDAT011.DAT	ASTER Original Data Format
		PRDAT012.DAT	ASTER Original Data Format
		PRDAT021.DAT	ASTER Original Data Format
		PRDAT031.DAT	ASTER Original Data Format
		Global Attributes for PRDAT011.txt	ASTER meta data
		Global Attributes for PRDAT012.txt	ASTER meta data
		Global Attributes for PRDAT021.txt	ASTER meta data
		Global Attributes for PRDAT031.txt	ASTER meta data
	02-GeoTiff Image	prdat011 Map Production UTM36S Arc1960.tif	GIS image format with tiffw file.
		prdat012 Map Production UTM36S Arc1960.tif	GIS image format with tiffw file.
		prdat021 Map Production UTM36S Arc1960.tif	GIS image format with tiffw file.
		prdat031 Map Production UTM36S Arc1960.tif	GIS image format with tiffw file.
	03-DEM	Full Nyando DEM Mosaic	20m Grid Elevation data from ASTER
		Full Nyando DEM 3x3 Smooth	20m Grid Elevation data from ASTER make 3x3 Smooth
	04-GIS	ASTERIndex.shp	Index Map of ASTER Satellite Image

Folder		Data Name	Data Description
03-Landsat TM	01-Original Data	¥1986¥169060¥p169r60_5t860128_nn1.tif	Landsat TM Original data -Band1-
		¥1986¥169060¥p169r60_5t860128_nn2.tif	Landsat TM Original data -Band2-
		¥1986¥169060¥p169r60_5t860128_nn3.tif	Landsat TM Original data -Band3-
		¥1986¥169060¥p169r60_5t860128_nn4.tif	Landsat TM Original data -Band4-
		¥1986¥169060¥p169r60_5t860128_nn5.tif	Landsat TM Original data -Band5-
		¥1986¥169060¥p169r60_5t860128_nn6.tif	Landsat TM Original data -Band6-
		¥1986¥169060¥p169r60_5t860128_nn7.tif	Landsat TM Original data -Band7-
		¥1986¥170060¥p170r60_5t860308_nn1.tif	Landsat TM Original data -Band1-
		¥1986¥170060¥p170r60_5t860308_nn2.tif	Landsat TM Original data -Band2-
		¥1986¥170060¥p170r60_5t860308_nn3.tif	Landsat TM Original data -Band3-
		¥1986¥170060¥p170r60_5t860308_nn4.tif	Landsat TM Original data -Band4-
		¥1986¥170060¥p170r60_5t860308_nn5.tif	Landsat TM Original data -Band5-
		¥1986¥170060¥p170r60_5t860308_nn6.tif	Landsat TM Original data -Band6-
		¥1986¥170060¥p170r60_5t860308_nn7.tif	Landsat TM Original data -Band7-
		¥2000¥169060¥L71169060_06020000306_B10.L1G	Landsat TM Original data -Band1-
		¥2000¥169060¥L71169060_06020000306_B10.L2G	Landsat TM Original data -Band2-
		¥2000¥169060¥L71169060_06020000306_B10.L3G	Landsat TM Original data -Band3-
		¥2000¥169060¥L71169060_06020000306_B10.L4G	Landsat TM Original data -Band4-
		¥2000¥169060¥L71169060_06020000306_B10.L5G	Landsat TM Original data -Band5-
		¥2000¥169060¥L71169060_06020000306_B10.L6G	Landsat TM Original data -Band6-
		¥2000¥169060¥L71169060_06020000306_B10.L7G	Landsat TM Original data -Band7-
		¥2000¥170060¥L71170060_06020000306_B10.L1G	Landsat TM Original data -Band1-
		¥2000¥170060¥L71170060_06020000306_B10.L2G	Landsat TM Original data -Band2-
		¥2000¥170060¥L71170060_06020000306_B10.L3G	Landsat TM Original data -Band3-
		¥2000¥170060¥L71170060_06020000306_B10.L4G	Landsat TM Original data -Band4-
		¥2000¥170060¥L71170060_06020000306_B10.L5G	Landsat TM Original data -Band5-
		¥2000¥170060¥L71170060_06020000306_B10.L6G	Landsat TM Original data -Band6-
		¥2000¥170060¥L71170060_06020000306_B10.L7G	Landsat TM Original data -Band7-
	02-GeoTiff Image	1986 Mosaic Natural Color.tif	1986 Landsat Mozaiced Image, Natural Color, GIS GeoTiff Format
		1986 Mosaic NDVI.tif	1986 Landsat Mozaiced Image, NEVI, GIS GeoTiff Format
		2000 Mosaic Natural Color.tif	2000 Landsat Mozaiced Image, Natural Color, GIS GeoTiff Format
		2000 Mosaic NDVI.tif	1986 Landsat Mozaiced Image, NDVI, GIS GeoTiff Format

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GIS Database Structure

Folder		Data Name
04-QuickBird	01-Original Data	¥2003JAN29¥03JAN29081131-S2AS_R1C1-005576058010_01_P001.TIF
		¥2003JAN29¥03JAN29081131-S2AS_R1C2-005576058010_01_P001.TIF
		¥2003JAN29¥03JAN29081131-S2AS_R2C1-005576058010_01_P001.TIF
		¥2003JAN29¥03JAN29081131-S2AS_R2C2-005576058010_01_P001.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R1C1-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R1C2-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R1C3-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R1C4-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R2C1-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R2C2-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R2C3-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R2C4-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R3C1-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R3C2-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R4C1-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R4C2-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R5C1-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R5C2-005576058010_01_P002.TIF
		¥2004JUN19¥04JUN19080521-S2AS_R6C1-005576058010_01_P002.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R1C1-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R1C2-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R1C3-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R1C4-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R2C1-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R2C2-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R2C3-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R2C4-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R3C1-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R3C2-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R4C1-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R4C2-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R5C1-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R5C2-005576058010_01_P003.TIF
		¥2005JAN03¥05JAN03081911-S2AS_R6C1-005576058010_01_P003.TIF

Folder		Data Name	Data Description
04-QB	02-GeoTiff Image	No01.tiff	2.3km×7.0km Tile Data, 2003 Janualy 29
		No02.tiff	2.3km×2.8km Tile Data, 2003 Janualy 29
		No03.tiff	5.0km×5.0km Tile Data, 2005 Janualy 03
		No04.tiff	5.0km×5.0km Tile Data, 2005 Janualy 03
		No05.tiff	5.0km×2.7km Tile Data, 2005 Janualy 03
		No06.tiff	1.7km×5.5km Tile Data, 2005 Janualy 03
		No07.tiff	3.3km×5.5km Tile Data, 2005 Janualy 03
		No08.tiff	5.0km×5.0km Tile Data, 2005 Janualy 03
		No09.tiff	5.0km×5.0km Tile Data, 2005 Janualy 03
		No10.tiff	5.0km×5.0km Tile Data, 2005 Janualy 03
		No11.tiff	5.0km×3.3km Tile Data, 2005 Janualy 03
		No12.tiff	1.1km×9.1km Tile Data, 2005 Janualy 03
		No13.tiff	3.1km×9.1km Tile Data, 2005 Janualy 03
		No14.tiff	5.0km×5.0km Tile Data, 2005 Janualy 03
		No15.tiff	5.0km×5.0km Tile Data, 2005 Janualy 03
		No16.tiff	5.0km×5.0km Tile Data, 2005 Janualy 03
		No17.tiff	5.0km×5.0km Tile Data, 2005 Janualy 03
		No18.tiff	5.0km×6.4km Tile Data, 2005 Janualy 03
		No19.tiff	4.0km×5.0km Tile Data, 2005 Janualy 03
		No20.tiff	4.0km×5.0km Tile Data, 2005 Janualy 03
		No21.tiff	4.0km×5.0km Tile Data, 2005 Janualy 03
		No22.tiff	4.0km×5.0km Tile Data, 2005 Janualy 03
		No23.tiff	4.0km×6.4km Tile Data, 2005 Janualy 03
		No24.tiff	3.8km×5.0km Tile Data, 2004 June 29
		No25.tiff	3.8km×5.0km Tile Data, 2004 June 29
		No26.tiff	3.8km×5.0km Tile Data, 2004 June 29
		No27.tiff	3.8km×6.3km Tile Data, 2004 June 29
		No28.tiff	3.8km×5.0km Tile Data, 2004 June 29
		No29.tiff	7.0km×3.0km Tile Data, 2004 June 29
		No30.tiff	7.0km×5.0km Tile Data, 2004 June 29
		No31.tiff	7.0km×2.0km Tile Data, 2004 June 29
	03-GIS	QuickBird_Area_Index.shp	QuickBird purchase area
		QuickBird_OriginalData_Index.shp	QuickBird original data set
		QuickBird_Tile_Index.shp	QuickBIrd Tile(Same with GeoTiff image) index
		5000_Index.shp	QuickBird 1:5,000 Scale map index
		10000_Index.shp	QuickBird 1:10,000 Scale map index
		25000_Index.shp	QuickBird 1:25,000 Scale map index

Chapter 7
GIS Database Structure

Folder		Data Name	Data Description
05-Other RS	01-DEM_1kmMesh	E020N40.DEM	1km mesh elevation data
	02-SRTM	HGT¥N00E033.hgt	90m mesh elevation data
		HGT¥N00E034.hgt	90m mesh elevation data
		HGT¥N00E035.hgt	90m mesh elevation data
		HGT¥N00E036.hgt	90m mesh elevation data
		HGT¥N00E037.hgt	90m mesh elevation data
		HGT¥N00E038.hgt	90m mesh elevation data
		HGT¥N01E033.hgt	90m mesh elevation data
		HGT¥N01E034.hgt	90m mesh elevation data
		HGT¥N01E035.hgt	90m mesh elevation data
		HGT¥N01E036.hgt	90m mesh elevation data
		HGT¥N01E037.hgt	90m mesh elevation data
		HGT¥N01E038.hgt	90m mesh elevation data
		HGT¥N02E033.hgt	90m mesh elevation data
		HGT¥N02E034.hgt	90m mesh elevation data
		HGT¥N02E035.hgt	90m mesh elevation data
		HGT¥N02E036.hgt	90m mesh elevation data
		HGT¥N02E037.hgt	90m mesh elevation data
		HGT¥N02E038.hgt	90m mesh elevation data
		HGT¥N03E033.hgt	90m mesh elevation data
		HGT¥N03E034.hgt	90m mesh elevation data
		HGT¥N03E035.hgt	90m mesh elevation data
		HGT¥N03E036.hgt	90m mesh elevation data
		HGT¥N03E037.hgt	90m mesh elevation data
		HGT¥N03E038.hgt	90m mesh elevation data
		HGT¥S01E033.hgt	90m mesh elevation data
		HGT¥S01E034.hgt	90m mesh elevation data
		HGT¥S01E035.hgt	90m mesh elevation data
		HGT¥S01E036.hgt	90m mesh elevation data
		HGT¥S01E037.hgt	90m mesh elevation data
		HGT¥S01E038.hgt	90m mesh elevation data

Folder			Data Name	Data Description
06-GIS	01-Admin Data	01-Original Data	Kericho.tif	Kericho adomininstrative boundary image (scanned)
			Kisumu.tif	Kisumu adomininstrative boundary image (scanned)
			Nandi.tif	Nandi adomininstrative boundary image (scanned)
			Nyando.tif	Nyando adomininstrative boundary image (scanned)
		02-Shape	District_Boundary.shp	4 District Boundary data
			Location_Boundary.shp	4 District location boundary data
			Location_Kericho.shp	Kericho location boundary data
			Location_Kisumu.shp	Kisumu location boundary data
			Location_Nandi.shp	Nandi location boundary data
			Location_Nyando.shp	Nyando location boundary data
			SubLocation_Boundary.shp	4 District sub-location boundary data
			SubLocation_Kisumu.shp	Kisumu sub location boundary data
			SubLocation_Nyando.shp	Nyando sub location boundary data
	02-Base Data (Topo)	01-Basin Scale	River.shp	River data (based on Topo map and updete with ASTER)
			Road.shp	Road data (based on Topo map)
			Railway.shp	Railway data (based on Topo map)
			Basin.shp	Nyand and Nyamasaria river basin data
			BasinMask.shp	Nyand and Nyamasaria river basin data Mask
			Contour_20m.shp	20m interval contour data (based on ASTER)
			FloodArea_JICA-MP.shp	Existing survey result (JICA-MP)
			FloodArea_JICA-Kano.shp	Existing survey result (JICA-Kano Plain project)
			FloodArea_MODIS.shp	Existing survey result (extracted by MODIS)
			FloodArea_JICA92.shp	Existing survey result (JICA 1992 survey result)
		02-Flood Damage Scale	QB_MappingArea.shp	Purchased Area of QuickBird Satellite
			River_Center_QB.shp	Created data based on QuickBird
			Road_QB.shp	Created data based on QuickBird
	03-Flood Damage Survey	01-Original Data	flood servey Result(final).xls	Flood damage survey result.
			flood servey Result(final+16).xls	Flood damage survey result + additional 16 points.
			Survey_GIS.xls	Flood damage survey result for GIS point data
			Survey_GIS＋16.xls	Flood damage survey result for GIS point data additional 16 points
			F_Survey.dbf	Dbf file of flood damage survey result
			F_Survey+16.dbf	Dbf file of flood damage survey result + additional 16 points
		02-Flood Damage Scale	Flood_Survey_Point.shp	Flood damage survey GIS point data
			Flood_Survey_Poly.shp	Flood damage survey GIS polygon data.

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GIS Database Structure

Folder			Data Name	Data Description
06-GIS	03-Flood Damage Survey	02-Flood Damage Scale	Flood_Survey-ex16_Point.shp	Flood damage survey GIS point data additional 16 point
			Flood_Survey-ex16_Poly.shp	Flood damage survey GIS polygon data additional 16 points.
			Flood_Survey-sublocation.shp	Flood affected sub location GIS polygon data
			Flood_Survey-sublocation_outline.shp	Flood affected sub location GIS line (outline) data
			FloodArea-Average_Poly.shp	Estimated Flood Damaged area GIS polygon data (Average)
			FloodArea-Average_Outline.shp	Estimated Flood Damaged area GIS polygon (outline) data (Average)
			FloodArea-Average_Poly.lyr	Estimated Flood Damaged area GIS polygon layer data (Average)
			FloodArea-Average_Outline.lyr	Estimated Flood Damaged area GIS polygon layer data (Average)
			FloodArea-Heaviest.shp	Estimated Flood Damaged area GIS polygon data (Heaviest)
			FloodArea-Heaviest_Outline.shp	Estimated Flood Damaged area GIS polygon (outline) data (Heaviest)
			FloodArea-Heaviest_Poly.lyr	Estimated Flood Damaged area GIS polygon layer data (Heaviest)
			FloodArea-Heaviest_Outline.lyr	Estimated Flood Damaged area GIS polygon layer data (Heaviest)
			FloodSuvery_SubBasin.shp	Estimated Sub-basin polygon by flood
			FloodSuvery_SubBasin.lyr	Estimated Sub-basin layer by flood
			FloodDirection_Ply.shp	Estimated Flood Direction GIS polygon data
			FlowDir_Point-Annual.lyr	Estimated Flood Direction GIS point layer file (Annual)
			FlowDir_Point-Heaviest.lyr	Estimated Flood Direction GIS point layer file (Heaviest)
	04-Elevation	01-ASTER DEM	Contour_20m.shp	20m pitch counter data made from ASTER Satellite image
		02-Kano Plain Project	01-Original Data/kano plains.tif	Paper map of existing survey of Kano Plain, road elevation, XY coordination
			01-Original Data/MainRoadElev.xls	Kano Plain Road elevation survey result. Original data was paper, input to Excel, XY coordination and Elevation
			02-Geo Tiff/kano plains_Geotiff.tif	Kano Plane survey map with attached coordination system (Scanned image)
			03-Shape/KanoPlain_elevPoint.shp	Point GIS data of Kano Plane survey, road elevation, XY coordination
			03-Shape/ExistingRoadSurvey_Point.shp	Point GIS data of Kano Plane survey, road elevation, XY coordination
	05-Pirot Project	01-Original Data	Evacuation.xls	Evacuation Center Survey data,
			Evacuation Centre 181106.xls	Evacuation Center Survey data updated by 18 Nov, 2006
		02-Shape	FoodforWork.shp	GIS polyline data of Food for Work. Data source is Red Cross Kisumu
			Exacuation.shp	Evacuation Center GIS Point data, based on the Evacuation excel

Folder			Data Name	Data Description
06-GIS	06-Others	02-Shape	Arrive_River.shp	Divided river data according to the Flood arrival time
			Arrive_Time3.shp	Estimated Flood arrival time
			Arrive_Time_Union2.shp	Estimated Flood arrival time
			Pub_Admin-outline.shp	Outline of Administrative Boundary data
			Pub_Mask.shp	Mask data of Administrative Boundary

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GIS Database Structure

Folder		Data Name	Data Descriotion
07-MXD	01-Base Map	Nyando-Basin.mxd	Nyand and Nyamasaria river basins
	02-Flood Damge Survey	FloodDamageSurvey.mxd	Flood damage survey point
		FloodDamageSurvey_Point.mxd	Flood damage survey point (Landsat TM)
		FloodDamageSurvey_Topo.mxd	Flood damage survey point (Topo Map)
		Q3a.mxd	Flood damage Survey Question-3a
		Q3c.mxd	Flood damage Survey Question-3c
		Q4.mxd	Flood damage Survey Question-4
		Q6-Depth_Annual.mxd	Flood damage Survey Question-6-Annual Depth
		Q6-Depth_Deepest.mxd	Flood damage Survey Question-6-Heaviest Depth
		Q6-Duration_Annual.mxd	Flood damage Survey Question-6-Annual Duration
		Q6-Duration_Deepest.mxd	Flood damage Survey Question-6-Heaviest Duration
		Q6-Velocity_Annual.mxd	Flood damage Survey Question-6-Annual Velocity
		Q6-Velocity_Deepest.mxd	Flood damage Survey Question-6-Heaviest Velocity
		Q6-Year.mxd	Flood damage Survey Question-6-Flood Heaviest Year
		Q7-1.mxd	Flood damage Survey Question-7-1
		Q7-1a.mxd	Flood damage Survey Question-7-1a
		Q7-1c.mxd	Flood damage Survey Question-7-1c
		Q8-2.mxd	Flood damage Survey Question-8-2
		Q8-3.mxd	Flood damage Survey Question-8-3
		Q8-4b1.mxd	Flood damage Survey Question-8-4b1
		Q8-4b2.mxd	Flood damage Survey Question-8-4b2
		Q8-5.mxd	Flood damage Survey Question-8-5
		Q8-6.mxd	Flood damage Survey Question-8-6
		Q8-7.mxd	Flood damage Survey Question-22a
		Q8a.mxd	Flood damage Survey Question-23a
		Q8b.mxd	Flood damage Survey Question-24a
		Q8c.mxd	Flood damage Survey Question-25a
	03-2nd Nyando Forum	2ndForum-P1-Admin.mxd	P1 Administrative boundary Map
		2ndForum-P2-SurveyPoint.mxd	P2 Flood damage survey point
		2ndForum-P3-WaterFlowDirection.mxd	P3 Water flow direction (Flood damage survey)
		2ndForum-P4-PriorityLocations.mxd	P4 Selected priority locations (for projects)
	04-Progress Report	Front1-NyandoBasin.mxd	Front page-1 Basin map
		Front2-Admin Boundary.mxd	Front page-2 Administrative boundary
		Front3-DisasterMap.mxd	Front page-3 Disaster Map (Heaviest)
		Elevation(Co).mxd	ASTER Elevation map (color)
		Elevation(BW).mxd	ASTER Elevation map (black and white)
		EvacuationCenter.mxd	Evacuation Facility Version 11.18
		EvacuationCenter_Topo.mxd	Evacuation Facility Version 11.18 + Topo Map

Folder		Data Name	Data Descriotion
07-MXD	04-Progress Report	HeaviestFlood+Evacuation.mxd	Evacuation Facility Version 11.18 + Disaster Map
		AnnualFlood+Evacuation.mxd	Evacuation Facility Version 11.18 + Disaster Map
		Awachi-Kano.mxd	Awach-Kano Sub basin + Admin Boundary
		Arrive_Time+Evacuation.mxd	Flood Arrival Time + Evacuation Facility
	05-Public Hearing	Original¥P1-Reference Map.mxd	P1 Topo map and Admin boundary
		Original¥P2-Estimated Flood Area(A3).mxd	P2 Disaster map(Average+Heaviest) A3
		Original¥P2-Estimated Flood Area.mxd	P2 Disaster map(Average+Heaviest) A4
		Original¥P3-Exist Flood Area1.mxd	P3 Flood existing survey results
		Original¥P4-Exist Flood Area2.mxd	P4 Flood existing survey results
		Original¥P5-Water Depth.mxd	P5 Flood water depth (Flood damage survey)
		Original¥P6-Duration.mxd	P6 Duration days (Flood damage survey)
		Original¥P7-Flow Direction.mxd	P7 Water flow direction (Flood damage survey)
		Original¥P8-Evacuatin.mxd	P8 Evacuation center (temporaly version)
		Revise¥P1-Reference Map_rev.mxd	Revised map after Public Hearing
		Revise¥P2-Estimated Flood Area(A3)_rev.mxd	Revised map after Public Hearing
		Revise¥P2-Estimated Flood Area_rev.mxd	Revised map after Public Hearing
		Revise¥P3-Exist Flood Area1_rev.mxd	Revised map after Public Hearing
		Revise¥P4-Exist Flood Area2_rev.mxd	Revised map after Public Hearing
		Revise¥P5-Water Depth_rev.mxd	Revised map after Public Hearing
		Revise¥P6-Duration_rev.mxd	Revised map after Public Hearing
		Revise¥P7-Flow Direction_rev.mxd	Revised map after Public Hearing
		Revise¥P8-Evacuatin_rev.mxd	Revised map after Public Hearing
	06-QuickBird	¥Scale10,000¥Index Map_10000.mxd	1:10,000 Scale QuickBird map index
		¥Scale10,000¥No01.mxd	1:10,000 Scale QuickBird map No.01
		¥Scale10,000¥No02.mxd	1:10,000 Scale QuickBird map No.02
		¥Scale10,000¥No03.mxd	1:10,000 Scale QuickBird map No.03
		¥Scale10,000¥No04.mxd	1:10,000 Scale QuickBird map No.04
		¥Scale10,000¥No05.mxd	1:10,000 Scale QuickBird map No.05
		¥Scale10,000¥No06.mxd	1:10,000 Scale QuickBird map No.06
		¥Scale10,000¥No07.mxd	1:10,000 Scale QuickBird map No.07
		¥Scale10,000¥No08.mxd	1:10,000 Scale QuickBird map No.08
		¥Scale10,000¥No09.mxd	1:10,000 Scale QuickBird map No.09
		¥Scale10,000¥No10.mxd	1:10,000 Scale QuickBird map No.10
		¥Scale10,000¥No11.mxd	1:10,000 Scale QuickBird map No.11
		¥Scale10,000¥No12.mxd	1:10,000 Scale QuickBird map No.12
		¥Scale10,000¥No13.mxd	1:10,000 Scale QuickBird map No.13
		¥Scale10,000¥No14.mxd	1:10,000 Scale QuickBird map No.14
		¥Scale10,000¥No15.mxd	1:10,000 Scale QuickBird map No.15
		¥Scale10,000¥No16.mxd	1:10,000 Scale QuickBird map No.16
		¥Scale10,000¥No17.mxd	1:10,000 Scale QuickBird map No.17
		¥Scale10,000¥No18.mxd	1:10,000 Scale QuickBird map No.18
		¥Scale10,000¥No19.mxd	1:10,000 Scale QuickBird map No.19

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Folder		Data Name	Data Descriotion
07-MXD	06-QuickBird	¥Scale10,000¥No20.mxd	1:10,000 Scale QuickBird map No.20
		¥Scale10,000¥No21.mxd	1:10,000 Scale QuickBird map No.21
		¥Scale10,000¥No22.mxd	1:10,000 Scale QuickBird map No.22
		¥Scale10,000¥No23.mxd	1:10,000 Scale QuickBird map No.23
		¥Scale10,000¥No24.mxd	1:10,000 Scale QuickBird map No.24
		¥Scale10,000¥No25.mxd	1:10,000 Scale QuickBird map No.25
		¥Scale10,000¥No26.mxd	1:10,000 Scale QuickBird map No.26
		¥Scale10,000¥No27.mxd	1:10,000 Scale QuickBird map No.27
		¥Scale10,000¥No28.mxd	1:10,000 Scale QuickBird map No.28
		¥Scale10,000¥No29.mxd	1:10,000 Scale QuickBird map No.29
		¥Scale10,000¥No30.mxd	1:10,000 Scale QuickBird map No.30
		¥Scale10,000¥No31.mxd	1:10,000 Scale QuickBird map No.31
		¥Scale10,000¥No32.mxd	1:10,000 Scale QuickBird map No.32
		¥Scale10,000¥No33.mxd	1:10,000 Scale QuickBird map No.33
		¥Scale10,000¥No34.mxd	1:10,000 Scale QuickBird map No.34
		¥Scale10,000¥No35.mxd	1:10,000 Scale QuickBird map No.35
		¥Scale10,000¥No36.mxd	1:10,000 Scale QuickBird map No.36
		¥Scale10,000¥No37.mxd	1:10,000 Scale QuickBird map No.37
		¥Scale10,000¥No38.mxd	1:10,000 Scale QuickBird map No.38
		¥Scale10,000¥No39.mxd	1:10,000 Scale QuickBird map No.39
		¥Scale10,000¥No40.mxd	1:10,000 Scale QuickBird map No.40
		¥Scale10,000¥No41.mxd	1:10,000 Scale QuickBird map No.41
		¥Scale10,000¥No42.mxd	1:10,000 Scale QuickBird map No.42
		¥Scale10,000¥No43.mxd	1:10,000 Scale QuickBird map No.43
		¥Scale10,000¥No44.mxd	1:10,000 Scale QuickBird map No.44
		¥Scale10,000¥No45.mxd	1:10,000 Scale QuickBird map No.45
		¥Scale10,000¥No46.mxd	1:10,000 Scale QuickBird map No.46
		¥Scale10,000¥No47.mxd	1:10,000 Scale QuickBird map No.47
		¥Scale10,000¥No48.mxd	1:10,000 Scale QuickBird map No.48
		¥Scale10,000¥No49.mxd	1:10,000 Scale QuickBird map No.49
		¥Scale10,000¥No50.mxd	1:10,000 Scale QuickBird map No.50
		¥Scale10,000¥No51.mxd	1:10,000 Scale QuickBird map No.51
		¥Scale10,000¥No52.mxd	1:10,000 Scale QuickBird map No.52
		¥Scale10,000¥No53.mxd	1:10,000 Scale QuickBird map No.53
		¥Scale10,000¥No54.mxd	1:10,000 Scale QuickBird map No.54
		¥Scale10,000¥No55.mxd	1:10,000 Scale QuickBird map No.55
		¥Scale10,000¥No56.mxd	1:10,000 Scale QuickBird map No.56
		¥Scale10,000¥No57.mxd	1:10,000 Scale QuickBird map No.57
		¥Scale10,000¥No58.mxd	1:10,000 Scale QuickBird map No.58
		¥Scale10,000¥No59.mxd	1:10,000 Scale QuickBird map No.59
		¥Scale10,000¥No60.mxd	1:10,000 Scale QuickBird map No.60
		¥Scale10,000¥No61.mxd	1:10,000 Scale QuickBird map No.61
		¥Scale10,000¥No62.mxd	1:10,000 Scale QuickBird map No.62
		¥Scale10,000¥No63.mxd	1:10,000 Scale QuickBird map No.63
		¥Scale10,000¥No64.mxd	1:10,000 Scale QuickBird map No.64
		¥Scale10,000¥No65.mxd	1:10,000 Scale QuickBird map No.65
		¥Scale10,000¥No66.mxd	1:10,000 Scale QuickBird map No.66
		¥Scale10,000¥No67.mxd	1:10,000 Scale QuickBird map No.67
		¥Scale10,000¥No68.mxd	1:10,000 Scale QuickBird map No.68
		¥Scale25,000¥Index Map_25000.mxd	1:25,000 Scale QuickBird map index

Folder		Data Name	Data Descriotion
07-MXD	06-QuickBird	¥Scale25,000¥No01.mxd	1:25,000 Scale QuickBird map No.01
		¥Scale25,000¥No02.mxd	1:25,000 Scale QuickBird map No.02
		¥Scale25,000¥No03.mxd	1:25,000 Scale QuickBird map No.03
		¥Scale25,000¥No04.mxd	1:25,000 Scale QuickBird map No.04
		¥Scale25,000¥No05.mxd	1:25,000 Scale QuickBird map No.05
		¥Scale25,000¥No06.mxd	1:25,000 Scale QuickBird map No.06
		¥Scale25,000¥No07.mxd	1:25,000 Scale QuickBird map No.07
		¥Scale25,000¥No08.mxd	1:25,000 Scale QuickBird map No.08
		¥Scale25,000¥No09.mxd	1:25,000 Scale QuickBird map No.09
		¥Scale25,000¥No10.mxd	1:25,000 Scale QuickBird map No.10
		¥Scale25,000¥No11.mxd	1:25,000 Scale QuickBird map No.11
		¥Scale25,000¥No12.mxd	1:25,000 Scale QuickBird map No.12
	07-Others	Arrival_Time.mxd	Flood arrival time, estimated by Kraven rule.
		FoodforWork.mxd	Food for Work based on NGO map
		DisasterMap+Sublocation.mxd	Heaviest flood + sub-location
		TechnicalM-1.mxd	For Technical Meeting (15 Nov,2006)
		TechnicalM-2.mxd	For Technical Meeting (15 Nov,2006)
		TechnicalM-3.mxd	For Technical Meeting (15 Nov,2006)

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GIS Database Structure

Folder		Data Name	Data Descriotion
08-Pri nting Maps	01-Base Map	Nyando-Basin.jpg	Nyand and Nyamasaria river basins
	02-Flood Damge Survey	FloodDamageSurvey.jpg	Flood damage survey point
		FloodDamageSurvey_Point.jpg	Flood damage survey point (Landsat TM)
		FloodDamageSurvey_Topo.jpg	Flood damage survey point (Topo Map)
		Q3a.jpg	Flood damage Survey Question-3a
		Q3c.jpg	Flood damage Survey Question-3c
		Q4.jpg	Flood damage Survey Question-4
		Q6-Depth_Annual.jpg	Flood damage Survey Question-6-Annual Depth
		Q6-Depth_Deepest.jpg	Flood damage Survey Question-6-Heaviest Depth
		Q6-Duration_Annual.jpg	Flood damage Survey Question-6-Annual Duration
		Q6-Duration_Deepest.jpg	Flood damage Survey Question-6-Heaviest Duration
		Q6-Velocity_Annual.jpg	Flood damage Survey Question-6-Annual Velocity
		Q6-Velocity_Deepest.jpg	Flood damage Survey Question-6-Heaviest Velocity
		Q6-Year.jpg	Flood damage Survey Question-6-Flood Heaviest Year
		Q7-1.jpg	Flood damage Survey Question-7-1
		Q7-1a.jpg	Flood damage Survey Question-7-1a
		Q7-1c.jpg	Flood damage Survey Question-7-1c
		Q8-2.jpg	Flood damage Survey Question-8-2
		Q8-3.jpg	Flood damage Survey Question-8-3
		Q8-4b1.jpg	Flood damage Survey Question-8-4b1
		Q8-4b2.jpg	Flood damage Survey Question-8-4b2
		Q8-5.jpg	Flood damage Survey Question-8-5
		Q8-6.jpg	Flood damage Survey Question-8-6
		Q8-7.jpg	Flood damage Survey Question-22a
		Q8a.jpg	Flood damage Survey Question-23a
		Q8b.jpg	Flood damage Survey Question-24a
		Q8c.jpg	Flood damage Survey Question-25a
	03-2nd Nyando Forum	2ndForum-P1-Admin.jpg	P1 Administrative boundary Map
		2ndForum-P2-SurveyPoint.jpg	P2 Flood damage survey point
		2ndForum-P3-WaterFlowDirection.jpg	P3 Water flow direction (Flood damage survey)
		2ndForum-P4-PriorityLocations.jpg	P4 Selected priority locations (for projects)
	04-Progre ss Report	Front1-NyandoBasin.jpg	Front page-1 Basin map
		Front2-Admin Boundary.jpg	Front page-2 Administrative boundary
		Front3-DisasterMap.jpg	Front page-3 Disaster Map (Heaviest)
		Elevation(Co).jpg	ASTER Elevation map (color)
		Elevation(BW).jpg	ASTER Elevation map (black and white)
		EvacuationCenter.jpg	Evacuation Facility Version 11.18
		EvacuationCenter_Topo.jpg	Evacuation Facility Version 11.18 + Topo Map

Folder		Data Name	Data Descriotion
08-Printing Maps	04-Progress Report	HeaviestFlood+Evacuation.jpg	Evacuation Facility Version 11.18 + Disaster Map
		AnnualFlood+Evacuation.jpg	Evacuation Facility Version 11.18 + Disaster Map
		Awachi-Kano.jpg	Awach-Kano Sub basin + Admin Boundary
		Arrive_Time+Evacuation.jpg	Flood Arrival Time + Evacuation Facility
	05-Public Hearing	Original¥P1-Reference Map.jpg	P1 Topo map and Admin boundary
		Original¥P2-Estimated Flood Area(A3).jpg	P2 Disaster map(Average+Heaviest) A3
		Original¥P2-Estimated Flood Area.jpg	P2 Disaster map(Average+Heaviest) A4
		Original¥P3-Exist Flood Area1.jpg	P3 Flood existing survey results
		Original¥P4-Exist Flood Area2.jpg	P4 Flood existing survey results
		Original¥P5-Water Depth.jpg	P5 Flood water depth (Flood damage survey)
		Original¥P6-Duration.jpg	P6 Duration days (Flood damage survey)
		Original¥P7-Flow Direction.jpg	P7 Water flow direction (Flood damage survey)
		Original¥P8-Evacuatin.jpg	P8 Evacuation center (temporaly version)
		Revise¥P1-Reference Map_rev.jpg	Revised map after Public Hearing
		Revise¥P2-Estimated Flood Area(A3)_rev.jpg	Revised map after Public Hearing
		Revise¥P2-Estimated Flood Area_rev.jpg	Revised map after Public Hearing
		Revise¥P3-Exist Flood Area1_rev.jpg	Revised map after Public Hearing
		Revise¥P4-Exist Flood Area2_rev.jpg	Revised map after Public Hearing
		Revise¥P5-Water Depth_rev.jpg	Revised map after Public Hearing
		Revise¥P6-Duration_rev.jpg	Revised map after Public Hearing
		Revise¥P7-Flow Direction_rev.jpg	Revised map after Public Hearing
		Revise¥P8-Evacuatin_rev.jpg	Revised map after Public Hearing
	06-QuickBird	¥Scale5,000¥Index Map_5000.jpg	1:5,000 Scale QuickBird map index
		¥Scale10,000¥Index Map_10000.jpg	1:10,000 Scale QuickBird map index
		¥Scale10,000¥No01.jpg	1:10,000 Scale QuickBird map No.01
		¥Scale10,000¥No02.jpg	1:10,000 Scale QuickBird map No.02
		¥Scale10,000¥No03.jpg	1:10,000 Scale QuickBird map No.03
		¥Scale10,000¥No04.jpg	1:10,000 Scale QuickBird map No.04
		¥Scale10,000¥No05.jpg	1:10,000 Scale QuickBird map No.05
		¥Scale10,000¥No06.jpg	1:10,000 Scale QuickBird map No.06
		¥Scale10,000¥No07.jpg	1:10,000 Scale QuickBird map No.07
		¥Scale10,000¥No08.jpg	1:10,000 Scale QuickBird map No.08
		¥Scale10,000¥No09.jpg	1:10,000 Scale QuickBird map No.09
		¥Scale10,000¥No10.jpg	1:10,000 Scale QuickBird map No.10
		¥Scale10,000¥No11.jpg	1:10,000 Scale QuickBird map No.11
		¥Scale10,000¥No12.jpg	1:10,000 Scale QuickBird map No.12
		¥Scale10,000¥No13.jpg	1:10,000 Scale QuickBird map No.13
		¥Scale10,000¥No14.jpg	1:10,000 Scale QuickBird map No.14
		¥Scale10,000¥No15.jpg	1:10,000 Scale QuickBird map No.15
		¥Scale10,000¥No16.jpg	1:10,000 Scale QuickBird map No.16
		¥Scale10,000¥No17.jpg	1:10,000 Scale QuickBird map No.17
		¥Scale10,000¥No18.jpg	1:10,000 Scale QuickBird map No.18
		¥Scale10,000¥No19.jpg	1:10,000 Scale QuickBird map No.19

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Folder		Data Name	Data Descriotion
08-Pri nting Maps	06-QuickBi rd	¥Scale10,000¥No20.jpg	1:10,000 Scale QuickBird map No.20
		¥Scale10,000¥No21.jpg	1:10,000 Scale QuickBird map No.21
		¥Scale10,000¥No22.jpg	1:10,000 Scale QuickBird map No.22
		¥Scale10,000¥No23.jpg	1:10,000 Scale QuickBird map No.23
		¥Scale10,000¥No24.jpg	1:10,000 Scale QuickBird map No.24
		¥Scale10,000¥No25.jpg	1:10,000 Scale QuickBird map No.25
		¥Scale10,000¥No26.jpg	1:10,000 Scale QuickBird map No.26
		¥Scale10,000¥No27.jpg	1:10,000 Scale QuickBird map No.27
		¥Scale10,000¥No28.jpg	1:10,000 Scale QuickBird map No.28
		¥Scale10,000¥No29.jpg	1:10,000 Scale QuickBird map No.29
		¥Scale10,000¥No30.jpg	1:10,000 Scale QuickBird map No.30
		¥Scale10,000¥No31.jpg	1:10,000 Scale QuickBird map No.31
		¥Scale10,000¥No32.jpg	1:10,000 Scale QuickBird map No.32
		¥Scale10,000¥No33.jpg	1:10,000 Scale QuickBird map No.33
		¥Scale10,000¥No34.jpg	1:10,000 Scale QuickBird map No.34
		¥Scale10,000¥No35.jpg	1:10,000 Scale QuickBird map No.35
		¥Scale10,000¥No36.jpg	1:10,000 Scale QuickBird map No.36
		¥Scale10,000¥No37.jpg	1:10,000 Scale QuickBird map No.37
		¥Scale10,000¥No38.jpg	1:10,000 Scale QuickBird map No.38
		¥Scale10,000¥No39.jpg	1:10,000 Scale QuickBird map No.39
		¥Scale10,000¥No40.jpg	1:10,000 Scale QuickBird map No.40
		¥Scale10,000¥No41.jpg	1:10,000 Scale QuickBird map No.41
		¥Scale10,000¥No42.jpg	1:10,000 Scale QuickBird map No.42
		¥Scale10,000¥No43.jpg	1:10,000 Scale QuickBird map No.43
		¥Scale10,000¥No44.jpg	1:10,000 Scale QuickBird map No.44
		¥Scale10,000¥No45.jpg	1:10,000 Scale QuickBird map No.45
		¥Scale10,000¥No46.jpg	1:10,000 Scale QuickBird map No.46
		¥Scale10,000¥No47.jpg	1:10,000 Scale QuickBird map No.47
		¥Scale10,000¥No48.jpg	1:10,000 Scale QuickBird map No.48
		¥Scale10,000¥No49.jpg	1:10,000 Scale QuickBird map No.49
		¥Scale10,000¥No50.jpg	1:10,000 Scale QuickBird map No.50
		¥Scale10,000¥No51.jpg	1:10,000 Scale QuickBird map No.51
		¥Scale10,000¥No52.jpg	1:10,000 Scale QuickBird map No.52
		¥Scale10,000¥No53.jpg	1:10,000 Scale QuickBird map No.53
		¥Scale10,000¥No54.jpg	1:10,000 Scale QuickBird map No.54
		¥Scale10,000¥No55.jpg	1:10,000 Scale QuickBird map No.55
		¥Scale10,000¥No56.jpg	1:10,000 Scale QuickBird map No.56
		¥Scale10,000¥No57.jpg	1:10,000 Scale QuickBird map No.57
		¥Scale10,000¥No58.jpg	1:10,000 Scale QuickBird map No.58
		¥Scale10,000¥No59.jpg	1:10,000 Scale QuickBird map No.59
		¥Scale10,000¥No60.jpg	1:10,000 Scale QuickBird map No.60
		¥Scale10,000¥No61.jpg	1:10,000 Scale QuickBird map No.61
		¥Scale10,000¥No62.jpg	1:10,000 Scale QuickBird map No.62
		¥Scale10,000¥No63.jpg	1:10,000 Scale QuickBird map No.63
		¥Scale10,000¥No64.jpg	1:10,000 Scale QuickBird map No.64
		¥Scale10,000¥No65.jpg	1:10,000 Scale QuickBird map No.65
		¥Scale10,000¥No66.jpg	1:10,000 Scale QuickBird map No.66
		¥Scale10,000¥No67.jpg	1:10,000 Scale QuickBird map No.67
		¥Scale10,000¥No68.jpg	1:10,000 Scale QuickBird map No.68
		¥Scale25,000¥Index Map_25000.jpg	1:25,000 Scale QuickBird map index

Folder		Data Name	Data Descriotion
08-Printing Maps	06-QuickBird	¥Scale25,000¥No01.jpg	1:25,000 Scale QuickBird map No.01
		¥Scale25,000¥No02.jpg	1:25,000 Scale QuickBird map No.02
		¥Scale25,000¥No03.jpg	1:25,000 Scale QuickBird map No.03
		¥Scale25,000¥No04.jpg	1:25,000 Scale QuickBird map No.04
		¥Scale25,000¥No05.jpg	1:25,000 Scale QuickBird map No.05
		¥Scale25,000¥No06.jpg	1:25,000 Scale QuickBird map No.06
		¥Scale25,000¥No07.jpg	1:25,000 Scale QuickBird map No.07
		¥Scale25,000¥No08.jpg	1:25,000 Scale QuickBird map No.08
		¥Scale25,000¥No09.jpg	1:25,000 Scale QuickBird map No.09
		¥Scale25,000¥No10.jpg	1:25,000 Scale QuickBird map No.10
		¥Scale25,000¥No11.jpg	1:25,000 Scale QuickBird map No.11
		¥Scale25,000¥No12.jpg	1:25,000 Scale QuickBird map No.12
	Others	Arrival_Time.jpg	Flood arrival time, estimated by Kraven rule.
		FoodforWork.jpg	Food for Work based on NGO map
		DisasterMap+Sublocation.jpg	Heaviest flood + sub-location

As of June 2007

Chapter 7
GIS Database Structure

CHAPTER 8
GIS Map and Data set structure

This chapter shows the list of the vector and raster data which compose map layout file (mxd file).

Folder	Data Name	Data	Data Path
01-Base Map	Nyando-Basin.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Railway.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
02-Flood Damge Survey	FloodDamageSurvey.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Flood_Survey_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥03-Shape
		Flood_Survey-ex16_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥05-Shape
		Landsat TM	c¥Nyando Study Team¥GIS DataBase¥03-Landsat TM¥02-GeoTiff Image
		ASTER	c¥Nyando Study Team¥GIS DataBase¥02-ASTER¥02-GeoTiff Image
		Topo-Map	c¥Nyando Study Team¥GIS DataBase¥01-Topo-Map¥02-GeoTiff Image
	FloodDamageSurvey_Point.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Flood_Survey_Point.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		Flood_Survey-ex16_Point.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥04-Shape
		Landsat TM	c¥Nyando Study Team¥GIS DataBase¥03-Landsat TM¥02-GeoTiff Image
		ASTER	c¥Nyando Study Team¥GIS DataBase¥02-ASTER¥02-GeoTiff Image
		Topo-Map	c¥Nyando Study Team¥GIS DataBase¥01-Topo-Map¥02-GeoTiff Image

Chapter 8
GIS Map and Data set structure

Folder	Data Name	Data	Data Path
02-Flood Damge Survey	FloodDamageSurvey_Topo.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Flood_Survey_Point.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		Flood_Survey_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥03-Shape
		Flood_Survey-ex16_Point.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥04-Shape
		Flood_Survey-ex16_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥05-Shape
		Topo-Map	c¥Nyando Study Team¥GIS DataBase¥01-Topo-Map¥02-GeoTiff Image
	Q3a.mxd to Q8c.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Flood_Survey_Point.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		Flood_Survey_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥03-Shape
		Flood_Survey-ex16_Point.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥04-Shape
		Flood_Survey-ex16_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥05-Shape
		Landsat TM	c¥Nyando Study Team¥GIS DataBase¥03-Landsat TM¥02-GeoTiff Image
		ASTER	c¥Nyando Study Team¥GIS DataBase¥02-ASTER¥02-GeoTiff Image
		Topo-Map	c¥Nyando Study Team¥GIS DataBase¥01-Topo-Map¥02-GeoTiff Image

Folder	Data Name	Data	Data Path
03-2nd Nyando Forum	2ndForum-P1-Admin.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		District_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
	2ndForum-P2-SurveyPoint.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		District_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		Flood_Survey_Point.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodDirection_Ply.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodSurvey_SubBasin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
	2ndForum-P3-WaterFlow Direction.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		District_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		FloodDirection_Ply.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodSurvey_SubBasin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
	2ndForum-P4-PriorityLocations.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		District_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		KN_division.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		KN_location.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape

Chapter 8
GIS Map and Data set structure

Folder	Data Name	Data	Data Path
04-Progress Report	Front1-NyandoBasin.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Railway.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
	Front2-Admin Boundary.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Railway.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		SubLocation_Kisumu.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		SubLocation_Nyando.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
	Front3-DisasterMap.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Railway.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		SubLocation_Kisumu.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		SubLocation_Nyando.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		FloodArea-Heaviest.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodArea-Heaviest_Outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		Topo-Map	c¥Nyando Study Team¥GIS DataBase¥01-Topo-Map¥02-GeoTiff Image

Folder	Data Name	Data	Data Path
05-Public Hearing	P1-Reference Map.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Railway.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		Pub_Admin-outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
		Pub_Mask.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
		Topo-Map	c¥Nyando Study Team¥GIS DataBase¥01-Topo-Map¥02-GeoTiff Image
	P2-Estimated Flood Area(A3).mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Railway.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		SubLocation_Kisumu.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		SubLocation_Nyando.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		FloodArea-Average_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodArea-Average_Outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodArea-Heaviest.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodArea-Heaviest_Outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		Pub_Admin-outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
		Pub_Mask.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
		Topo-Map	c¥Nyando Study Team¥GIS DataBase¥01-Topo-Map¥02-GeoTiff Image

Chapter 8
GIS Map and Data set structure

Folder	Data Name	Data	Data Path
05-Public Hearing	P3-Exist Flood Area1.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Railway.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		FloodArea_JICA-MP.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		FloodArea_JICA-Kano.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Pub_Admin-outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
		Pub_Mask.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
	P4-Exist Flood Area2.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Basin.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Railway.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		FloodArea_MODIS.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		FloodArea_JICA92.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Pub_Admin-outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
		Pub_Mask.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting

Folder	Data Name	Data	Data Path
05-Public Hearing	P5-Water Depth.mxd	Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		FloodArea-Average_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodArea-Average_Outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodArea-Heaviest.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodArea-Heaviest_Outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		Flood_Survey_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥03-Shape
		Flood_Survey-ex16_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥05-Shape
		Pub_Admin-outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
		Pub_Mask.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
	P6-Duration.mxd	Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		FloodArea-Average_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodArea-Average_Outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodArea-Heaviest.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		FloodArea-Heaviest_Outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥02-Shape
		Flood_Survey_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥03-Shape
		Flood_Survey-ex16_Poly.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥05-Shape
		Pub_Admin-outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
		Pub_Mask.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
	Original¥P7-Flow Direction.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Railway.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		FlowDir_Point-Annual.lyr	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥03-Shape
		FlowDir_Point-Heaviest.lyr	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥03-Flood Damage Survey¥03-Shape
		Pub_Admin-outline.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting
		Pub_Mask.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥06-Others¥01-forPrinting

Chapter 8
GIS Map and Data set structure

Folder	Data Name	Data	Data Path
05-Public Hearing	P8-Evacuati n.mxd	River.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Road.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥02-Base Data¥01-Basin Scale
		Location_Boundary.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		SubLocation_Kisumu.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		SubLocation_Nyando.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥01-Admin Data¥02-Shape
		Exacuation_ver4.shp	c¥Nyando Study Team¥GIS DataBase¥06-GIS¥05-Pirot Project¥02-Shape
06-QuickBi rd	Index Map_5000 .mxd	5000_Index.shp	c¥Nyando Study Team¥GIS DataBase¥04-QuickBird¥03-GIS
		No01.tiff to No31.tiff	c¥Nyando Study Team¥GIS DataBase¥04-QuickBird¥02-GeoTiff Image
	Index Map_1000 0.mxd	10000_Index.shp	c¥Nyando Study Team¥GIS DataBase¥04-QuickBird¥03-GIS
		No01.tiff to No31.tiff	c¥Nyando Study Team¥GIS DataBase¥04-QuickBird¥02-GeoTiff Image
	No01.mxd to No68.mxd	10000_Index.shp	c¥Nyando Study Team¥GIS DataBase¥04-QuickBird¥03-GIS
		No01.tiff to No31.tiff	c¥Nyando Study Team¥GIS DataBase¥04-QuickBird¥02-GeoTiff Image
	Index Map_2500 0.mxd	25000_Index.shp	c¥Nyando Study Team¥GIS DataBase¥04-QuickBird¥03-GIS
		No01.tiff to No31.tiff	c¥Nyando Study Team¥GIS DataBase¥04-QuickBird¥02-GeoTiff Image
	No01.mxd to No12.mxd	25000_Index.shp	c¥Nyando Study Team¥GIS DataBase¥04-QuickBird¥03-GIS
		No01.tiff to No31.tiff	c¥Nyando Study Team¥GIS DataBase¥04-QuickBird¥02-GeoTiff Image

CHAPTER 9

Error Handling

This chapter shows the method of dealing with the error of the ArcGIS software. Here, four (4) methods of dealing with the error that can be expected are shown.

-Caution!-

1. This GIS Database use the software ArcGIS Version 9.x.
2. This GIS Database need the "Spatial Analyst" extention to open raster dataset.
3. This GIS Database must be copied under " C:¥ " on your computer, otherwise mxd files can not be opened.

| 1 | ***Expected Error-1   Does not open mxd file*** |

When existing mxd file opens, you see the message window shown below.

This error happens when existing mxd cannot be opened by the difference version of the software. This database use ArcGIS version 9.1. If user's ArcGIS software version is under 9.x (ex; version 8.x), this error occored.

2-1

Expected Error-2　Coordination System

When vector data file opens such as point, line or polygon data, ,ArcGIS need Spatial Reference (projection file, "*.prj") . If the projection file does not attached to the vector file, ArcGIS open window show below.
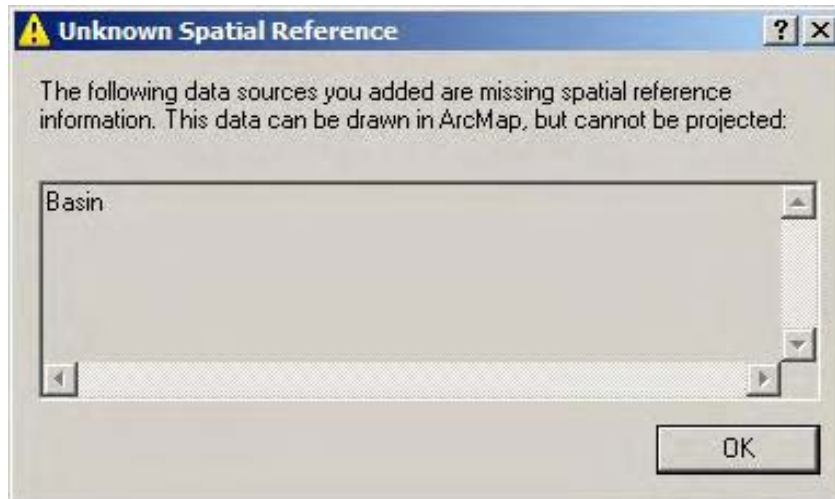
2-2

On the Table of Contents window, select the shape file and Right-Click Properties. Press Source tub and check the coordination system. If the coordination system does not attached, you should to attach the coordination file to this vector data.
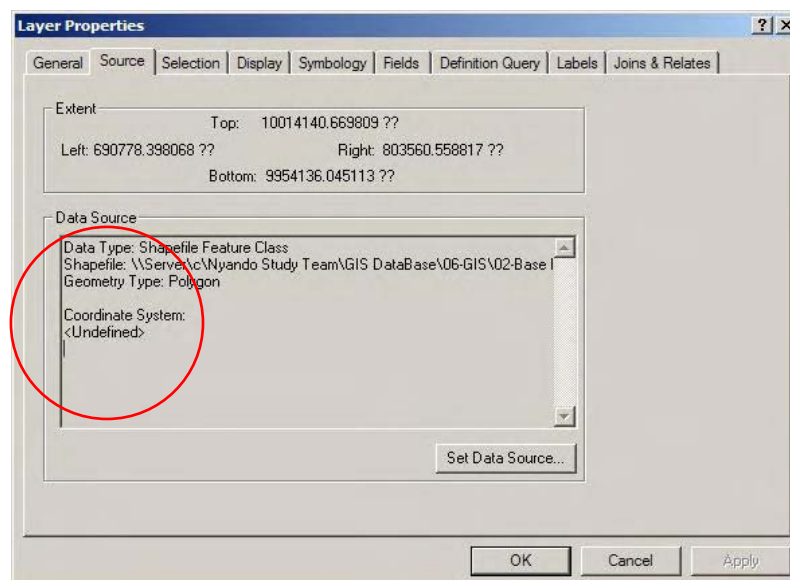
3-1　　　***Expected Error-3　Does not open Raster data***

When raster data file opens such as QuickBird satellite image, ASTER DEM, etc., ArcGIS need Spatial Analyst extension. If this extension does not work, you need to active the extension. Tools -> Extensions then check Spatial Analyst.
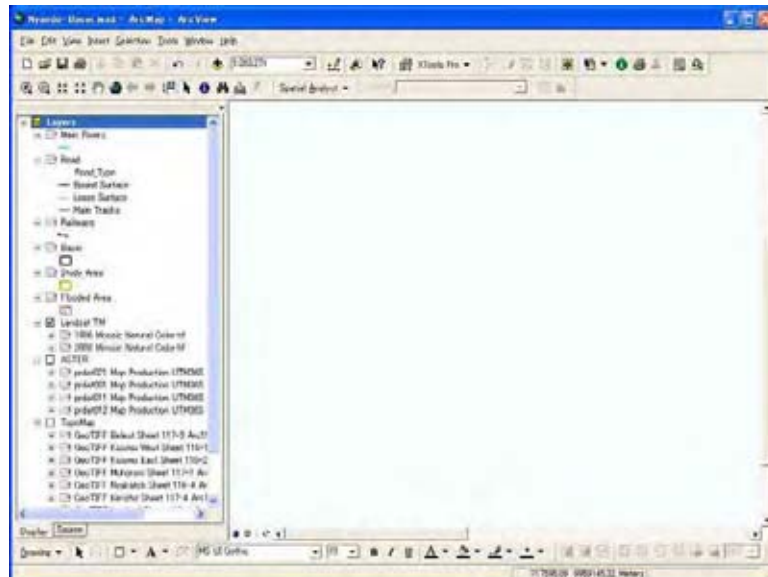

3-2　　After Check on Spatial Analyst extension, every type of raster data can open and can do some analysis.
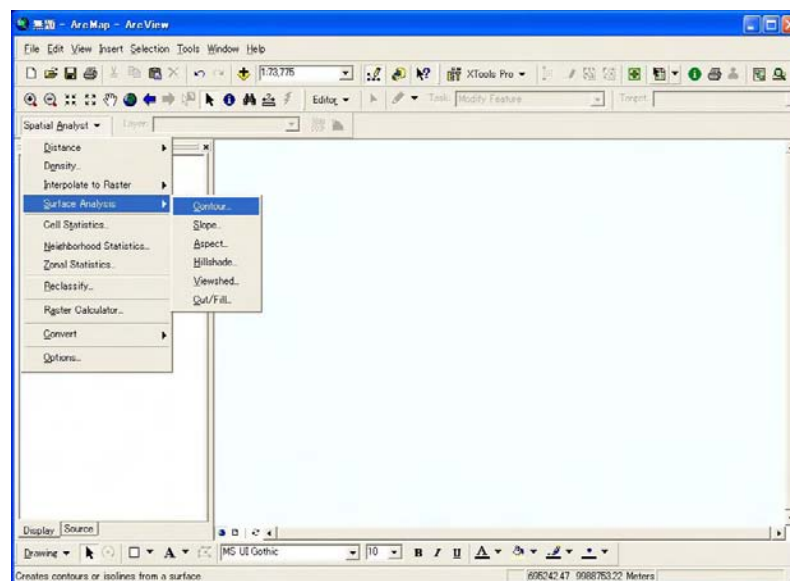
4-1

Expected Error-4   Does not read shape file

When existing mxd file opens, you see the empty map shown below:

This error happens when database structure is broken, or database is not stored in the appropriate place, under ¥C: on your computer.
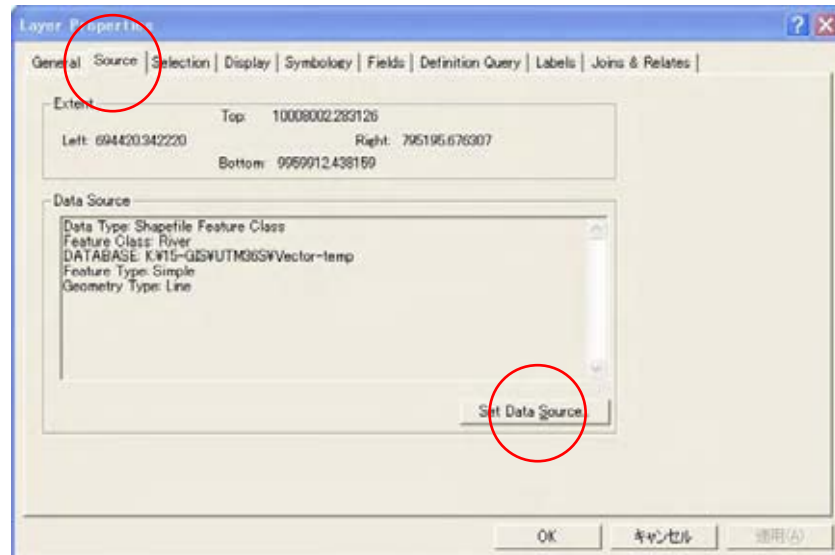
4-2

" **!** " shows that data cannot be read. Data doesn't exist in place or it is broken.

There are two action methods when it encounters this error. One is shift the database as the appropriate place. The other method is try to re-read existing shape file

4-3   Right-Click the layer name and select Properties. Layer Properties window open and select Source tub.

4-4   Click Set Data Source, then Data Source window opens. You can select the folder which you shifted and select the same shape file which mxd file read. Select the shape file, Layer Properties window set new Data Source.

4-5 Shape file reset and read. If you want to save this data path, File -> Save / Save as to save this mxd file.