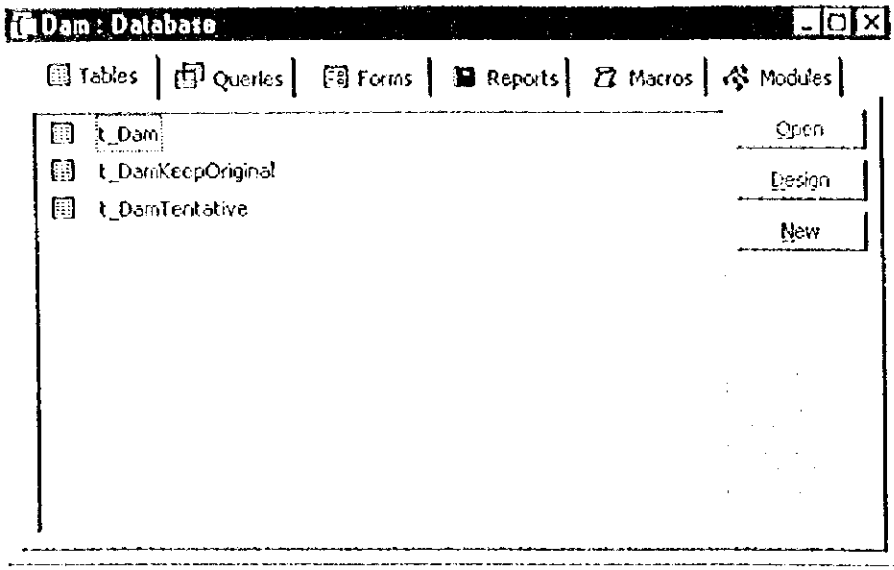
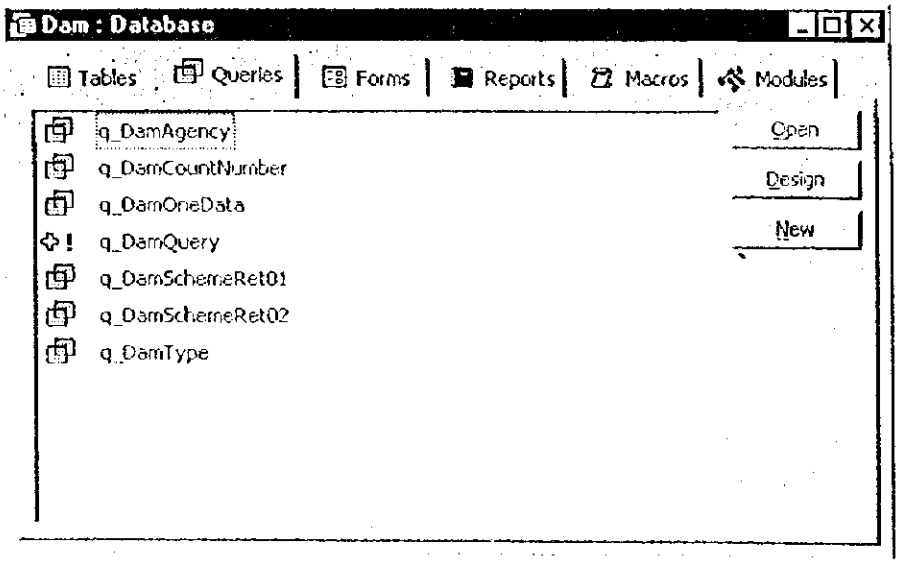
Chapter 5

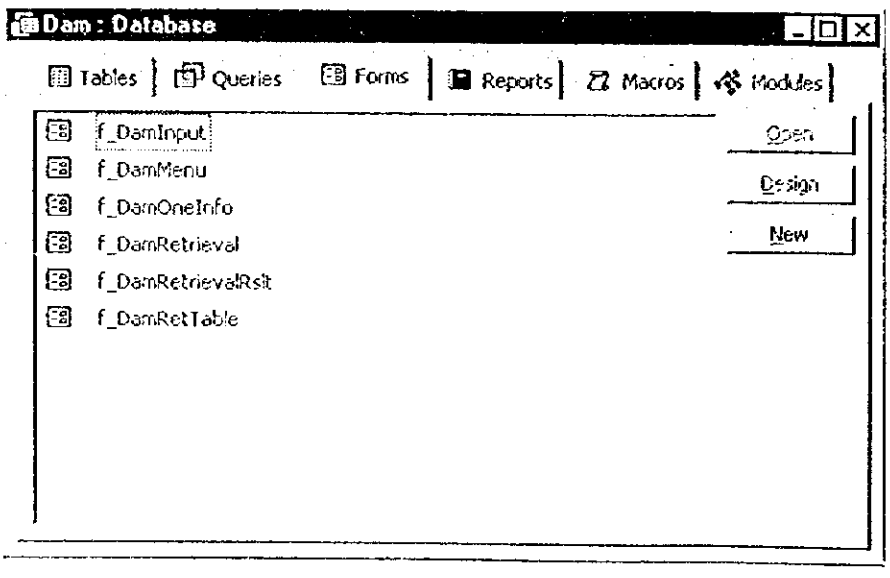
Dam Inventory Database

CONTENTS

5.1 Database Components

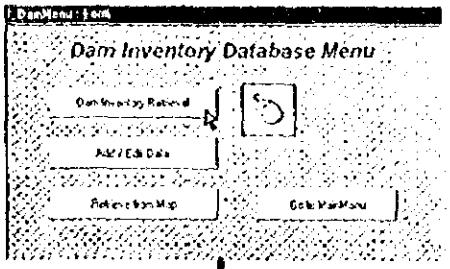




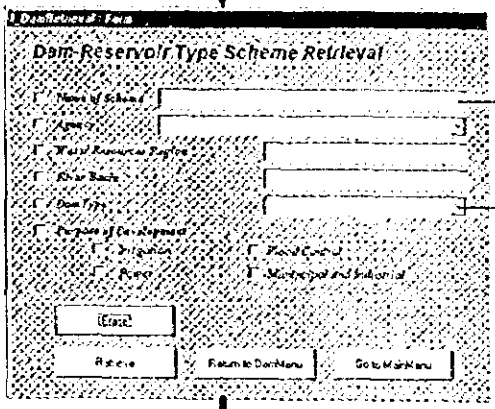


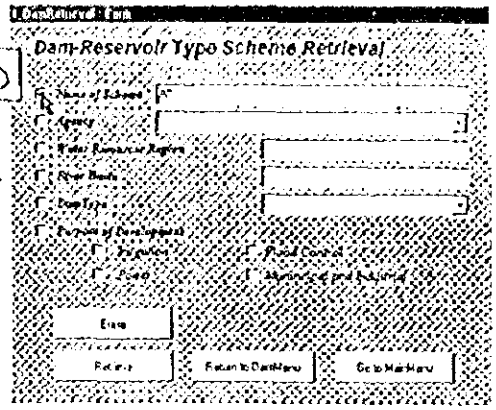
5.2 Dam Inventory Data

5.2.1 How to Retrieve



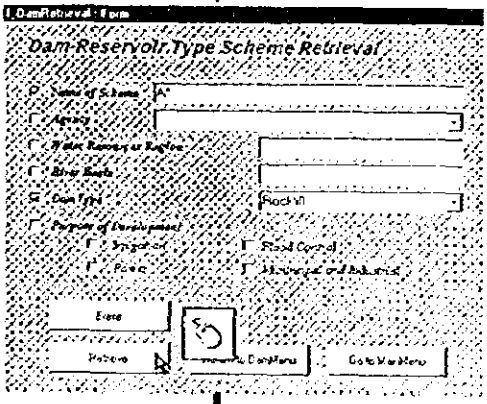
Click the 'Dam Inventory Retrieval' button.



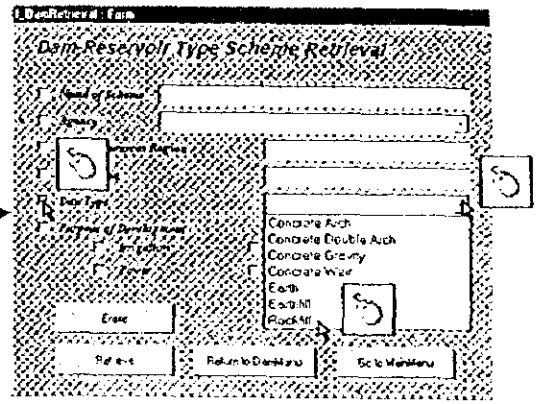


1) Click the Check Box.

2) Enter the Text Box such as follows if you would like to retrieve the name of scheme of 'ANGAT'.
[e.g.] ANGAT, A*, AN*T, *GAT, etc.

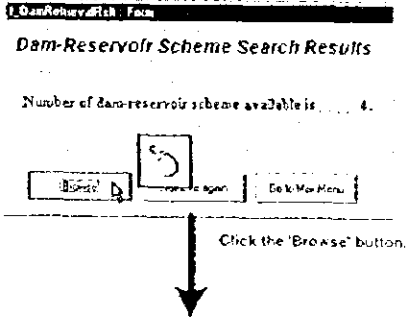


Click the 'Retrieve' button.

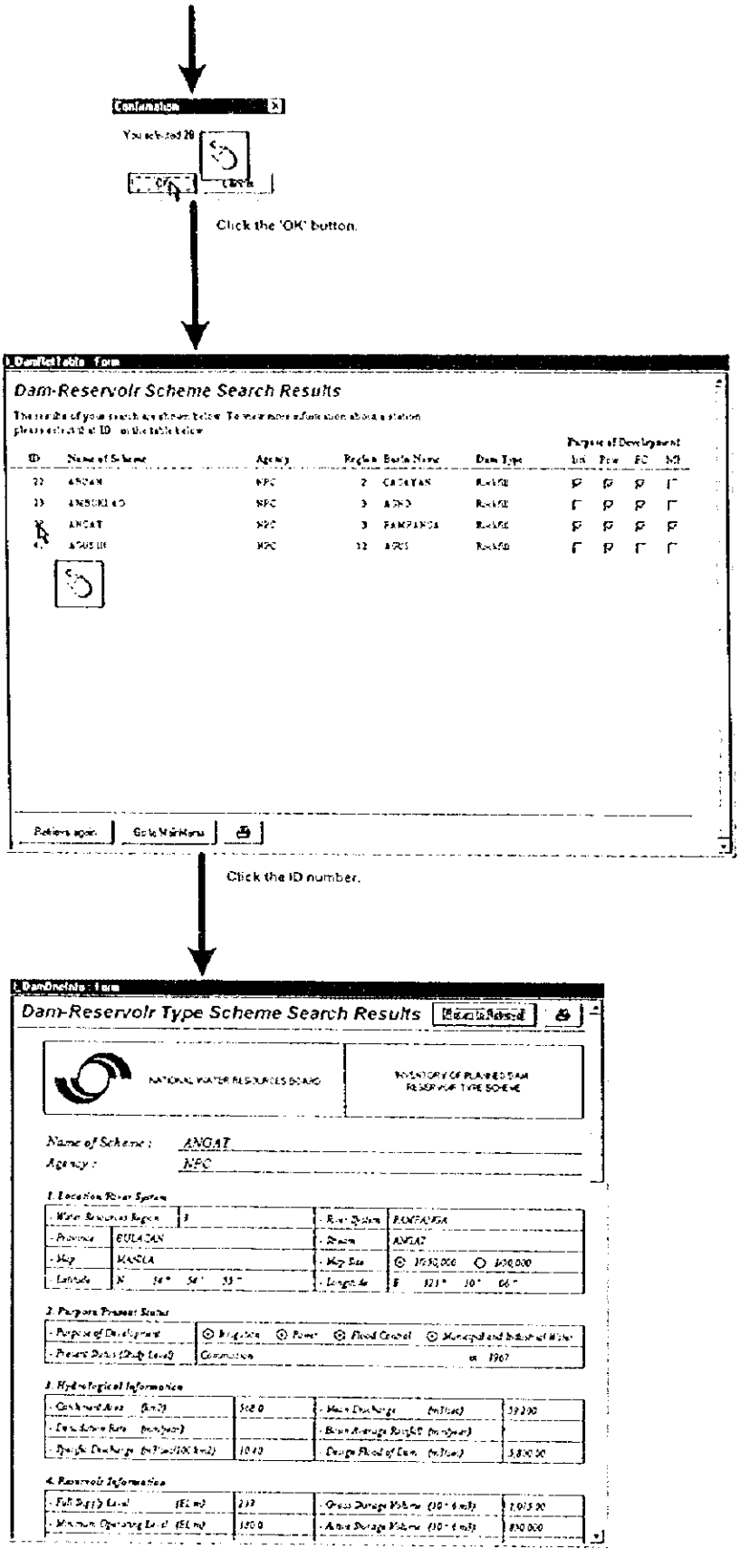


1) Click the Check Box.

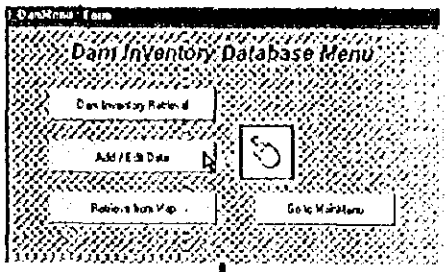
2) Click the right edge of Combo Box, and then either select one of Combo Box or enter such as 'Con' if you would like to retrieve all of Concrete Double Arch, Concrete Gravity, Concrete Weir.



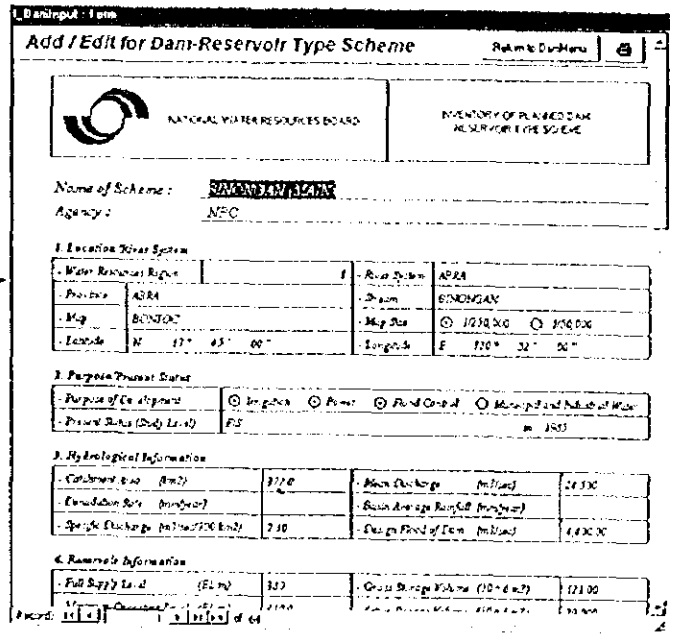
Click the 'Browse' button.


Click the 'OK' button.
Dam-Reservoir Scheme Search Results
Click the ID number.
Dam-Reservoir Type Scheme Search Results

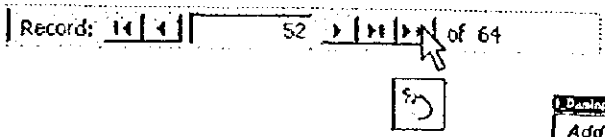
5.2.2 How to Add / Edit

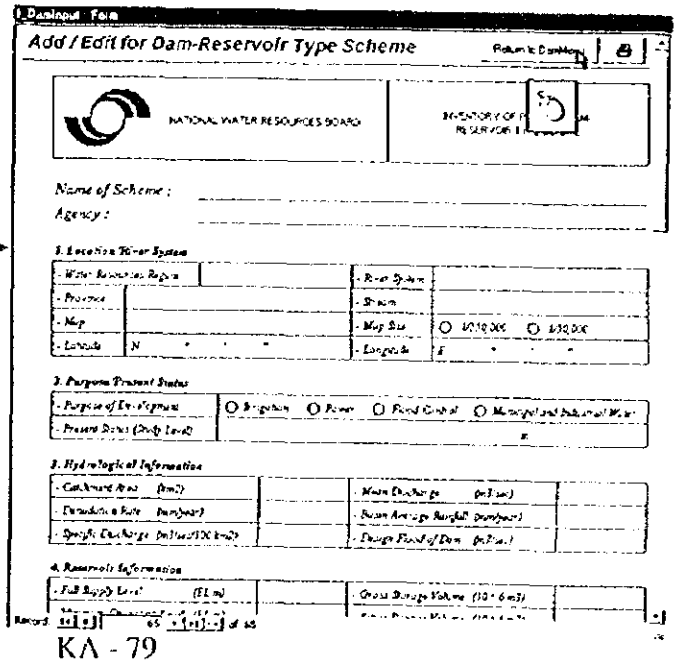


Click the 'Add / Edit Data' button.



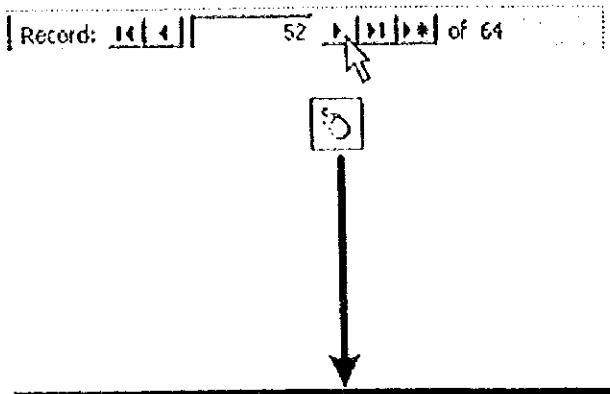
1) Add New Data

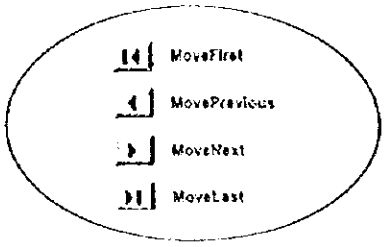


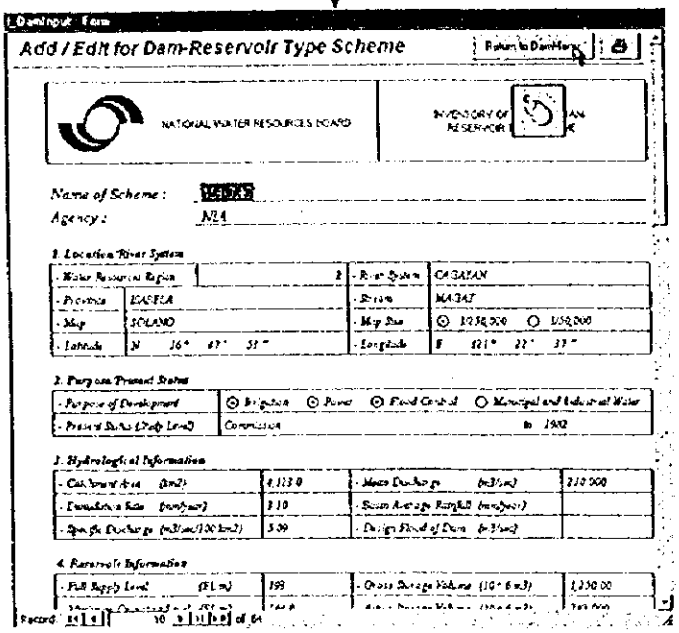


1) When you click the 'Add New' button, you can add new data.
2) Enter the data into each field.
3) After encoded, click the 'Return to DamMenu' button.

2) Edit the Data







1) Click the 'Move' button, and then select a record for which you would like to edit.

2) After edited, click the 'Return to DamMenu' button for update table of database.

5.3 Output Sample

1) Dam Inventory Data

NATIONAL WATER RESOURCES BOARD	INVENTORY OF PLANNED DAM-RESERVOIR TYPE SCHEME

Name of Scheme : ANGAT

Agency : NPC

1. Location/River System

- Water Resources Region	3	- River System	PAMPANGA
- Province	BULACAN	- Stream	ANGAT
- Map	MANILA	- Map Size	○ 1/250,000 ○ 1/50,000
- Latitude	N 14° 54' 55"	- Longitude	E 121° 10' 06"

2. Purpose/Present Status

- Purpose of Development	● Irrigation ● Power ● Flood Control ● Municipal and Industrial Water
- Present Status (Study Level)	Commission in 1967

3. Hydrological Information

- Catchment Area (km2)	568.0	- Mean Discharge (m3/sec)	59.200
- Denudation Rate (mm/year)		- Basin Average Rainfall (mm/year)	
- Specific Discharge (m3/sec/100 km2)	10.40	- Design Flood of Dam (m3/sec)	5,800.00

4. Reservoir Information

- Full Supply Level (EL.m)	217	- Gross Storage Volume (10^6 m3)	1,075.00
- Minimum Operating Level (EL.m)	180.0	- Active Storage Volume (10^6 m3)	850.000
- Surcharge Level (EL.m)	219.0	- Flood Control Space (10^6 m3)	
- Drawdown Depth (m)	37	- Dead Storage Volume (10^6 m3)	225.00
- Geology			

5. Main Dam Information

- Dam Type	Rockfill	- Dam Height (m)	131.0
- Crest Elevation (EL.m)	223.5	- Crest Length (m)	368
- Bottom Elevation (EL.m)	92.5	- Embankment Volume (10^6 m3)	

6. Construction Cost (at the Price Level of)

- Total Project Construction Cost (10^6 US$)	
Dam Cost (10^6 US$)	
Power Facilities Cost (10^6 US$)	
Water Supply Facilities Cost (10^6 US$)	

7. Main Features of Hydropower

- Installed Capacity	(MW)	218.0	- Rated Net Head	(m)	135
- Length of Waterway	(m)		- Firm Peak Power	(MW)	150.0
- Diameter of Waterway	(m)		- Annual Total Energy	(GWh)	398.0
- Tailwater Level	(EL.m)		Firm Energy	(GWh)	280.0
- Plant Maximum Discharge	(m3/sec)		Secondary Energy	(GWh)	118.0
- Firm Discharge	(m3/sec)				

8. Main Features of Irrigation

- Total Irrigation Area Covered by Water Supply from the Reservoir (ha)		
- Period of Irrigation Water Being Supplied	From month	to month
- Annual Mean Discharge Supplied (m3/sec)		
- Monthly Maximum Discharge (m3/sec)		

9. Main Features of Municipal Water Supply

- Main Area Served by the Municipal Water Supply System	
- Mean Discharge Used for Municipal Water Supply (m3/sec)	

10. Other Description on the Dam-Reservoir Scheme

Consultant : Horza

Note

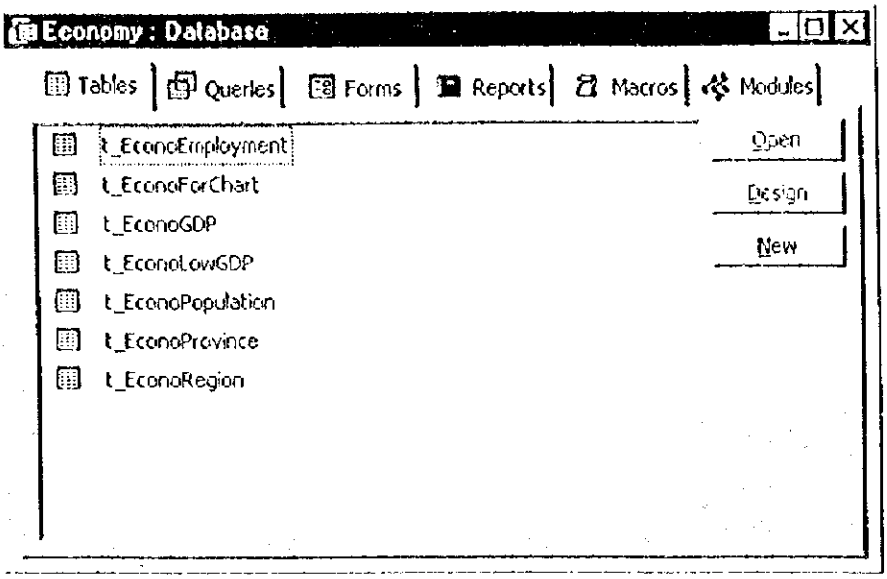
Source of Data : HPPS
NPC's data
Survey/Inventory

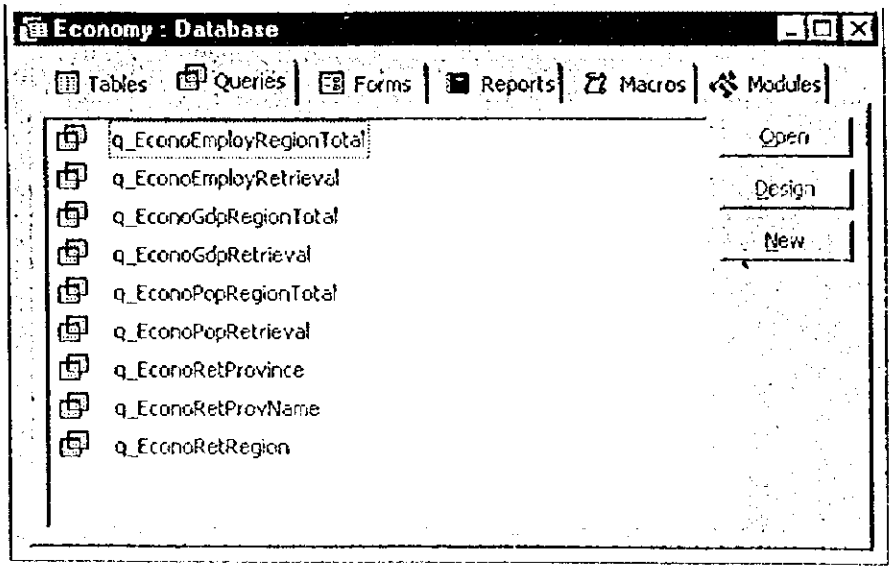
Chapter 6

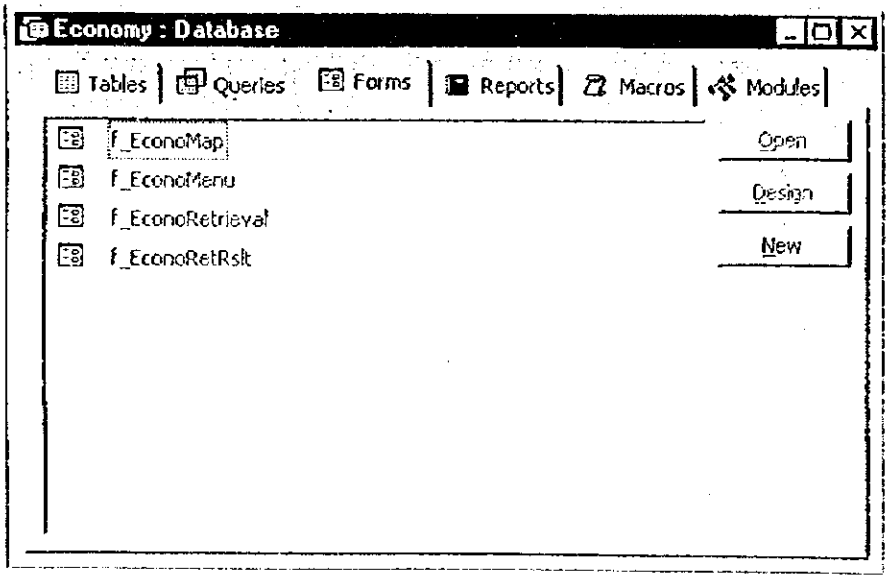
Socio-Economy Database

CONTENTS

6.1 Database Components



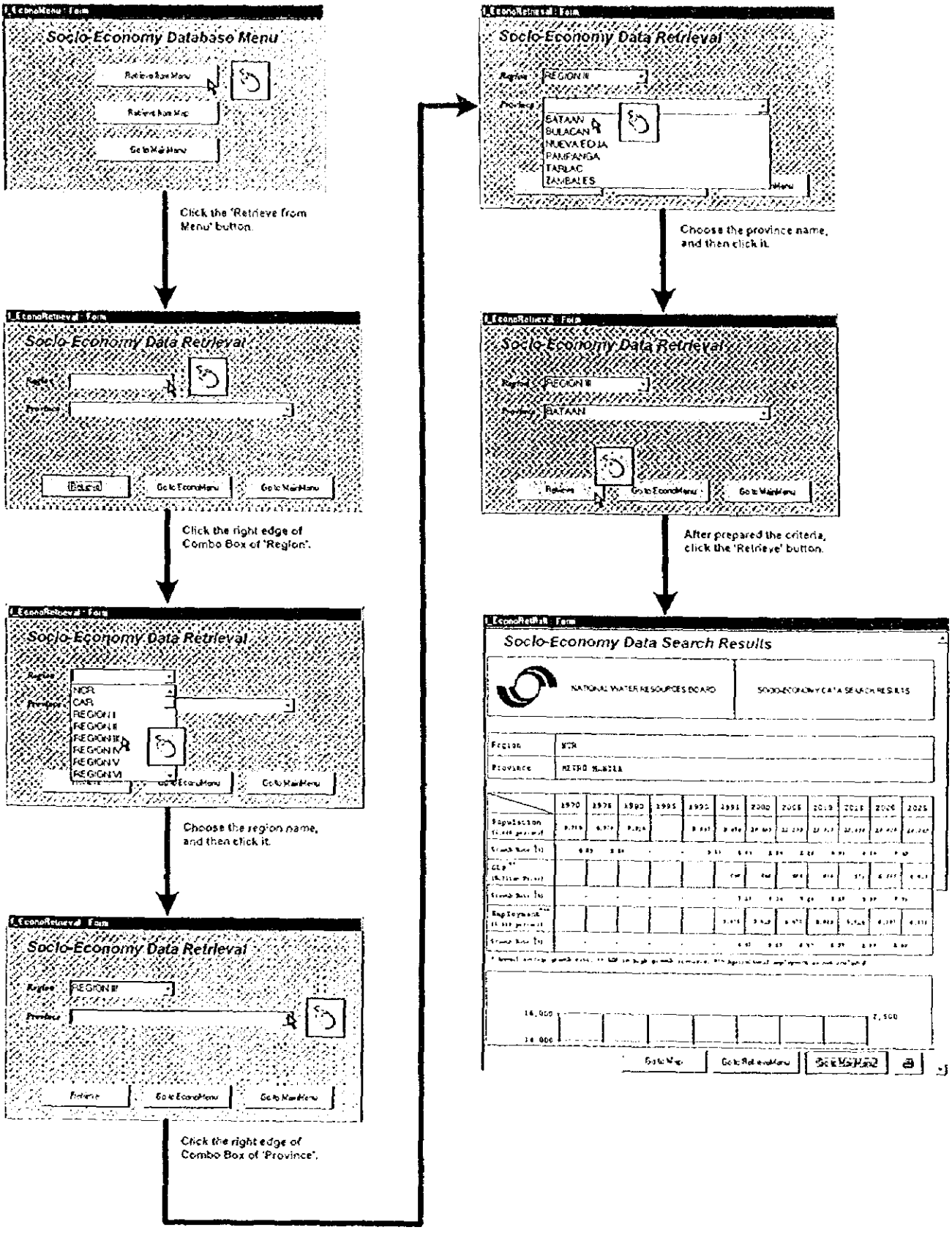




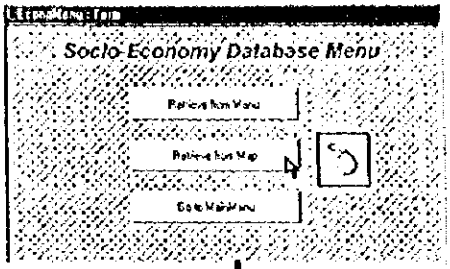
6.2 Economy Projection Data

6.2.1 How to Retrieve

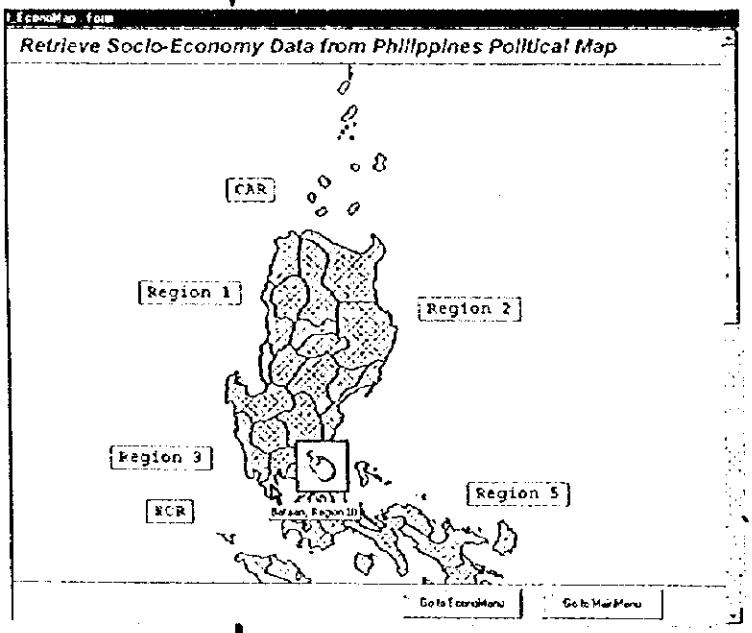
1) Using Retrieval Menu



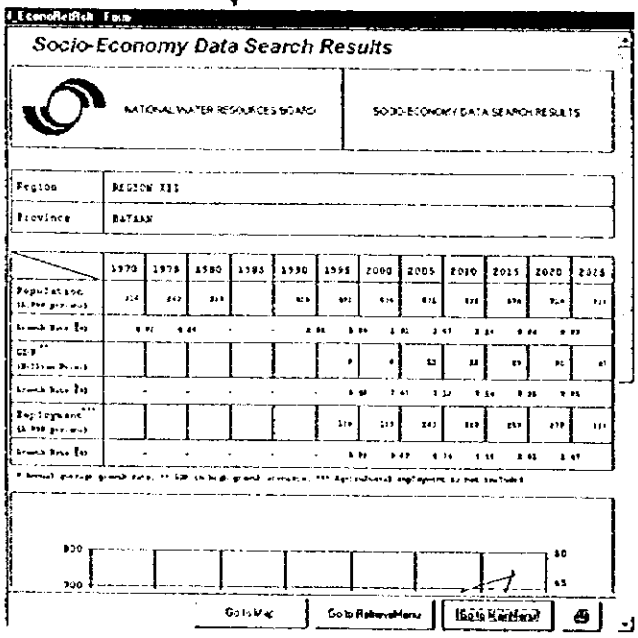
2) Using Retrieval Map



Click the 'Retrieve from Map' button.



Click the region / province on the philippines map.



6.3 Output Sample

1) Economy Projection Data

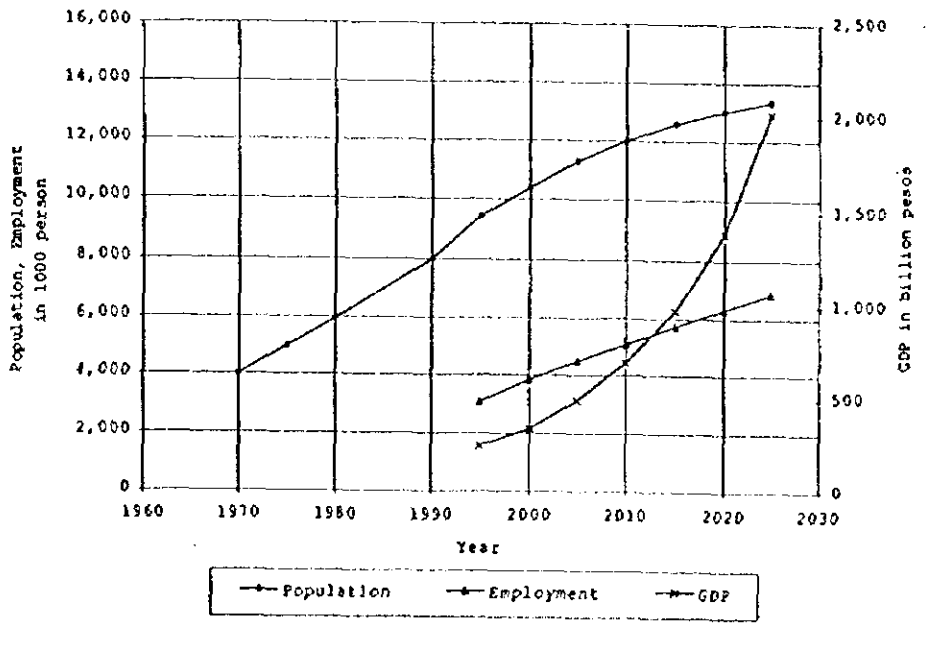
NATIONAL WATER RESOURCES BOARD

SOCIO-ECONOMY DATA SEARCH RESULTS

Region	NCR
Province	METRO MANILA

	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025
Population (1,000 persons)	3,956	4,970	5,926		7,967	9,454	10,495	11,289	12,020	12,593	13,025	13,349
Growth Rate* (%)		4.63	3.58	-	-	3.53	1.94	1.64	1.26	0.93	0.68	0.49
GDP ** (Billion Peso)						240	340	484	688	933	1,389	2,019
Growth Rate* (%)		-	-	-	-	-	7.15	7.36	7.28	7.17	7.39	7.76
Employment *** (1,000 persons)						3,075	3,819	4,437	5,083	5,714	6,307	6,836
Growth Rate* (%)		-	-	-	-	-	4.43	3.23	2.57	2.37	1.99	1.62

* Annual average growth rate, ** GDP in high growth scenario, *** Agricultural employment is not included

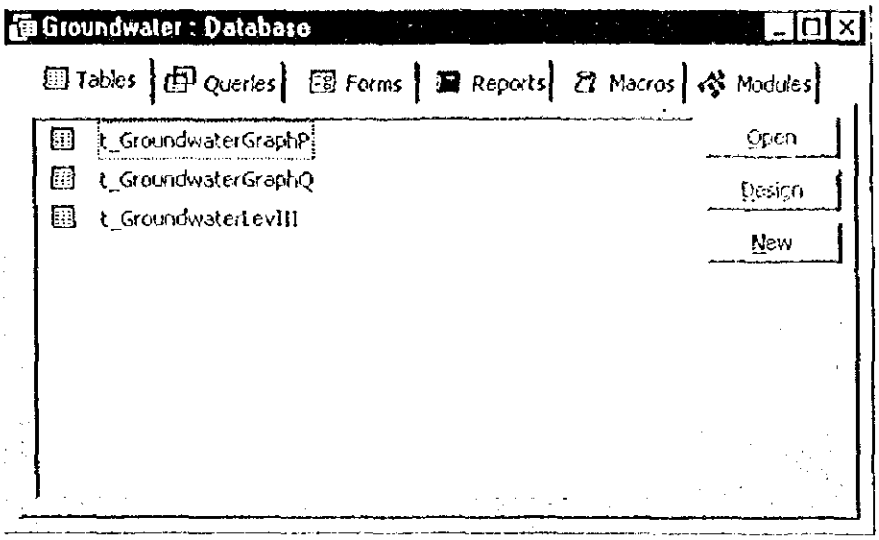


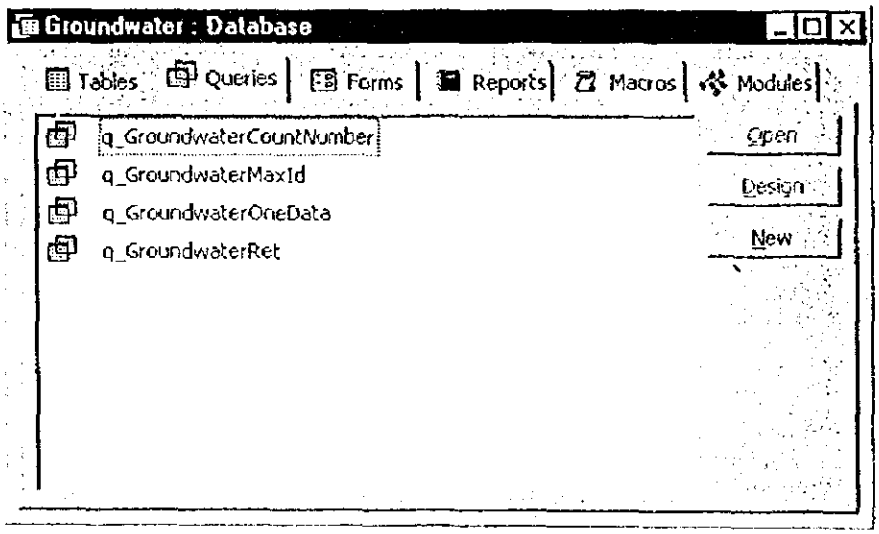
Chapter 7

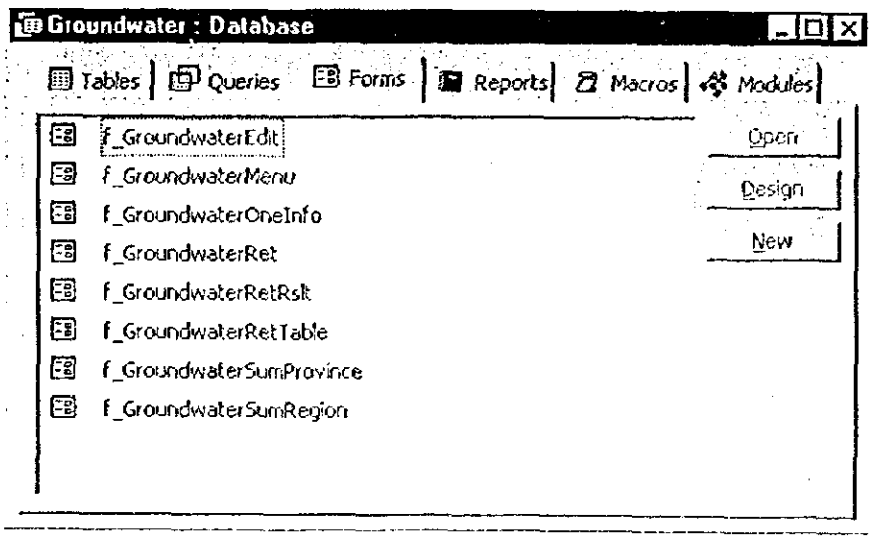
Groundwater Database

CONTENTS

7.1 Database Components

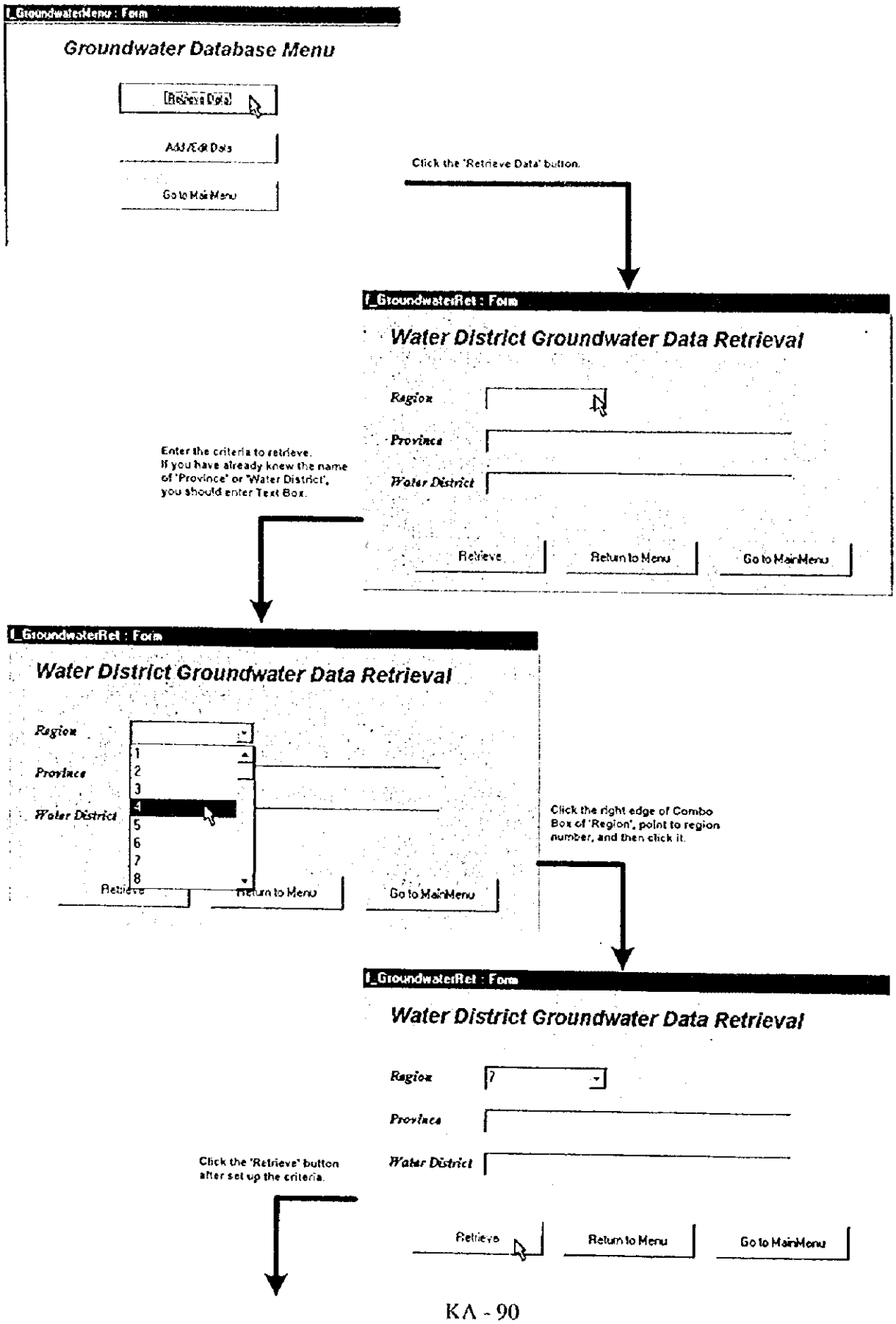


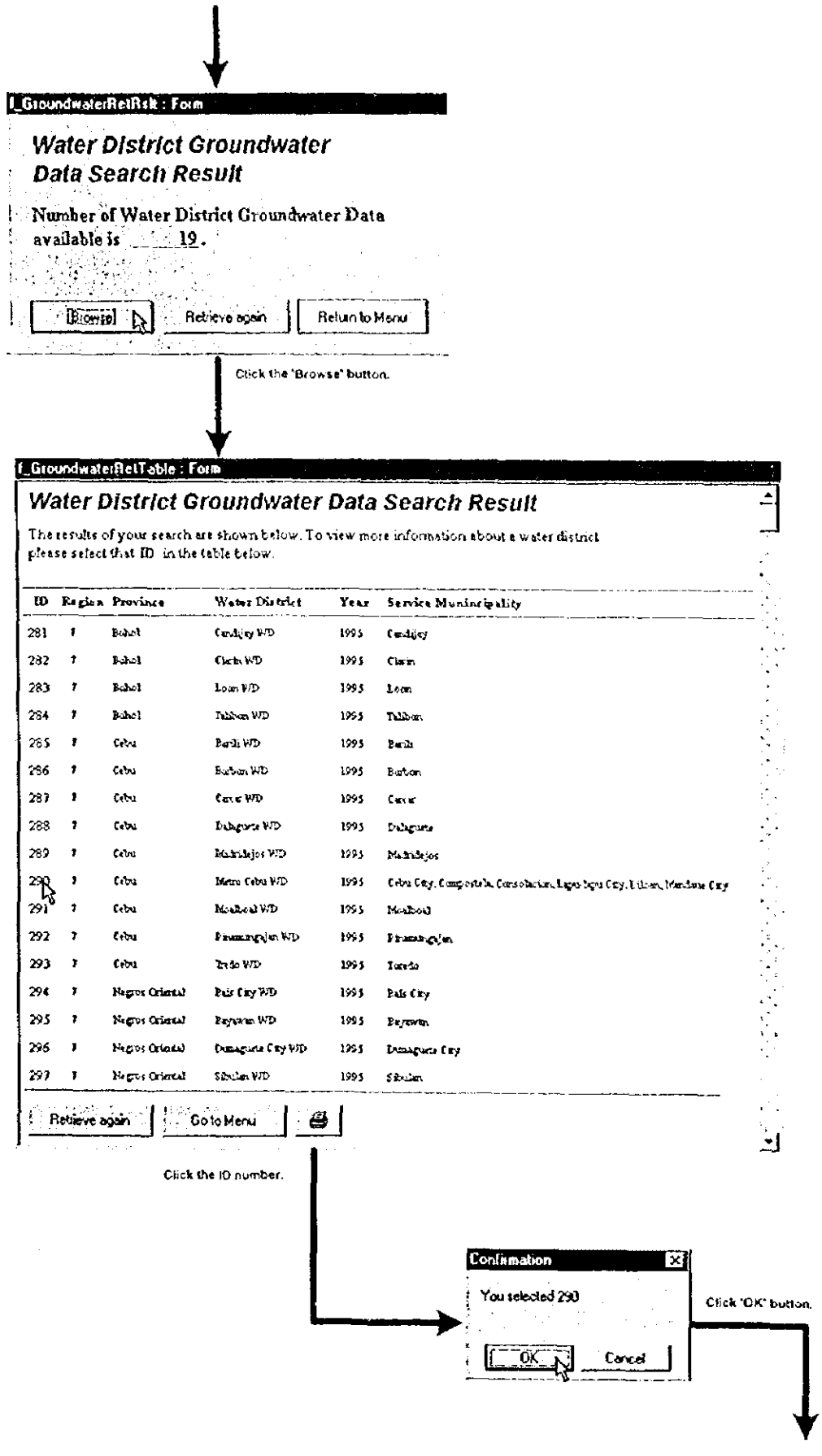


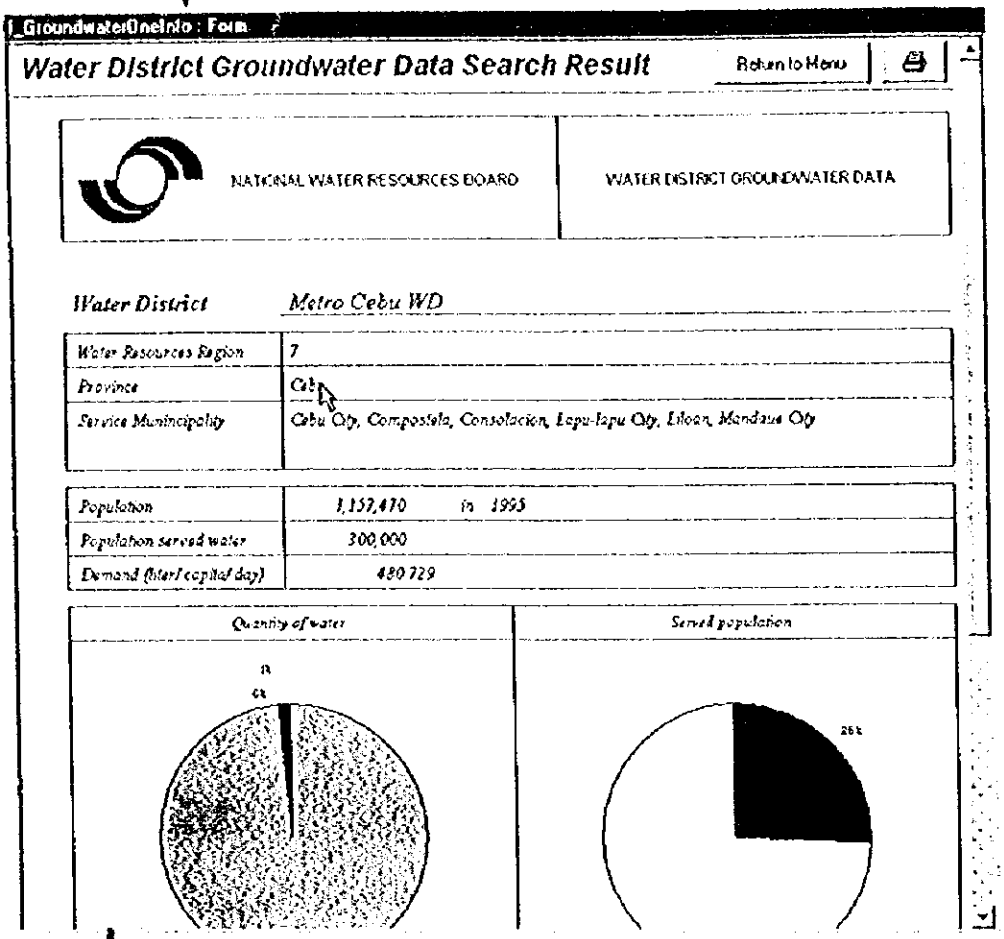


7.2 Water District Groundwater Data

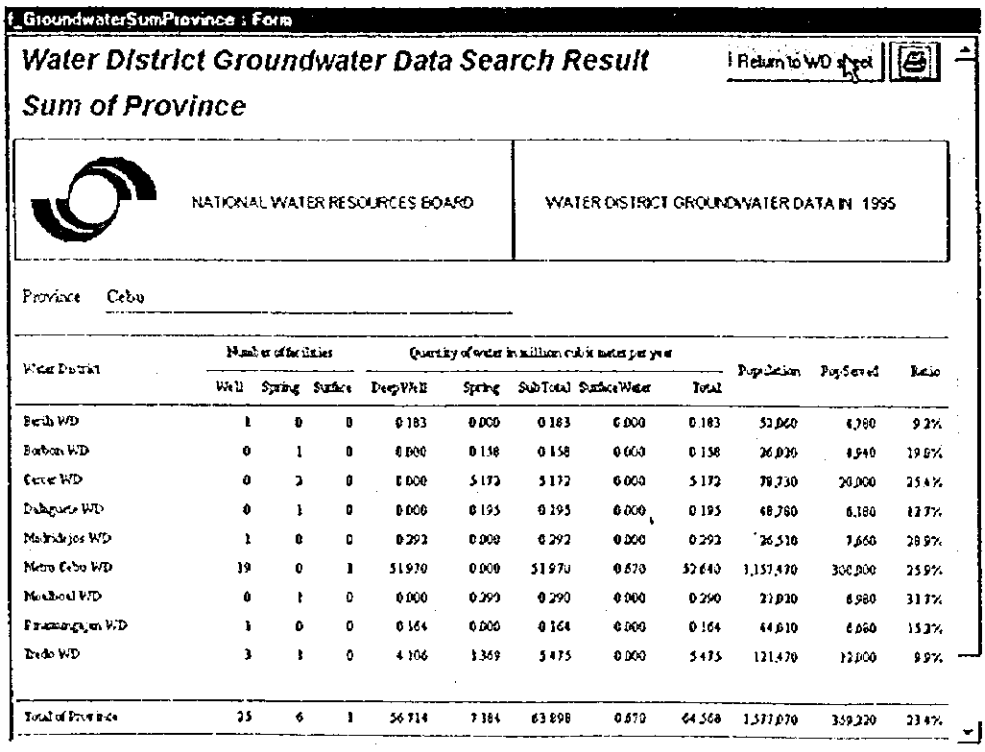
7.2.1 How to Retrieve



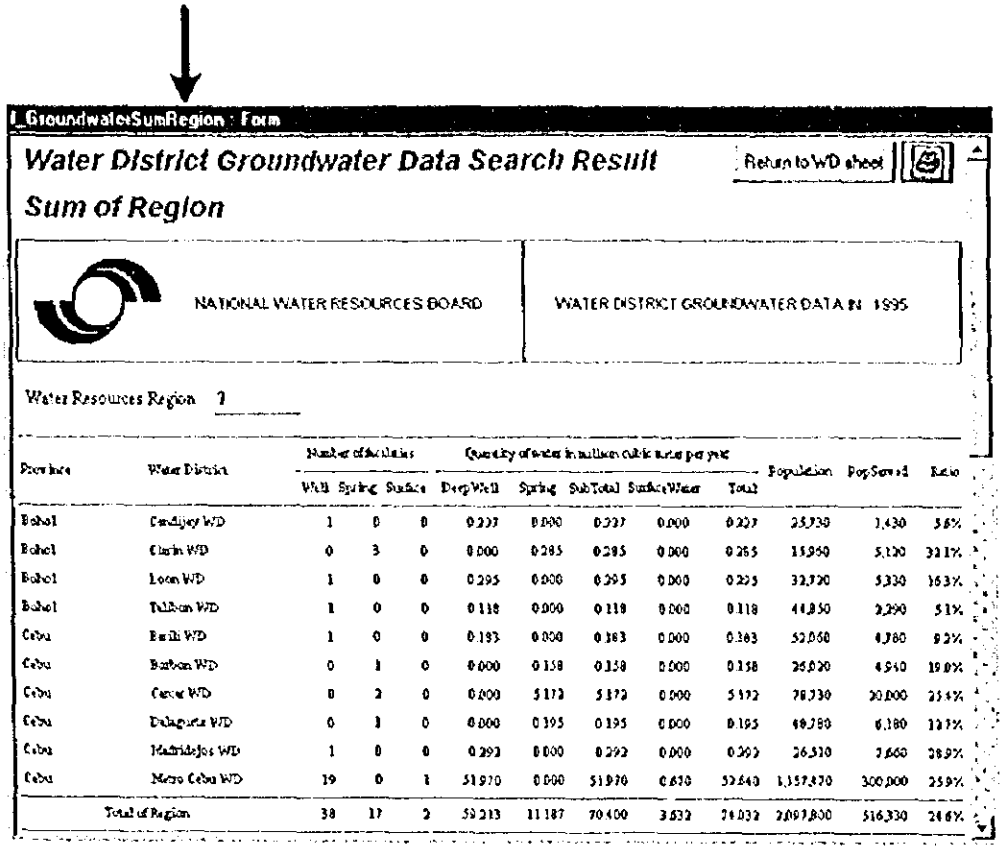

f_GroundwaterRetRsk : Form
Water District Groundwater Data Search Result
Number of Water District Groundwater Data available is 19.
Browse
Retrieve again
Return to Menu
Click the 'Browse' button.
f_GroundwaterRetTable : Form
Water District Groundwater Data Search Result
The results of your search are shown below. To view more information about a water district please select that ID in the table below.
ID Region Province Water District Year Service Municipality
281 7 Bohol Candijay WD 1995 Candijay
282 7 Bohol Clarin WD 1995 Clarin
283 7 Bohol Loon WD 1995 Loon
284 7 Bohol Tubigon WD 1995 Tubigon
285 7 Cebu Barili WD 1995 Barili
286 7 Cebu Borbon WD 1995 Borbon
287 7 Cebu Carcar WD 1995 Carcar
288 7 Cebu Dalaguete WD 1995 Dalaguete
289 7 Cebu Madridejos WD 1995 Madridejos
290 7 Cebu Metro Cebu WD 1995 Cebu City, Compostela, Consolacion, Lapu-lapu City, Liloan, Mandaue City
291 7 Cebu Moalboal WD 1995 Moalboal
292 7 Cebu Pinamungajan WD 1995 Pinamungajan
293 7 Cebu Toledo WD 1995 Toledo
294 7 Negros Oriental Bais City WD 1995 Bais City
295 7 Negros Oriental Bayawan WD 1995 Bayawan
296 7 Negros Oriental Dumaguete City WD 1995 Dumaguete City
297 7 Negros Oriental Sibulan WD 1995 Sibulan
Retrieve again
Go to Menu
Click the ID number.
Confirmation
You selected 290
OK
Cancel
Click 'OK' button.



Click the province name if you want to know the sum of province.
And you can click the region number to look the sum of region.



Water District	Number of facilities			Quantity of water in million cubic meters per year					Population	Pop.Served	Ratio
	Well	Spring	Surface	DeepWell	Spring	SubTotal	SurfaceWater	Total			
Bantayan WD	1	0	0	0.183	0.000	0.183	0.000	0.183	52,060	6,780	9.2%
Barbon WD	0	1	0	0.000	0.158	0.158	0.000	0.158	26,030	8,540	19.0%
Carcar WD	0	3	0	0.000	5.172	5.172	0.000	5.172	78,230	20,000	25.6%
Daanbantayan WD	0	1	0	0.000	0.195	0.195	0.000	0.195	68,780	6,380	12.7%
Madridejos WD	1	0	0	0.293	0.000	0.292	0.000	0.293	26,530	7,660	28.9%
Metro Cebu WD	19	0	1	51.970	0.000	51.970	0.670	52.640	1,157,470	300,000	25.9%
Moalboal WD	0	1	0	0.000	0.290	0.290	0.000	0.290	21,030	6,980	33.2%
Pinamungajan WD	1	0	0	0.164	0.000	0.164	0.000	0.164	44,610	6,860	15.3%
Tredo WD	3	1	0	4.106	1.369	5.475	0.000	5.475	121,470	12,000	9.9%
Total of Province	25	6	1	56.714	7.384	63.898	0.670	64.568	1,577,070	369,220	23.4%



I_GroundwaterSumRegion : Form

Water District Groundwater Data Search Result

Return to WD sheet

Sum of Region

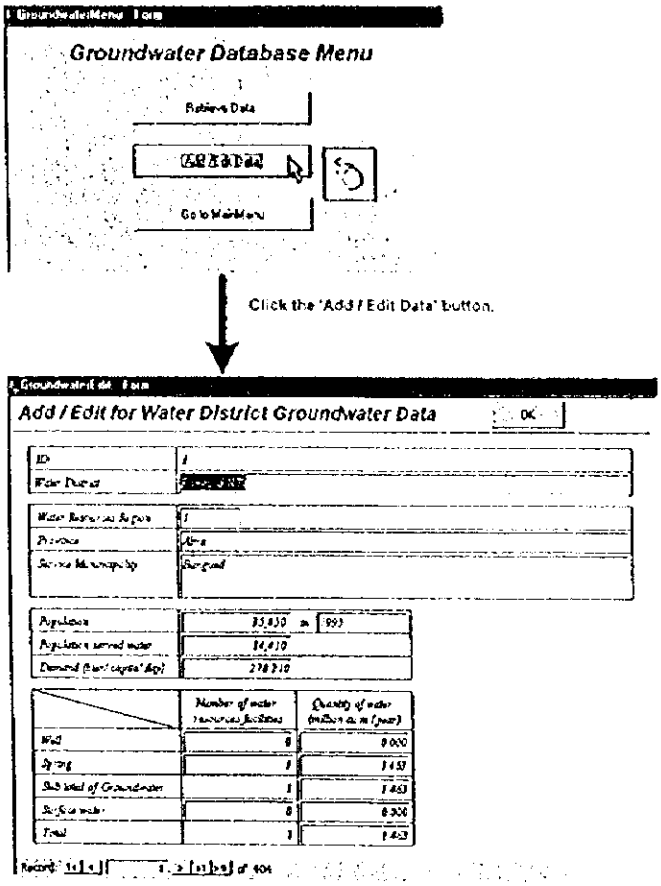
NATIONAL WATER RESOURCES BOARD

WATER DISTRICT GROUNDWATER DATA IN 1995

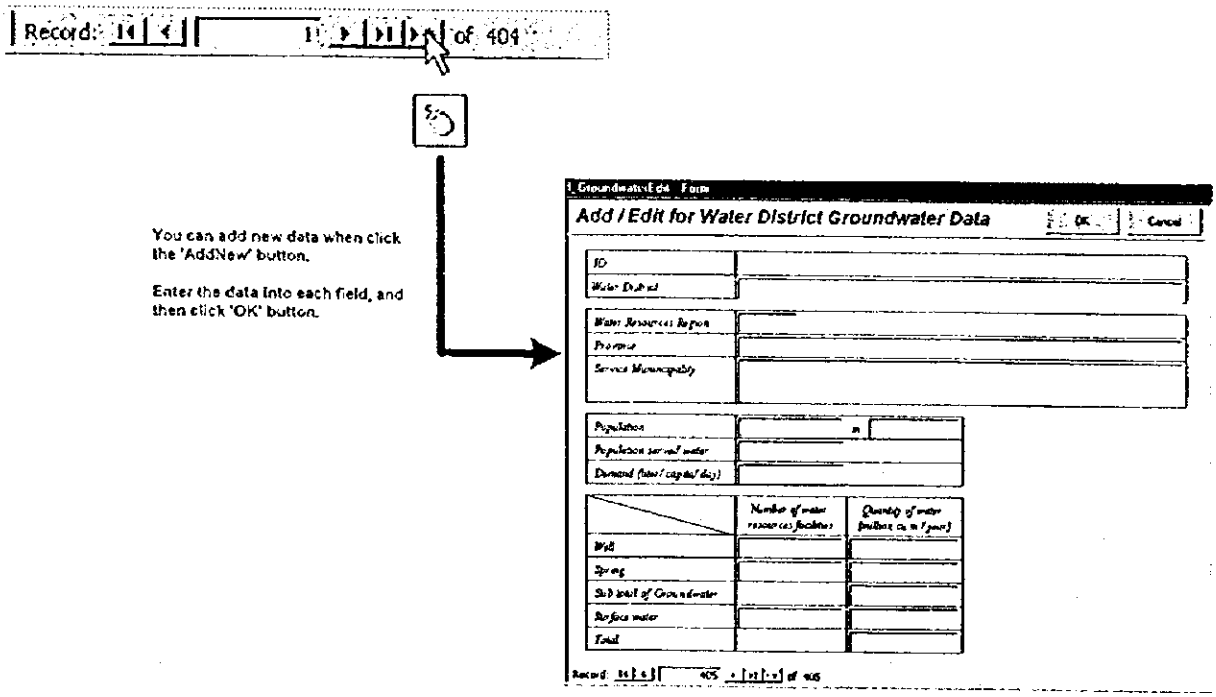
Water Resources Region 7

Province	Water District	Number of facilities			Quantity of water in million cubic meter per year					Population	Pop.Served	Ratio
		Well	Spring	Surface	Deep Well	Spring	SubTotal	Surface Water	Total			
Bohol	Candijay WD	1	0	0	0.237	0.000	0.237	0.000	0.237	25,730	1,430	5.6%
Bohol	Clarin WD	0	3	0	0.000	0.285	0.285	0.000	0.285	15,950	5,120	32.1%
Bohol	Loon WD	1	0	0	0.295	0.000	0.295	0.000	0.295	32,700	5,330	16.3%
Bohol	Talibon WD	1	0	0	0.118	0.000	0.118	0.000	0.118	44,850	2,290	5.1%
Cebu	Barili WD	1	0	0	0.183	0.000	0.183	0.000	0.183	52,050	4,780	9.2%
Cebu	Bonbon WD	0	1	0	0.000	0.158	0.158	0.000	0.158	26,020	4,940	19.0%
Cebu	Carcar WD	0	2	0	0.000	5.172	5.172	0.000	5.172	78,730	20,000	25.4%
Cebu	Dalaguete WD	0	1	0	0.000	0.195	0.195	0.000	0.195	49,780	6,180	12.3%
Cebu	Madridejos WD	1	0	0	0.293	0.000	0.292	0.000	0.293	26,510	7,660	28.9%
Cebu	Metro Cebu WD	19	0	1	51.970	0.000	51.970	0.670	52.640	1,357,470	300,000	25.9%
Total of Region		38	17	2	59.213	11.187	70.400	3.632	74.032	2,097,800	516,330	24.6%

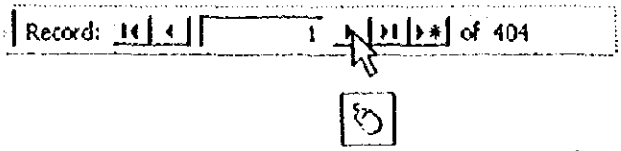
7.2.2 How to Add / Edit



1) Add New Data

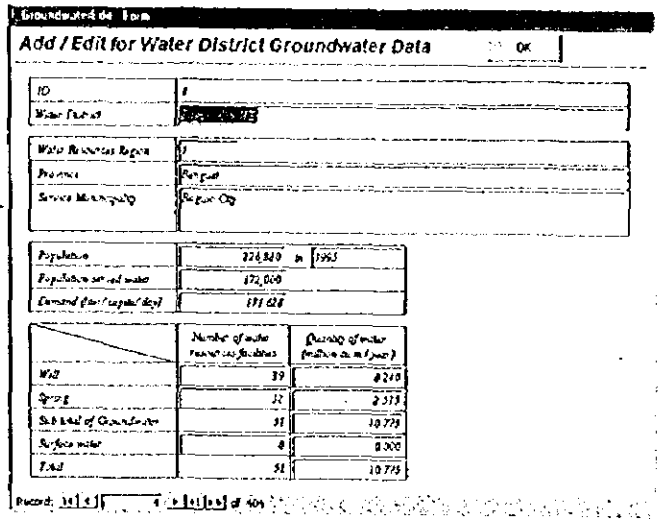


2) Edit the Data



Click the 'Move' button to select a record for which you would like to edit.

After edited, click the 'OK' button to close the editor.



7.3 Output Samples

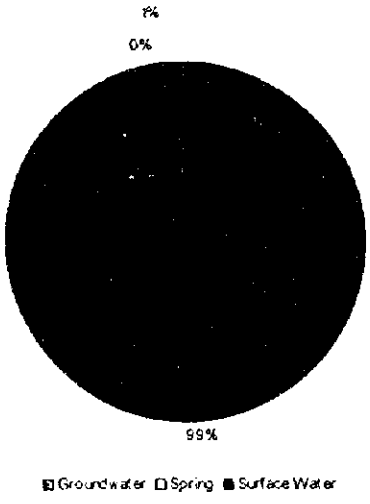
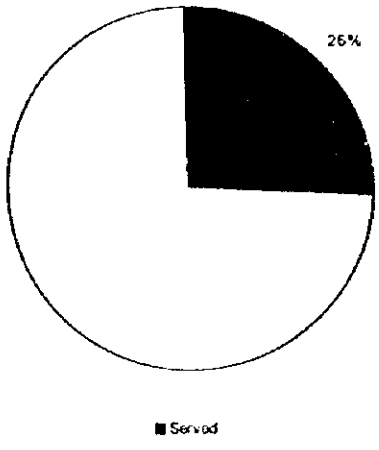
1) Water District Groundwater Data

NATIONAL WATER RESOURCES BOARD	WATER DISTRICT GROUNDWATER DATA

Water District *Metro Cebu WD*

Water Resources Region	*7*
Province	*Cebu*
Service Municipality	*Cebu City, Compostela, Consolacion, Lapu-lapu City, Liloan, Mandaue City*

Population	*1,157,470*	*in 1995*
Population served water	*300,000*	
Demand (liter/ capita/ day)	*480.729*	

Quantity of water	*Served population*
	

	Number of water resources facilities	*Quantity of water (million cu.m / year)*
Well	*19*	*51.970*
Spring	*0*	*0.000*
Sub total of Groundwater	*19*	*51.970*
Surface water	*1*	*0.670*
Total	*20*	*52.640*

2) Regional Summation of Water District Groundwater Data

NATIONAL WATER RESOURCES BOARD | WATER DISTRICT GROUNDWATER DATA IN 1995

Water Resources Region 7

Province	Water District	Number of facilities			Quantity of water in million cubic meter per year					Population	PopServed	Ratio
		Well	Spring	Surface	DeepWell	Spring	SubTotal	SurfaceWater	Total			
Bohol	Candijay WD	1	0	0	0.227	0.000	0.227	0.000	0.227	25,730	1,450	5.6%
Bohol	Clarin WD	0	3	0	0.000	0.285	0.285	0.000	0.285	15,960	5,120	32.1%
Bohol	Loon WD	1	0	0	0.295	0.000	0.295	0.000	0.295	32,720	5,330	16.3%
Bohol	Talibon WD	1	0	0	0.118	0.000	0.118	0.000	0.118	44,850	2,290	5.1%
Cebu	Barili WD	1	0	0	0.183	0.000	0.183	0.000	0.183	53,060	4,780	9.2%
Cebu	Borbon WD	0	1	0	0.000	0.158	0.158	0.000	0.158	26,020	4,940	19.0%
Cebu	Carcar WD	0	2	0	0.000	5.172	5.172	0.000	5.172	78,330	20,000	25.4%
Cebu	Dalaguete WD	0	1	0	0.000	0.195	0.195	0.000	0.195	48,780	6,180	12.7%
Cebu	Madridejos WD	1	0	0	0.292	0.000	0.292	0.000	0.292	26,510	7,660	28.9%
Cebu	Metro Cebu WD	19	0	1	51.970	0.000	51.970	0.670	52.640	1,157,470	300,000	25.9%
Cebu	Moalboal WD	0	1	0	0.000	0.290	0.290	0.000	0.290	22,020	6,980	31.7%
Cebu	Pinamungajan WD	1	0	0	0.164	0.000	0.164	0.000	0.164	44,010	6,680	15.2%
Cebu	Toledo WD	3	1	0	4.106	1.369	5.475	0.000	5.475	121,470	12,000	9.9%
Negros Oriental	Bais City WD	1	0	0	0.174	0.000	0.174	0.000	0.174	63,360	9,470	14.9%
Negros Oriental	Bayawan WD	0	3	0	0.000	2.131	2.131	0.000	2.131	90,950	21,120	23.2%
Negros Oriental	Dumaguete City WD	6	0	1	0.673	0.000	0.673	2.962	3.635	92,640	71,350	76.9%
Negros Oriental	Sibulan WD	0	1	0	0.000	0.409	0.409	0.000	0.409	33,210	3,590	11.5%
Negros Oriental	Tanjay WD	1	1	0	0.678	0.679	1.357	0.000	1.357	65,630	18,990	28.9%
Siquijor	Metro Siquijor WD	2	3	0	0.333	0.499	0.832	0.000	0.832	57,680	8,520	14.8%
Total of Region		38	17	2	59.213	11.187	70.400	3.632	74.032	2,097,800	516,330	24.6%

3) Provincial Summation of Water District Groundwater Data

NATIONAL WATER RESOURCES BOARD | WATER DISTRICT GROUNDWATER DATA IN 1995

Province Cebu

Water District	Number of facilities			Quantity of water in million cubic meter per year					Population	PopServed	Ratio
	Well	Spring	Surface	DeepWell	Spring	SubTotal	SurfaceWater	Total			
Barili WD	1	0	0	0.183	0.000	0.183	0.000	0.183	52,060	4,780	9.2%
Borbon WD	0	1	0	0.000	0.158	0.158	0.000	0.158	26,020	4,940	19.0%
Carcar WD	0	2	0	0.000	5.172	5.172	0.000	5.172	78,930	20,000	25.4%
Daanguera WD	0	1	0	0.000	0.195	0.195	0.000	0.195	48,780	6,180	12.7%
Madridejos WD	1	0	0	0.292	0.000	0.292	0.000	0.292	26,510	7,660	28.9%
Metro Cebu WD	19	0	1	51.970	0.000	51.970	0.670	52.640	1,133,470	300,000	25.9%
Moalboal WD	0	1	0	0.000	0.290	0.290	0.000	0.290	22,020	6,980	31.7%
Pinamungajan WD	1	0	0	0.164	0.000	0.164	0.000	0.164	44,010	6,680	15.2%
Tredo WD	3	1	0	4.106	1.369	5.475	0.000	5.475	121,470	12,000	9.9%
Total of Province	25	6	1	56.714	7.364	63.898	0.670	64.568	1,573,070	369,220	23.4%

Chapter 8

Probability Calculation

CONTENTS

8.1 Methodology of Probability Calculation

All projects are planned for the future, and the planner is uncertain as to the precise conditions to which the works will be subjected. Since the exact sequence of streamflow for future years can not be predicted, something must be said about the probable variations in flow so that the plan can be completed on the basis of a calculated risk. This section describes the methods for estimating the probability of hydrologic events.

8.1.1 Recurrence Interval

The recurrence interval is defined as the average interval in years between the occurence of a flood of specified magnitude and an equal or larger flood. The m th largest flood in a data series has been equaled or exceeded m times in the period of record. n years and an estimate of its recurrence interval T as given by the Hazen formula is

$$T = \frac{2n}{2m - 1} \qquad (8.1)$$

Several other formulas have been suggested for the calculation of recurrence interval or return period. The disagreement between the various formulas is limited to the larger floods, where m is small. If m equals 5 or more, the calculated values of T by all methods are almost identical. Equation (8.1) can be used to define plotting position, which provide a good estimate of flood flows with return periods of less than 20 years.

If an event has a true recurrence interval of T years, then the probability P that it will be equaled or exceeded in any one year is

$$P = \frac{1}{T} \qquad (8.2)$$

Since the only possibilities are that the event will or will not occur in any year, the probability that it will not occur in a given year is $1 - P$.

8.1.2 Gumbel Method

Gumbel suggested that the distribution of extreme values was appropriate for flood analysis since the annual flood could be assumed to be the largest of a sample of 365 possible values each year. Based on the argument that the distribution of floods is unlimited, i.e., that there is no physical limit to the maximum flood, Gumbel proposed that the probability P of the occurrence of a value equal to or greater than any X be expressed as

$$P = 1 - e^{-e^{-b}} \qquad (8.3)$$

$$b = -ln\left[-ln\left(1 - \frac{1}{T}\right)\right] \qquad (8.4)$$

where e is the base of Natural logarithms and b is given by

$$X = \bar{X} + \sigma(0.7797\, b - 0.45) \qquad (8.5)$$

where $\bar{X}$ is the arithmetic average of all values of X, and σ is the standard deviation of the series computed from

$$\sigma = \left[\frac{\Sigma (X - \bar{X})^2}{n - 1} \right]^{1/2} \tag{8.6}$$

where n is the number of years of record. The probability P is related to the recurrence interval T.

8.1.3 Log Pearson Type III Distribution

In 1967, the U.S. Water Resources Council adopted the log Pearson Type III distribution (of which the lognormal is a special case) as a standard for use by federal agencies. The purpose was to achieve standardization of procedures. The recommended procedure is to convert the series to logarithms and compute the mean, standard deviation, and skew coefficient G, which is

$$G = \frac{n \Sigma (\log X - \overline{\log X})^3}{(n - 1)(n - 2)(\sigma_{\log X})^3} \tag{8.7}$$

The values of X for various periods are computed from

$$\log X = \overline{\log X} + K \sigma_{\log X} \tag{8.8}$$

where K is selected from the following table for the computed value of G and the desired return period. Lognormal probability paper should be used for graphical display of the curves. A straight line will result only if $G = 0$.

K value of Log Pearson Type III Distribution

Skew coefficient G	Return Period, yr												
	1.005	1.010	1.020	1.042	1.111	1.250	2	5	10	25	50	100	200
	Chance, %												
	99.5	99	98	96	90	80	50	20	10	4	2	1	0.5
3.0	-0.667	-0.667	-0.666	-0.666	-0.660	-0.636	-0.396	0.420	1.180	2.278	3.152	4.051	4.970
2.5	-0.800	-0.799	-0.798	-0.793	-0.771	-0.711	-0.360	0.518	1.250	2.262	3.048	3.845	4.652
2.0	-0.995	-0.990	-0.980	-0.959	-0.895	-0.777	-0.307	0.609	1.302	2.219	2.912	3.605	4.298
1.8	-1.097	-1.087	-1.069	-1.035	-0.945	-0.799	-0.282	0.643	1.318	2.193	2.848	3.499	4.147
1.6	-1.216	-1.197	-1.166	-1.116	-0.994	-0.817	-0.254	0.675	1.329	2.163	2.780	3.388	3.990
1.4	-1.351	-1.318	-1.270	-1.198	-1.041	-0.832	-0.225	0.705	1.337	2.128	2.706	3.271	3.828
1.2	-1.501	-1.449	-1.379	-1.282	-1.086	-0.844	-0.195	0.732	1.340	2.087	2.626	3.149	3.661
1.0	-1.664	-1.588	-1.492	-1.366	-1.128	-0.852	-0.164	0.758	1.340	2.043	2.542	3.022	3.489
0.9	-1.749	-1.660	-1.549	-1.407	-1.147	-0.854	-0.148	0.769	1.339	2.018	2.498	2.957	3.401
0.8	-1.837	-1.733	-1.606	-1.448	-1.166	-0.856	-0.132	0.780	1.336	1.993	2.453	2.891	3.312
0.7	-1.926	-1.806	-1.663	-1.488	-1.183	-0.857	-0.116	0.790	1.333	1.967	2.407	2.824	3.223
0.6	-2.016	-1.880	-1.720	-1.528	-1.200	-0.857	-0.099	0.800	1.328	1.939	2.359	2.755	3.132
0.5	-2.108	-1.955	-1.777	-1.567	-1.216	-0.856	-0.083	0.808	1.323	1.910	2.311	2.686	3.041
0.4	-2.201	-2.029	-1.834	-1.606	-1.231	-0.855	-0.066	0.816	1.317	1.880	2.261	2.615	2.949
0.3	-2.294	-2.104	-1.890	-1.643	-1.245	-0.853	-0.050	0.823	1.309	1.849	2.211	2.544	2.856
0.2	-2.388	-2.178	-1.945	-1.680	-1.258	-0.850	-0.033	0.830	1.301	1.818	2.159	2.472	2.763
0.1	-2.482	-2.252	-2.000	-1.716	-1.270	-0.846	-0.017	0.836	1.292	1.785	2.107	2.400	2.670
0.0	-2.576	-2.326	-2.054	-1.751	-1.282	-0.842	0.000	0.842	1.282	1.751	2.054	2.326	2.576
-0.1	-2.670	-2.400	-2.107	-1.785	-1.292	-0.836	0.017	0.846	1.270	1.716	2.000	2.252	2.482
-0.2	-2.763	-2.472	-2.159	-1.818	-1.301	-0.830	0.033	0.850	1.258	1.680	1.945	2.178	2.388
-0.3	-2.856	-2.544	-2.211	-1.849	-1.309	-0.823	0.050	0.853	1.245	1.643	1.890	2.104	2.294
-0.4	-2.949	-2.615	-2.261	-1.880	-1.317	-0.816	0.066	0.855	1.231	1.606	1.834	2.029	2.201
-0.5	-3.041	-2.686	-2.311	-1.910	-1.323	-0.808	0.083	0.856	1.216	1.567	1.777	1.955	2.108
-0.6	-3.132	-2.755	-2.359	-1.939	-1.328	-0.800	0.099	0.857	1.200	1.528	1.720	1.880	2.016
-0.7	-3.223	-2.824	-2.407	-1.967	-1.333	-0.790	0.116	0.857	1.183	1.488	1.663	1.806	1.926
-0.8	-3.312	-2.891	-2.453	-1.993	-1.336	-0.780	0.132	0.856	1.166	1.448	1.606	1.733	1.837
-0.9	-3.401	-2.957	-2.498	-2.018	-1.339	-0.769	0.148	0.854	1.147	1.407	1.549	1.660	1.749
-1.0	-3.489	-3.022	-2.542	-2.043	-1.340	-0.758	0.164	0.852	1.128	1.366	1.492	1.588	1.664
-1.2	-3.661	-3.149	-2.626	-2.087	-1.340	-0.732	0.195	0.844	1.086	1.282	1.379	1.449	1.501
-1.4	-3.828	-3.271	-2.706	-2.128	-1.337	-0.705	0.225	0.832	1.041	1.198	1.270	1.318	1.351
-1.6	-3.990	-3.388	-2.780	-2.163	-1.329	-0.675	0.254	0.817	0.994	1.116	1.166	1.197	1.216
-1.8	-4.147	-3.499	-2.848	-2.193	-1.318	-0.643	0.282	0.799	0.945	1.035	1.069	1.087	1.097
-2.0	-4.298	-3.605	-2.912	-2.219	-1.302	-0.609	0.307	0.777	0.895	0.959	0.980	0.990	0.995
-2.5	-4.652	-3.845	-3.048	-2.262	-1.250	-0.518	0.360	0.711	0.771	0.793	0.798	0.799	0.800
-3.0	-4.970	-4.051	-3.152	-2.278	-1.180	-0.420	0.396	0.636	0.660	0.666	0.666	0.667	0.667

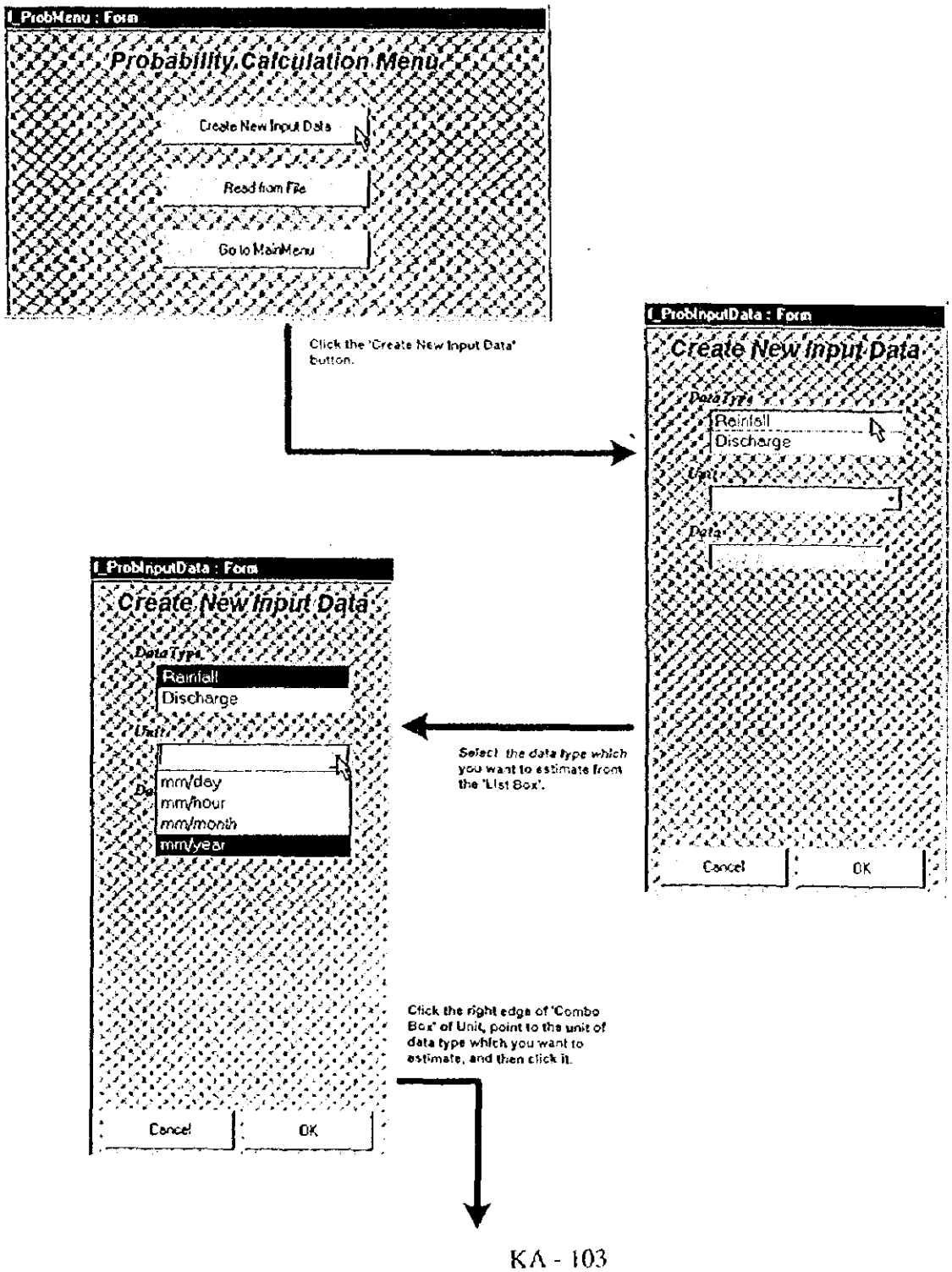
8.2 How to Use

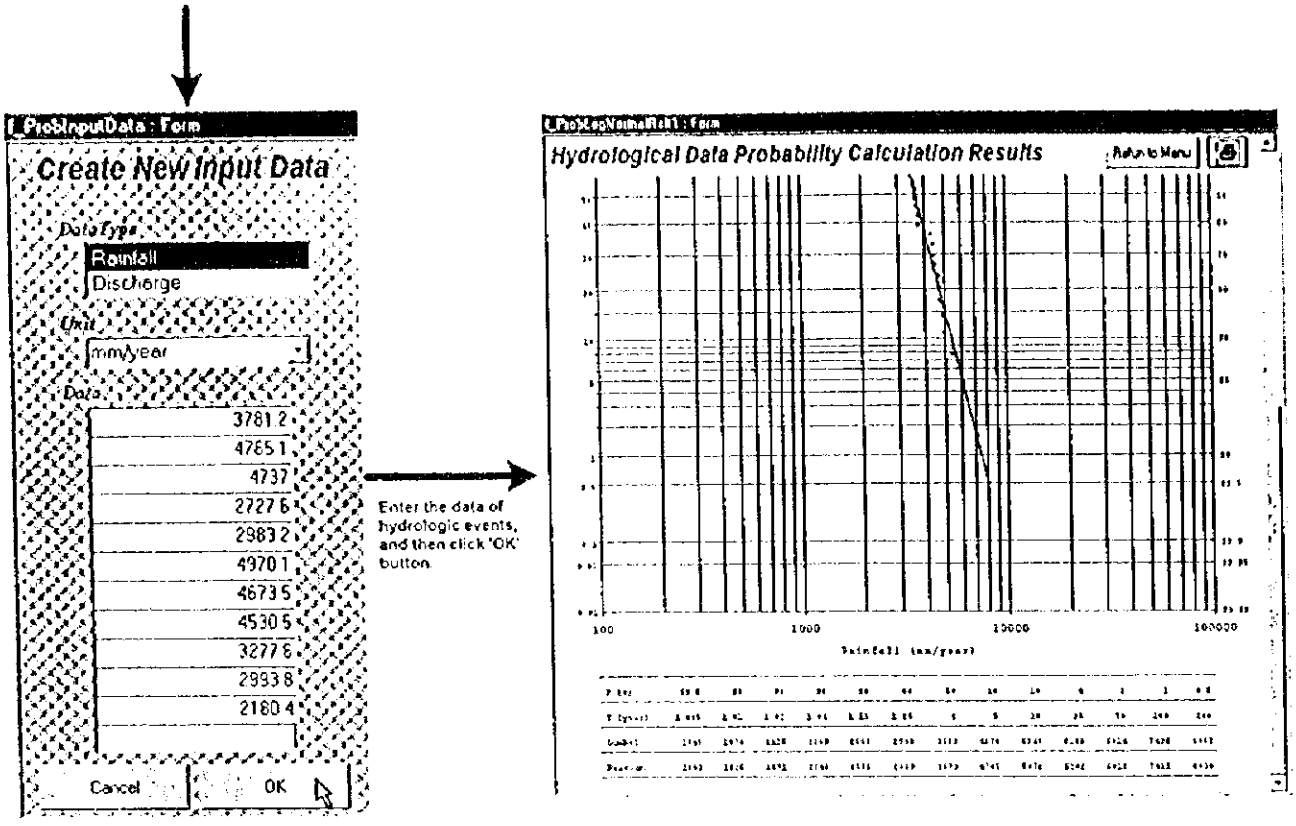
You can estimate easily the probability of hydrologic events by using this tool. Gumbel method and Log Pearson Type III distribution explained at the previous section are available, and this tool can also print out the lognormal probability paper with plotting position by Hazen formula.

Input data of hydrologic events is encorded directly on Microsoft ACCESS, and is possible to read from external files such as Microsoft EXCEL.

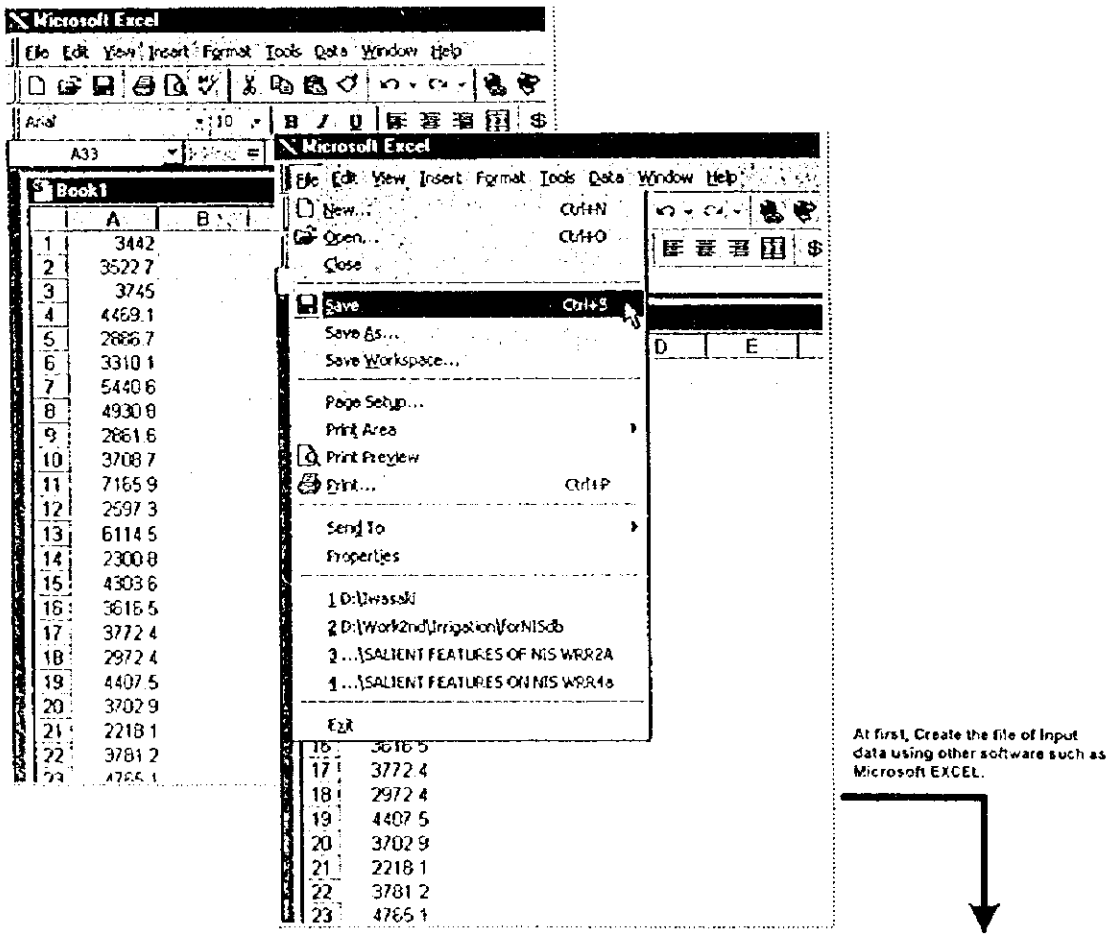
This section will explain the handling by using annual rainfall data of Baguio city for the example.

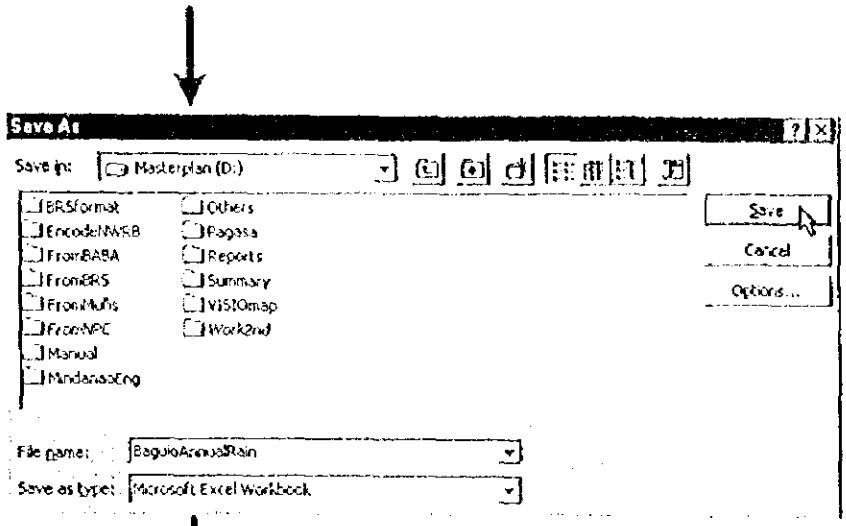
8.2.1 Using Input Form of Microsoft ACCESS





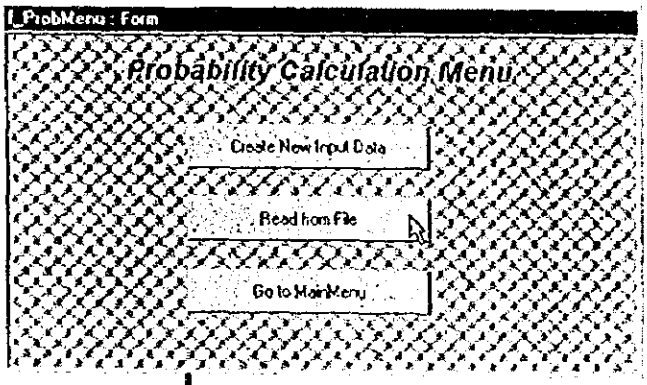
8.2.2 Using Data Read from File



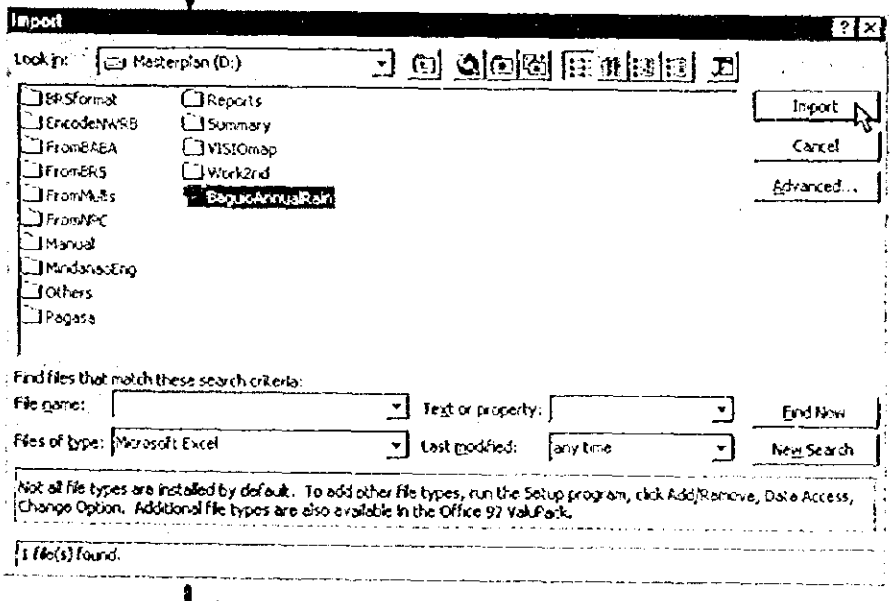


Enter the file name, and then click 'Save' button.

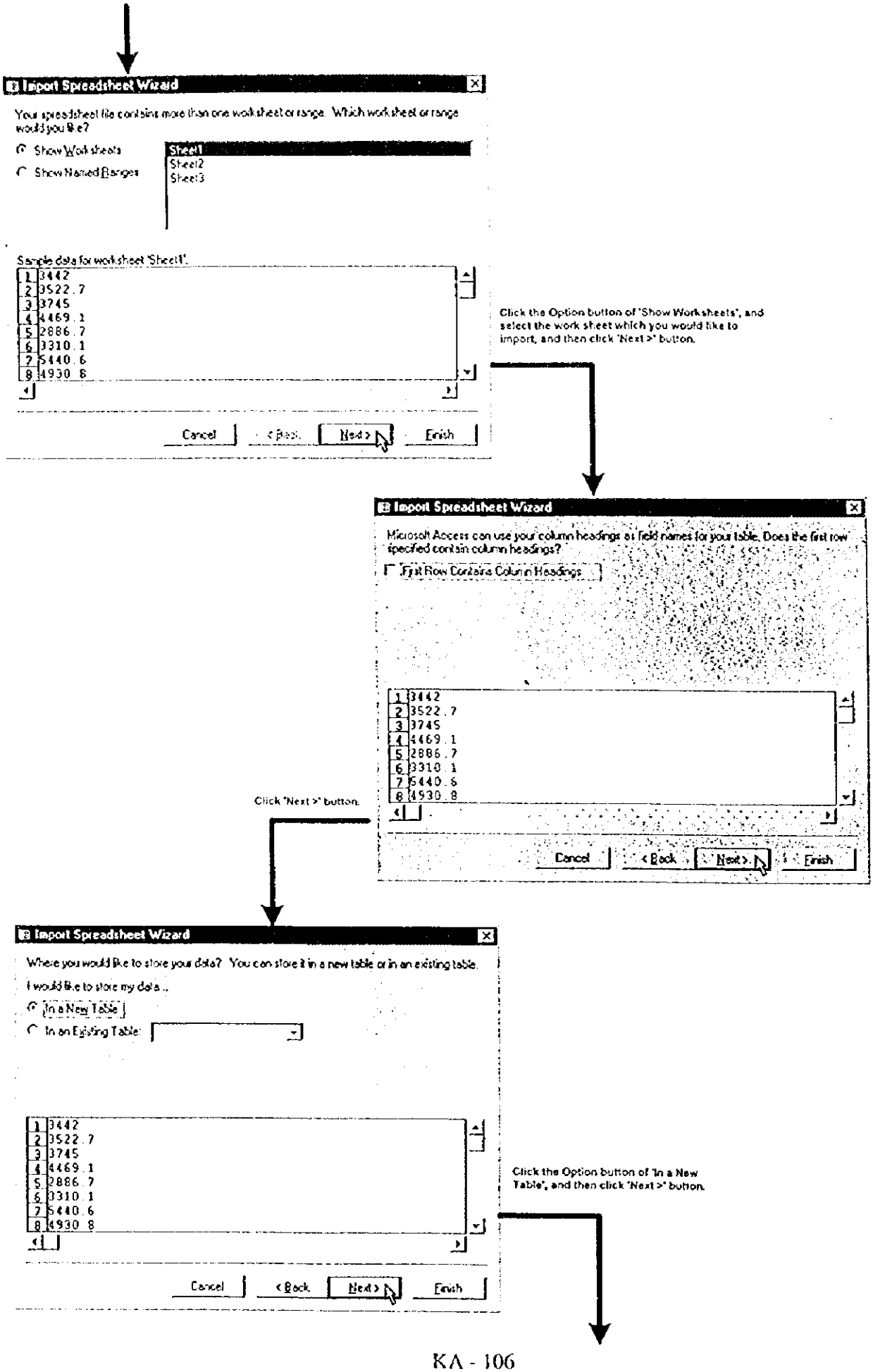
In this section, 'File name' is 'BaguioAnnualRain', and 'Save as type' is 'Microsoft Excel Workbook'.

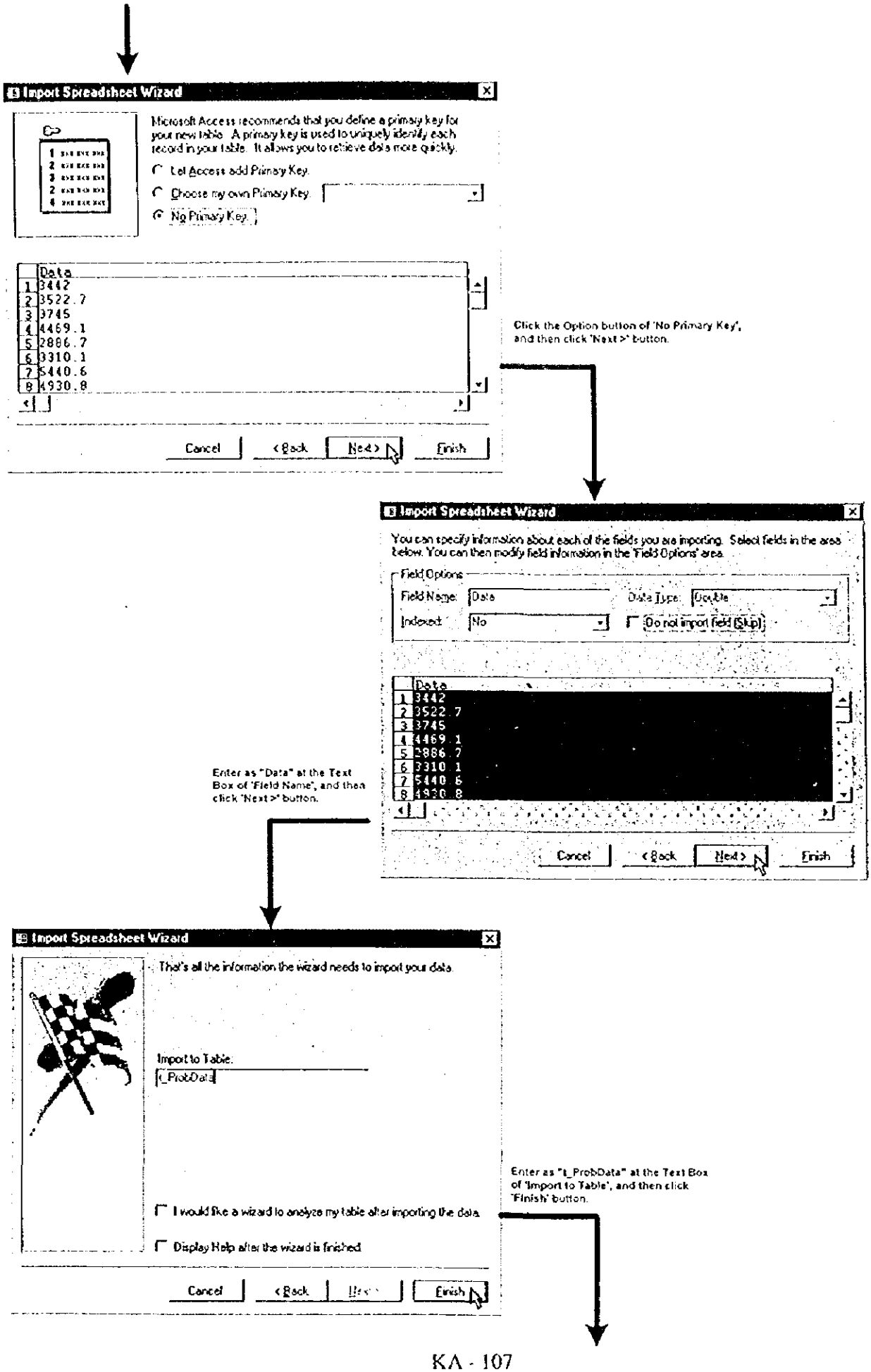


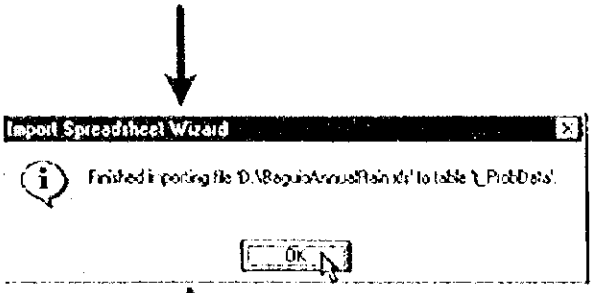
On Microsoft ACCESS, click the 'Read from File' button.



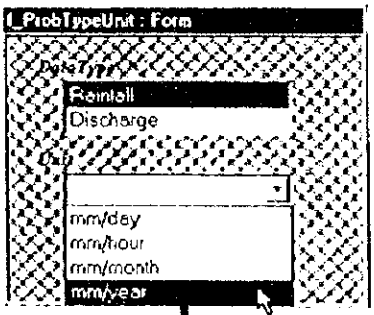
On the Import dialog, select created file, and then click the 'Import' button.


Import Spreadsheet Wizard
Your spreadsheet file contains more than one worksheet or range. Which worksheet or range would you like?
Show Worksheets
Show Named Ranges
Sheet1
Sheet2
Sheet3
Sample data for worksheet 'Sheet1':
1 3442
2 3522.7
3 3745
4 4469.1
5 2886.7
6 3310.1
7 5440.6
8 4930.8
Cancel
< Back
Next >
Finish
Click the Option button of 'Show Worksheets', and select the work sheet which you would like to import, and then click 'Next >' button.
Import Spreadsheet Wizard
Microsoft Access can use your column headings as field names for your table. Does the first row specified contain column headings?
First Row Contains Column Headings
1 3442
2 3522.7
3 3745
4 4469.1
5 2886.7
6 3310.1
7 5440.6
8 4930.8
Cancel
< Back
Next >
Finish
Click 'Next >' button.
Import Spreadsheet Wizard
Where you would like to store your data? You can store it in a new table or in an existing table.
I would like to store my data ..
In a New Table
In an Existing Table:
1 3442
2 3522.7
3 3745
4 4469.1
5 2886.7
6 3310.1
7 5440.6
8 4930.8
Cancel
< Back
Next >
Finish
Click the Option button of 'In a New Table', and then click 'Next >' button.

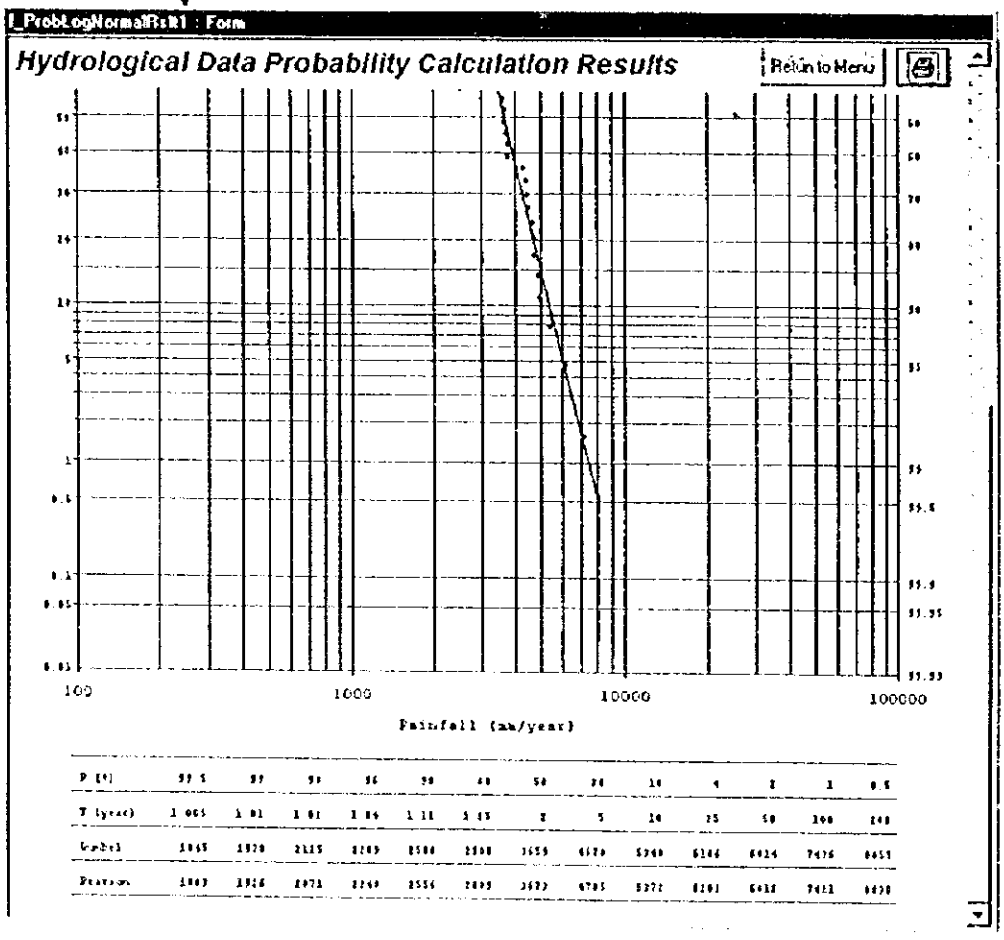

Import Spreadsheet Wizard
Microsoft Access recommends that you define a primary key for your new table. A primary key is used to uniquely identify each record in your table. It allows you to retrieve data more quickly.
Let Access add Primary Key.
Choose my own Primary Key.
No Primary Key.
Data
1 3442
2 3522.7
3 3745
4 4469.1
5 2886.7
6 3310.1
7 5440.6
8 4930.8
Cancel
< Back
Next >
Finish
Click the Option button of 'No Primary Key', and then click 'Next >' button.
Import Spreadsheet Wizard
You can specify information about each of the fields you are importing. Select fields in the area below. You can then modify field information in the 'Field Options' area.
Field Options
Field Name: Data
Data Type: Double
Indexed: No
Do not import field (Skip)
Enter as "Data" at the Text Box of 'Field Name', and then click 'Next >' button.
Import Spreadsheet Wizard
That's all the information the wizard needs to import your data.
Import to Table:
t_ProbData
I would like a wizard to analyze my table after importing the data.
Display Help after the wizard is finished.
Enter as "t_ProbData" at the Text Box of 'Import to Table', and then click 'Finish' button.



Click 'OK' button.

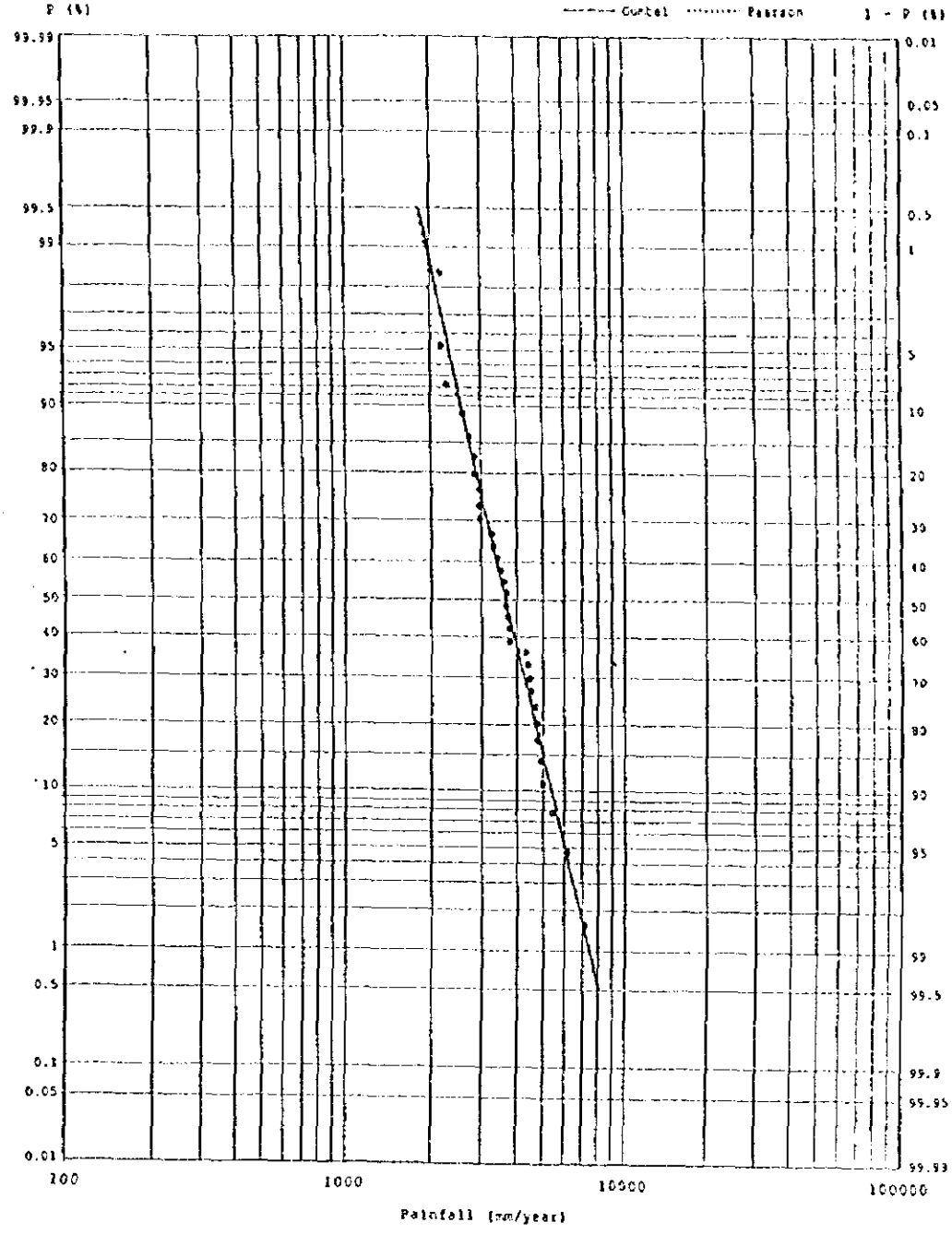


Choose the data type at List Box of 'DataType', and then click the right edge of Combo Box of 'Unit', select one. Then click 'OK' button.



8.3 Output Sample

1) Log Normal Probability Paper



P (%)	99.5	99	98	96	90	80	50	20	10	4	2	1	0.5
T (year)	1.005	1.01	1.02	1.04	1.11	1.25	2	5	10	25	50	100	200
Gumbel	1845	1930	2115	2289	2588	2908	3659	4670	5343	6186	6814	7436	8057
Pearson	1803	1926	2071	2248	2556	2899	3693	4705	5372	6202	6812	7421	8030

Chapter 9

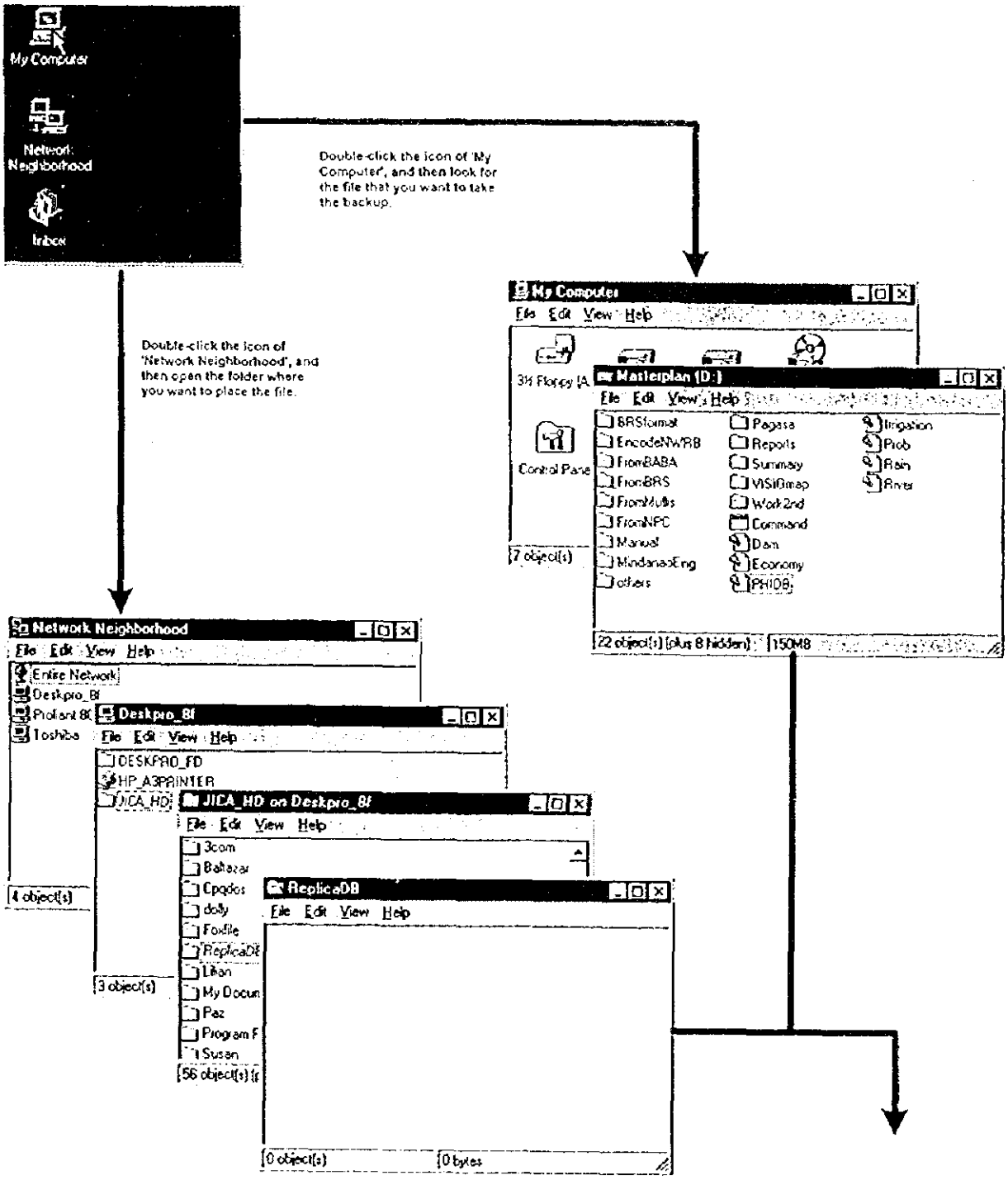
Maintenance

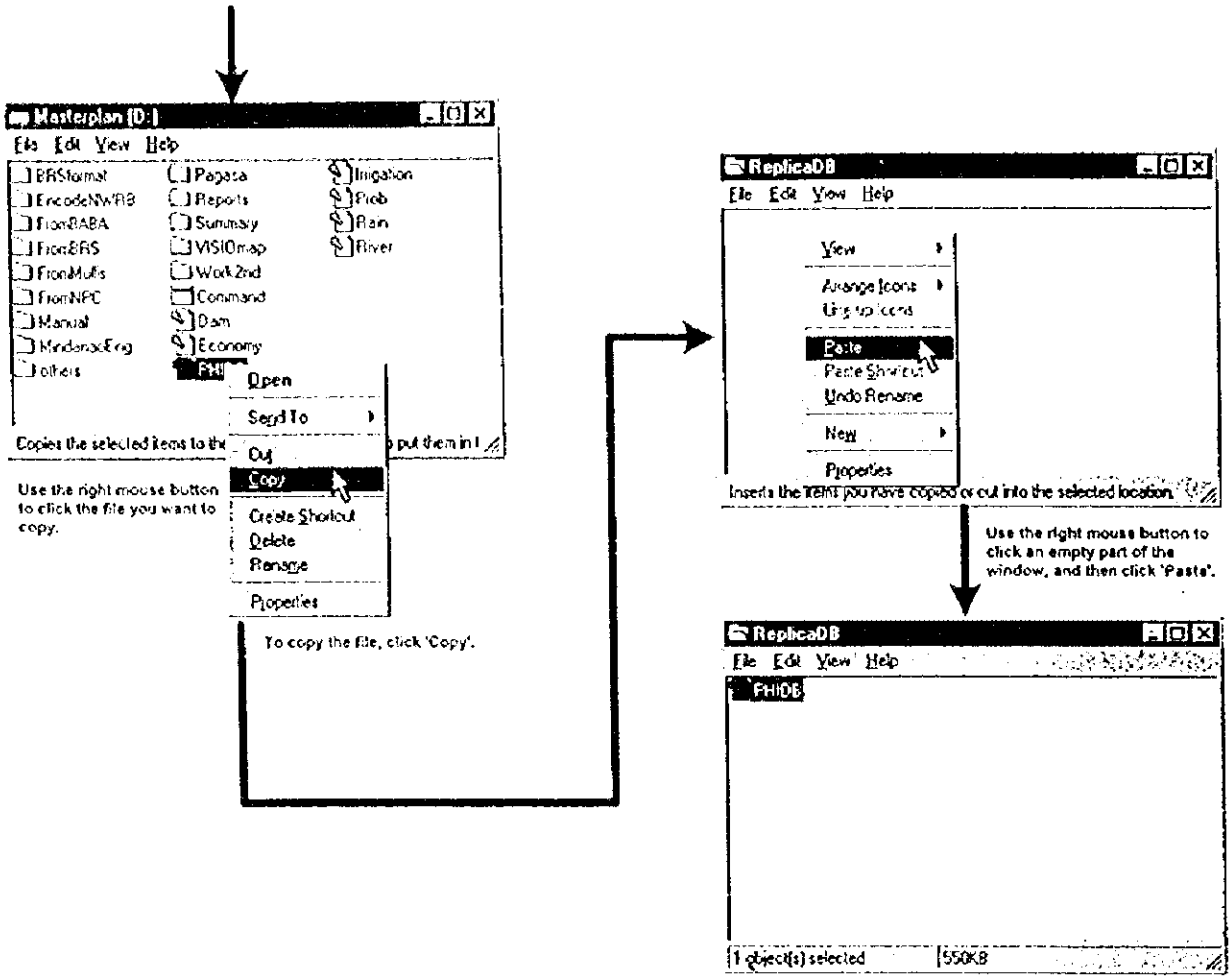
CONTENTS

9.1 Back Up the Information

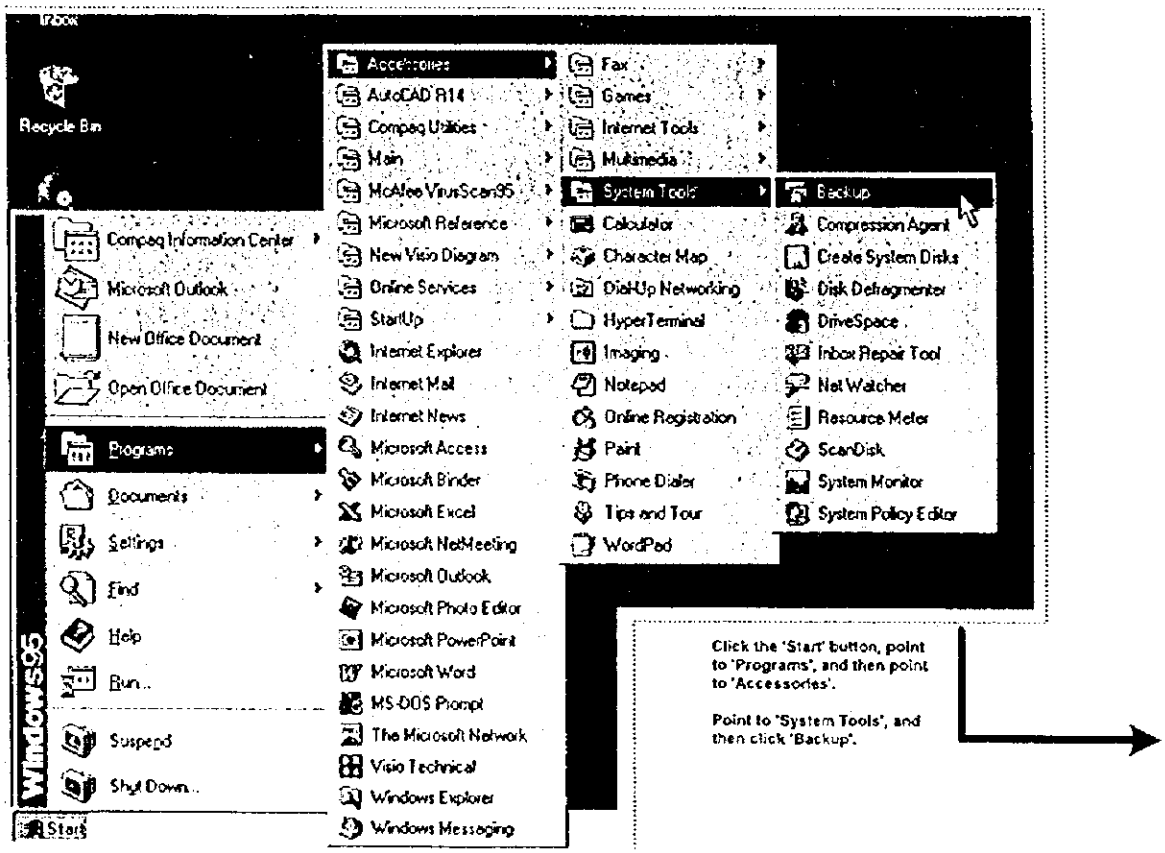
You may lose the files if your hard disk fails or you accidentally overwrite or delete data. Backing up your files safeguards them against these loss. You should take a backup to the other media regularly by the following procedure.

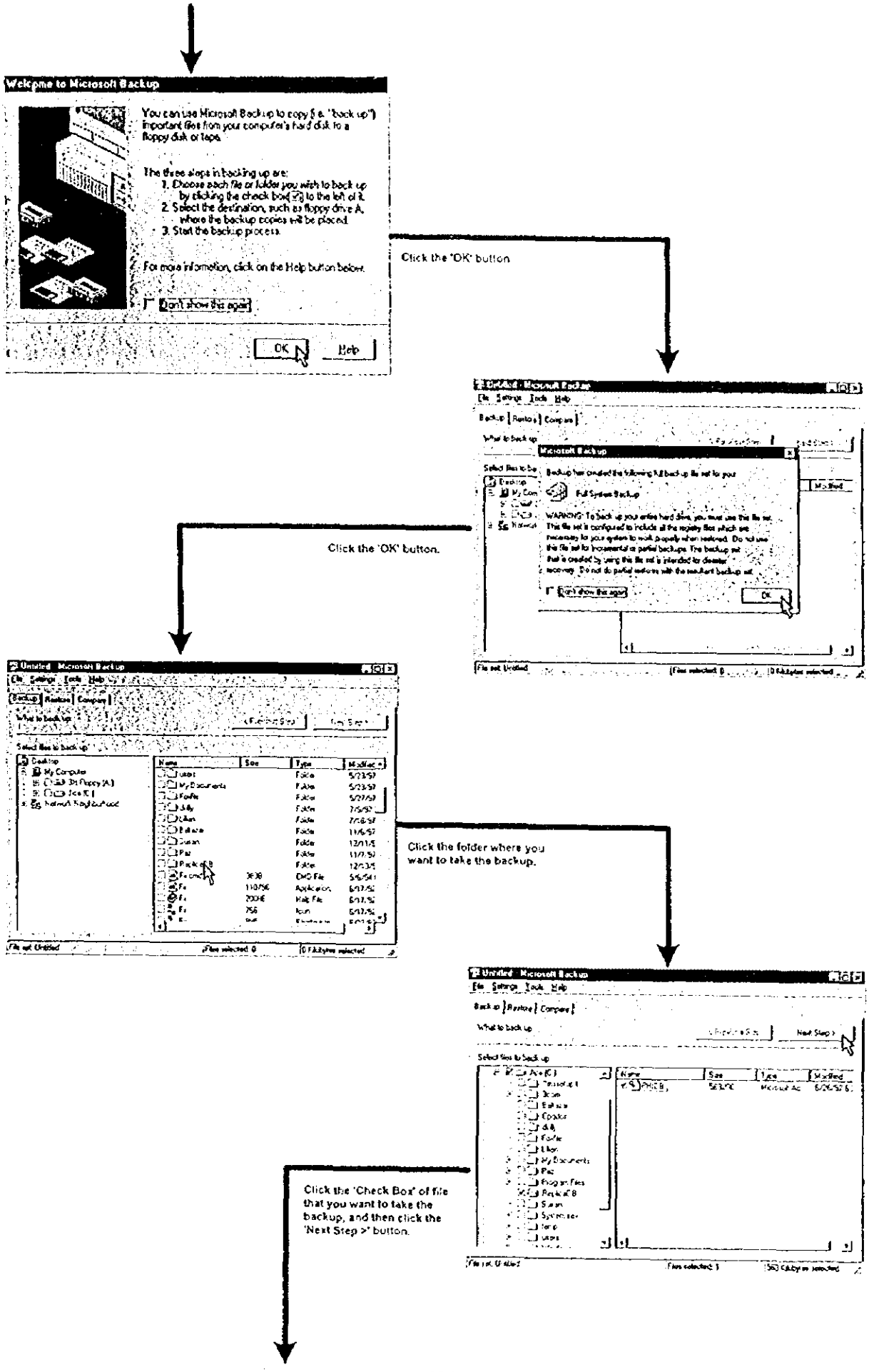
9.1.1 Back Up to the Hard Disk of Network Computer

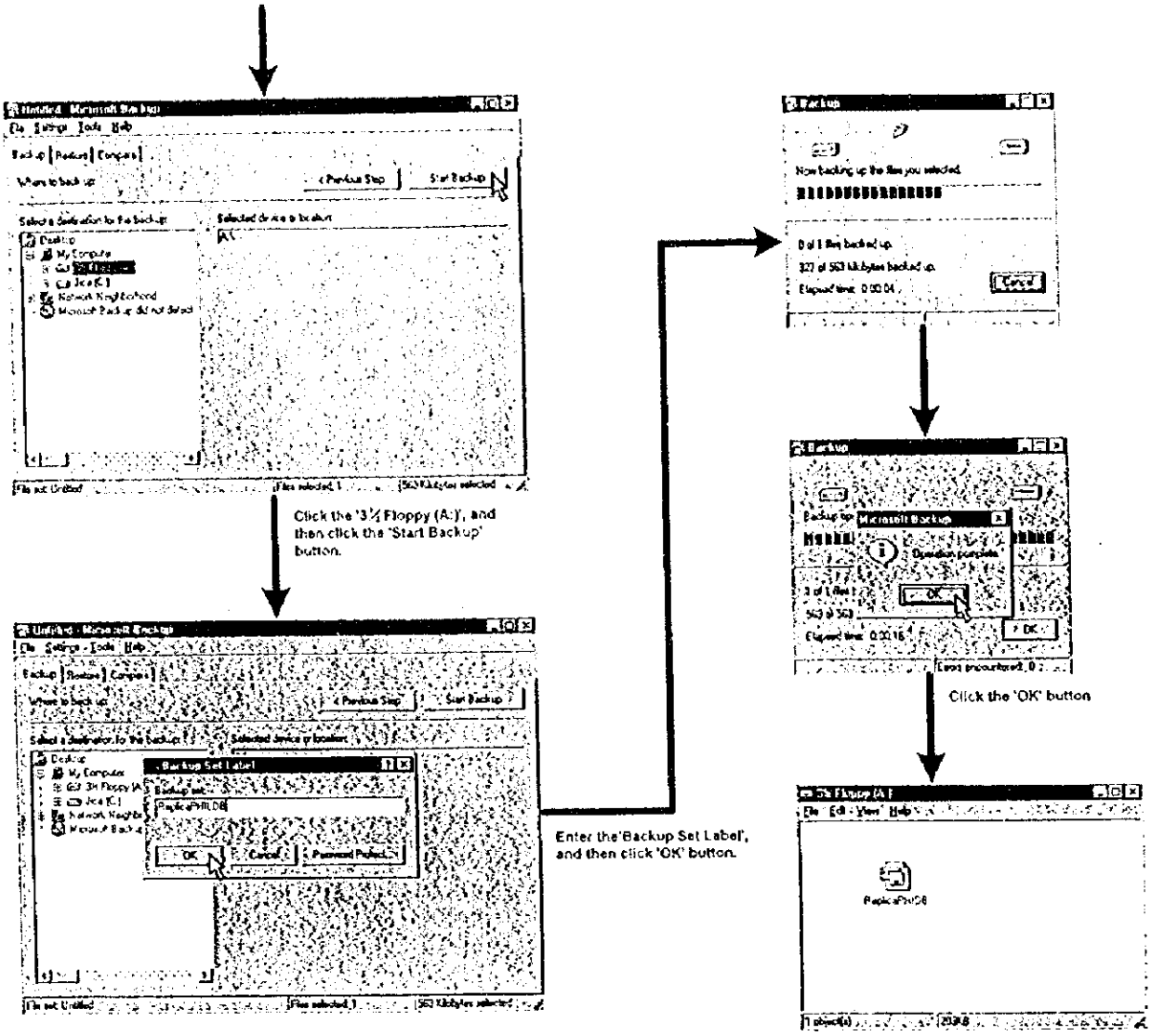




9.1.2 Back Up to the Floppy Disk

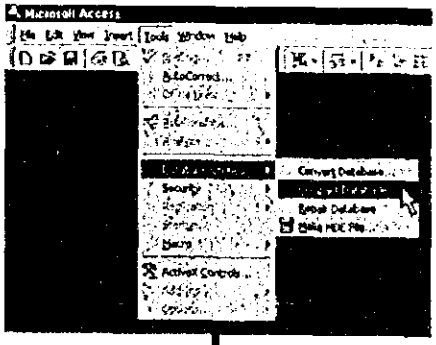



Welcome to Microsoft Backup
You can use Microsoft Backup to copy (i.e. "back up") important files from your computer's hard disk to a floppy disk or tape.
The three steps in backing up are:
1. Choose each file or folder you wish to back up by clicking the check box to the left of it.
2. Select the destination, such as floppy drive A, where the backup copies will be placed.
3. Start the backup process.
For more information, click on the Help button below.
Don't show this again
OK
Help
Click the 'OK' button.
Click the 'OK' button.
Click the folder where you want to take the backup.
Click the 'Check Box' of file that you want to take the backup, and then click the 'Next Step >' button.

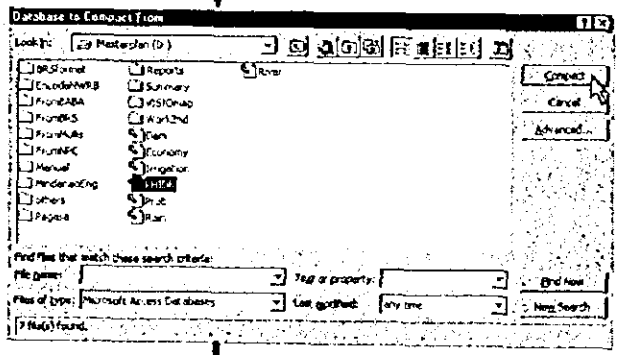

Click the '3½ Floppy (A:)', and then click the 'Start Backup' button.
Enter the 'Backup Set Label', and then click 'OK' button.
Click the 'OK' button

9.2 Compact Database

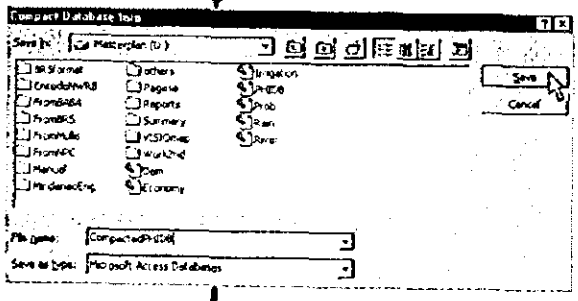
You may find that the file size of database changes in the near future. The file size of database becomes big by repeating the operation of the addition, the renewal and the deletion in the database. This is to be generated.the blank portion in the database by these operation. The increase of the file size becomes the burden to the hard disk. Compacting database has the effect to make small the file size by rearranging useless space. You should compact the database regularly by the following procedure.



On the menu of Microsoft Access, Click the 'Tools', point to 'Database Utilities'. Then click the 'Compact Database'.

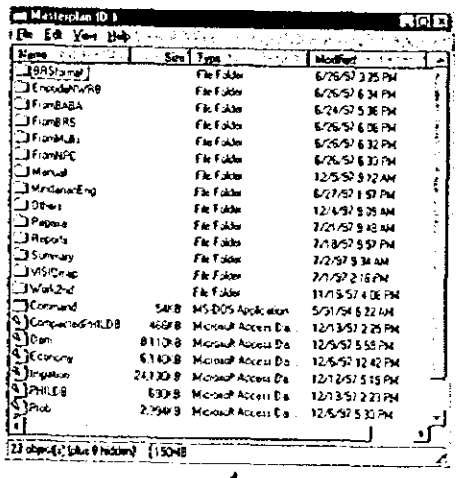


Select the file that you want to compact, and then click the 'Compact' button.



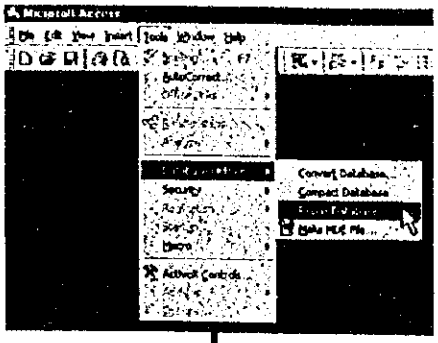
Enter the file name you want to save, and then click the 'Save' button.

In the comparison between 'PHILDB' and 'CompactedPHILDB', the file size of data-base decreases from 690 KB to 456 KB.

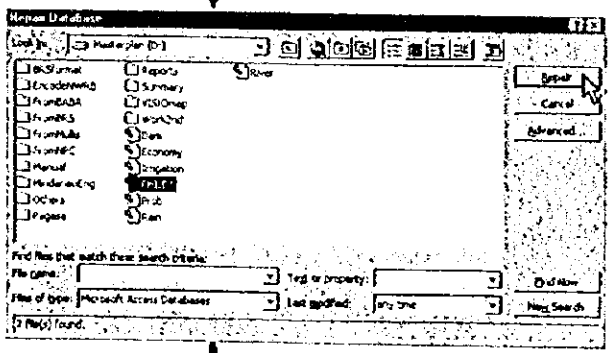


9.3 Repair Database

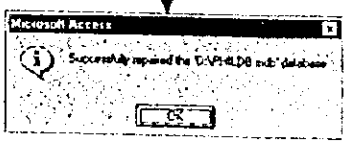
You may face the situation that the file can not open or the database can not operate normally. In most cases, the database was damaged by some reasons. If the damaging is slight, you can repair the database file in the way of the following example. However, you can not repair the database without backup file if your hard disk fails or delete the file.



On the menu of Microsoft Access, Click the 'Tools', point to 'Database Utilities', Then click the 'Repair Database'.



Select the file that you want to repair, and then click the 'Repair' button.



Part – L

WORKSHOP USING PROJECT CYCLE MANAGEMENT (PCM)

Part - L WORKSHOP USING PROJECT CYCLE MANAGEMENT (PCM)

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Attachment LA to Part-L: EXPLANATION NOTE ON PROJECT CYCLE MANAGEMENT
Attachment LB to Part-L: GUIDE FOR MODERATOR

Part - L WORKSHOP USING PROJECT CYCLE MANAGEMENT(PCM)

L1 Objectives of Workshop Using PCM

The Project Cycle Management (PCM) was applied to the Study on water resources development and management in the Philippines in the second field investigation stage as well as third field investigation stage. It was expected that the workshops, which are the highlight of the PCM, would facilitate the JICA Study Team to formulate the master plan that is acceptable to and is able to be implemented by the agencies concerned of the Philippines. The PCM is a newly developed method to formulate, implement and maintain plans in the mutually understood and agreed manner among the participants from the various parties. The benefit and loss to those parties that are incurred by the plans may naturally vary, and sometime their relation becomes opposite. The main objectives of holding the PCM workshop are summarized as follows:

i) To scrutinize the problems related to the project,
ii) To collect various opinions and verify the master plan proposed through project dialogue, and
iii) To identify and establish the strategic approaches to solve problems from the various aspects.

Hence, the PCM is usually applied for the people benefited, local residents and implementing agencies of the projects. The concerned agencies with the water resources development master plan are, however, widely diversified in functions and positions thereof. NIA, for instance, is a user of water through diverting a part of river water. Meanwhile, DENR is responsible for preservation of the river environment, which may be affected by the water diversion. Accordingly, mutual understanding among the agencies concerned is fundamental to formulate an effective Master Plan. In this respect, the PCM was introduced to the group of agencies that form the Steering Committee of the Study in the stage of a master plan study.

L.2 Activities and Selection of Participants

L.2.1 Preparatory Works

In cooperation with the National Water Resources Board (NWRB), the JICA Study Team conducted the one-day Workshop by using the Project Cycle Management (PCM) method for the Master Plan Study on Water Resources management in the Philippines on January 15 and June 26,1998. Since the method is a quite new approach for having project dialogue among relevant agencies including NWRB, JICA, the Study Team, the following preparatory works for the PCM workshop were conducted during the assignment period of the PCM Expert for the period from December 21 1997 to January 16, 1998 in the second stage field investigation.

As the nature of the PCM method, it facilitates communication and cooperation among all parties involved in the project. Although in the method the constant procedure and uniform understanding of the term are used, its application to the study can be flexibly adjusted and planned in compliance with the magnitude and complication of the problems involved in the study.

The selection of participants for the workshop is the important process of the PCM procedure. Basically, it is advisable that the participants of the workshop comprise the representatives of beneficiaries, the community directory affected by the project, relevant governmental agencies, experts, and funding agencies. Since the workshop is held on in the stage of the master plan study concerned with many agencies, the forty-five (45) participants were invited from the 14 governmental agencies as shown in Table L-1.

L2.2 Guidance on PCM Method

Prior to holding the workshop, the guidance of PCM method attended by the representative from relevant offices was conducted on January 8, 1998, as listed in Table L-2. In the guidance, the procedures and mechanisms of the PCM method were explained to the attendants by using flip chart on PCM method and the explanatory note on the Project Cycle Management as well as brief case study. The explanatory note is shown in the Attachment LA to this Part-L: EXPLANATORY NOTE ON PROJECT CYCLE MANAGEMENT.

L2.3 Orientation for Moderator

In response to the request from NWRB, the orientation for the selected moderators was conducted on January 14, 1998. The material for the orientation, " the Guide for Moderator" was prepared, in which the detailed steps were explained, and instructions to steer the workshop were given. In addition, the prevailing subjects were illustrated to the eligible moderator, and specific tasks and role were allocated to three personnel who were selected as the moderator for the workshop. The Guide for Moderator is presented in the Attachment LB to this Part - L.

L.2.4 Workshop Using PCM Method

The Workshop using Project Cycle Management (PCM) for the Master Plan Study on Water Resources Management in the Republic of the Philippines was conducted on January 15, 1998 at the BSWM Convention Hall, Visayas Ave. in Quezon City. The one-day workshop was organized jointly by the NWRB and the JICA Study Team. The workshop was conducted pursuant to the program shown in Table L-3.

Since the PCM workshop was conducted by being attended by 45 participants, the participants were divided into three groups, allocating the issues relating to the water resources management, water supply and the irrigation demand as shown in Table L-4. These groups were chaired by Mr. Melchor O. Baltazar (Deputy Executive Director of NWRB at that time), Mr. Toshio Katayama (Deputy Team Leader of the JICA Study Team)/Mr. Lope R. Villenas (Chief Water Resources Development Officer of NWRB) and Mr. Emerson Coloma (Irrigation Expert of the JICA Study Team). The participants are listed in Table L-5.

L.3 Performance of Workshop

L.3.1 Participation Analysis

Before starting the group works, the overall discussion on participation analysis and problem analysis was conducted to determine on what projects the participants belong to and what problem they have. Table L-6 shows the results of the overall participation analysis. The outputs of the overall participation analysis indicate that there are many agencies which have the issues on water right as shown in Table L-7. Each group performed further detailed participation analysis. As a consequence, each group identified the target group as shown below:

Group	Target Group
Water resources management group	Water related organizations
Water supply group	MWSS
Irrigation water demand group	Farmers in the country

In the detail participation analysis, the target group that may be solved under the project is identified, though wide views arise through project dialogue. In addition, the specific issues of the target group such as differing needs, demands and absorptive capacities were extracted in the course of the group work as shown in Table L-8. The participation analysis of each group is shown in Table L-9.

L.3.2 Problem Analysis

The first step of this method is to identify a core problem, which is the starting point of the analysis. Each work group identifies the core problem as follows:

Group	Core Problem
Water resources management group	Weak institutional framework
Water supply group	People experience inadequate and unportable water supply
Irrigation water demand group	Farmer cannot get enough irrigation water.

The outputs in this stage are shown in Table L-10.

L.3.3 Problem Analysis, Objectives Analysis and Selection of Approach

The approaches identified through the workshop are as follows:

Group	Approach
Water resources management group	Institutional Strength Approach
Water supply group	Water Resources Approach
Irrigation water demand group	Water Management Improvement Approach

Though more time was required to find out the measures to obtain the final outcome, the approaches were identified from the objective trees as shown in Table L-11. The "Matrix for Selection of Approach" is shown in Table L-12.

L3.4 Project Design Matrix

Based on the results of the successive analysis such as problem analysis, objectives analysis and alternative analysis, the PDM was prepared by each group independently as shown in Table L-13. Finally, three PDMs were integrated into one PDM through workshop held at the third field survey as shown in Table L-14. As summarized in the integrated PDM, the project purpose identified by the participants of the workshop is that not only the safe and adequate drinking water for Metro Manila residents but also irrigation water for farmers in the basin are provided systematically. In order to achieve the project purpose, the following outputs were identified through project dialogue among the participants.

Outputs to achieve the Project Purpose on the Integrated PDM

Institutional Aspect	Water Resources Development Aspect	Irrigation Aspect
Master Plan on water supply for Metro Manila is formulated.	Water sources are developed adequately.	Adequate irrigation water is supplied to farmers.
Strong institutional framework is legally established.	Water delivery service is improved to higher level.	Proper irrigation water management is established.
Institutionalized authoritative body (APEX body), WRAP is established	Water quality is maintained well.	Source of water supply is improved.
Water-related institution (NWRB) is strengthened	Over-exploitation of groundwater ceases.	Operation and maintenance of irrigation system is improved.
Hydrological data collection network is established and improved.	Less saline water intrusion into aquifer.	Sediment inflow into reservoir is reduced .

Although the results of the PCM method applied to the master plan stage seems to be not applicable to the specific project, it will provide the strategic ideas to overcome the present issues. Each output tabulated above seems to be an eligible project. Based on the urgency, the importance and the availability of the resources such as budgets and manpower, those outputs will be scheduled and implemented in harmony with the growth

of the national economy.

The PDM finalized at this master plan is subjected to modified corresponding to the new findings and situations to achieve the project purpose set up at this stage.

L4 Monitoring System Using PDM

L4.1 Definition of Monitoring

The term of "monitoring" is common word for checking and/or regulating the performance of not only natural phenomena but also human activities. The word of monitoring is used in various stages and parts in development project to examine a degree of the achievement and/or the performance during the implementation stage of the project or program. In the Project Cycle Management (PCM) method, the term is defined as follows:

> The monitoring is to examine the degree of project implementation and to reformulate the project contents as necessary. The project components such as "activities", "outputs" or "project purpose" are examined and checked for the achievement level, grasping the situation of "inputs" and "important assumptions" defined in PDM. The project components representing "activities" and "inputs" may be adjusted and/or modified in compliance with actual situation to achieve project purpose or overall goal.

L4.2 Purpose of Monitoring

The main purposes of the monitoring are to optimize the operation and management of ongoing projects and to ensure the accountability to the funding agencies and stakeholders and decision makers.

The monitoring is the important activity to grasp the level of progress on a regular basis or under some assumptions and to understand the problems preventing the progress of the project. The results of the monitoring results enable the application of appropriate countermeasures to cope with problems, or enable the decision-makers to reformulate or continue the project. The most important purpose of the monitoring is to feed back the results of monitoring activities into the projects so as to steer and optimize the project or program to achieve the project purpose.

L4.3 Monitoring System

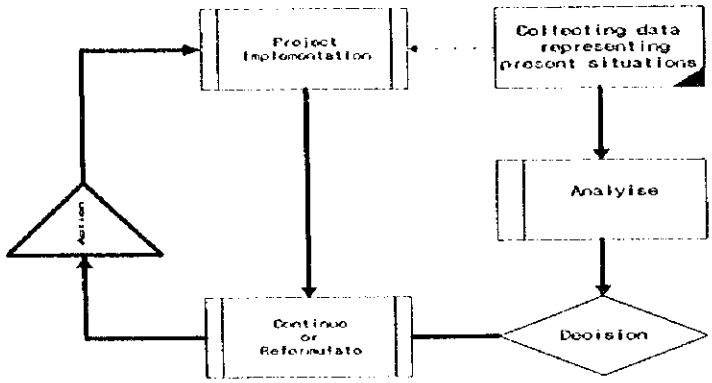
The monitoring requires constant review of the project progress to ensure efficient implementation of the project. The achievement level of "activities", "outputs" and "project purpose" of the PDM are reviewed, influencing factors and movement of important assumptions analyzed, and necessary actions taken to improve the situation. In technical assistance projects, an approval from the higher authority may be necessary for the reformulation of the project activities.

The projects may face unexpected problems during implementation. In such a case, it is necessary to analyze the situation in order to examine the countermeasures and to remove the impedance that is causing the problems. The original plan may be found to be inadequate, inappropriate or already unfeasible in case of changes of the situation.

In that case, partial change of the original plan may be required by readjusting the indicators and adding new activities to improve the project performance.

The systematic monitoring will be required for steering the project or program. The basic monitoring system is illustrated below:

Illustration of Monitoring



L4.4 Monitoring Mechanism

The following items are subject to the monitoring on the PDM:

i) Activities
ii) Outputs
iii) Project Purpose

If the monitoring indicates that "the project purpose is not achieved as planned", the PDM will be used to investigate its causes. In the matrix, the factors that influence the achievement level of the project purpose are "outputs" and "important assumptions". If the achievement level of "outputs" is lower than planned, it may be caused either by lower achievement of some "activities" or changes in the "important assumptions". Similarly, if there are problems in "activities", the cause might lie in the "inputs" or "preconditions". In some cases, the inappropriate project management may be the cause.

It is necessary to review the situation of the "inputs", "important assumptions" and "preconditions". The first step to establish monitoring system is to create a system to collect, examine and communicate the required information periodically within the project.

The monitoring system must be clarified with respect to the following items:

Items to be clarified	General requirements	Proposal for this project
What to monitor	Indicators of project purpose and outputs, expected results of activities and so on.	Economic growth Population growth Water consumption per capita Water quality
Responsibility	Responsible person, timing, frequency, methods, etc.	NWRB
To whom to report	Higher authority of funding agency	Presidential Task Force JICA
Who makes decisions	Project manager, steering committee	Steering Committee

Since a establishment of monitoring mechanism is a part of institutional building, it is important to design a system that is sustainable after the project completion.

The monitoring results should be shared amongst the project personnel and be reported to the higher authorities. To ensure efficient project implementation, it is important that a regular and smooth flow of information within the project organization be maintained in order to avoid any information gaps.

Whether monitoring results are submitted to the higher authorities as a part of a regular reporting or on an ad hoc monitoring depends on its urgency.

L.5 Observation and Recommendation

The observation and recommendation on the workshop are as follows:

i) Since the participants were invited from the water-related agencies, the problems arising from the participants are mainly categorized as the views from the implementation agencies. Further discussion with water users groups, leaders and spokespersons, and access to and utilization of MWSS services, and payments for these services will be required for the assurance of the needs of the beneficiaries.

ii) It will be required to assess the needs of MWSS in relation to other needs such as drainage, solid waste management, other public sanitation measures and public health education. Concerning the analysis on water supply group, both quantity and quality of MWSS services are pointed out, and the measures to attain the core objective are scrutinized carefully.

iii) It is important to compare the present cost and quality of these services with the cost and quality to be provided under the project based on the results of master plan study.

iv) Although the MWSS was changed in terms of the management procedure after its privatization, the present situation on the focal issues seems to be still remained in the field in terms of their motivation to change, knowledge and skills that may be required.

v) It is recommended to prepare a socio-economic profile for each vulnerable group which will quantitatively describe and quantify the impact of the project on the affected group and to identify and assess options for compensating groups which are adversely affected. It is also recommended to conduct dialogues with the communities that may potentially be adversely affected.

vi) It is recommended to assess existing management information system in terms of its adequacy to enable the executing agency to properly account to the community and other stakeholders for its financial operations and performance.

vii) It is recommended to allocate the functions to NWRB so as to monitor the conditions in relation to the assumptions adopted in the Master Plan.

Part – L

Tables

Table L-1 AGENCIES CONCERNED WITH THE PROJECT

	Organization	
1	Presidential Task Force Water Resources Development and Management	PTDWRDM
2	National Water Resources Board	NWRB
3	Department of Public Works and Highways	DPWH
4	National Economic and Development Authority	NEDA
5	Department of Health	DOH
6	Department of Environment and National Resources	DENR
7	Metropolitan Waterworks and Sewerage System	MWSS
8	National Irrigation Administration	NIA
9	Department of Interior and Local Government	DILG
10	National Power Corporation	NPC
11	LWUA	LWUA
12	Representative from Private Cooperation	MWSI/CI
13	Mines and Geo-science Bureau	MGB
14	JICA Expert	JICA
15	JICA Study Team	

Table L-2 ATTENDANCE LIST OF GUIDANCE ON PCM

	Organization	Name	Designation
1	Presidential Task Force Water Resources Development and Management	Godfredo M. Caprio	Hydrogeologist
2	National Water Resources Board	Melchor O. Baltazar	Deputy Exec. Director
3		Lope R. Villenas	Planning Officer
4		Pacita F.Barba	Counterpart Expert
5		Arleen E. BATAC	Secretaries
6	Department of Public Works and Highwa	Helen G. Marvilla	Pros. Director
7	BRS-DPWH	Judy F. Sese	Chief Research Dev.DIX
8	Department of Health	Mario C. Villaverde	Director III Environmental Health Service
9	Department of Environment and National	Jesus A Javier	Div. Chief, FMB-REFO.DIV
10	Resources	Ricarte Javelosa	Chief MGB- Hydrogeology
11	National Irrigation Administration	Milo M. Landicho	Division Manager
12	Department of Interior and Local Govern	Rogelio B. Ocampo	DMOV
13	National Power Corporation	Romualo T. Beltran	Principal Engineer
14	Local Water Utilities Administration	Edwin T. Ruiz	Manager Sveluan Profect Office
15	Mines and Geo-science Buaru	Ricarte Jevelosa	Chief Hydrogeologist
16	JICA Study Team	Toshio Katayama	

Table L-3 PROGRAMME ON PCM WORKSHOP

January 15, 1998 at 8:00 AM,
Convention Hall,
Bureau of Soils &Water Management,
Elliptical Road, Diliman, Quezon City

8:00 - 8:40 AM	Registration	
	OPENING CEREMONY	
8:40 - 8:45	National Anthem	Ms. Arleen E. Batac, NWRB
8:45 - 8:50	Invocation	Dr. Lope R. Villenas, NWRB
8:50 - 9:00	Welcome Message	Dr. Rogelio N. Concepcion, Director, BSWM
	WORKSHOP PROPER	
9:00 - 9:15	Workshop Mechanics	Mr. Shigeyoshi Hanada, PCM Expert JICA Study Team
9:15 - 9:35	Overview of the Master plan Study on Water Resources Management in the Philippines	Mr. Toshio Katayama, Deputy Team Leader, JICA Study Team
9:35 - 10:00	Preliminary Participation Analysis	Mr. S. Hanada
10:00 - 10:25	Problem Analysis for the Overall Views	
10:25 - 10:30	Grouping for Specific Subject	MODERATOR:
-	Water Resources Management Engr.	Mr. Melchor O. Baltazar, Deputy Executive Director, NWRB
-	Water Supply	Mr. Toshio Katayama
-	Irrigation	Mr. Emerson Coloma, Irrigation Expert, JICA Study Team
Coffee Break		
10:45 - 11:10	Detailed Participation Analysis	By Each Group
11:10 - 12:00	Problem Analysis For Specific Field	By Each Group
Lunch Break		
1:00 - 1:30 PM	Problem Analysis (continuation)	
1:30 - 2:30	Objective Analysis	By Each Group
Coffee Break		
2:45 - 3:30	Alternative Analysis	By Each Group
3:30 - 4:30	Preparation of Project Design Matrix (PDM)	By Each Group
	CLOSING CEREMONY	
4:30 - 4:50	Presentation of PDM and Plan of Operation	By Each Group
4:50 - 5:00	Closing Remarks	Dir. Luis M. Sosa
	Awarding of Certificate	Director, NWRB

Notes;

OVERALL MODERATOR - MR. SHIGEYOSHI HANADA

CO-MODERATOR - ENGR. PACITA F. BARBA

Table L-4 COMPOSITION OF EACH GROUP

Water Resources Management group	Irrigation Water Demand group	Water Supply group
NEDA	NIA	NEDA
LWUA	DENR	NWRB
NIA	BSWM	MWSS
DILG	NWRB	MWCI
BRS	DPWH	MWSI
DOH	DA	LWUA
NPC		DILG
DPWH		BRS
DTI		NPC
PTFWRDM		DOH
NWRB		DTI
BSWM		JICA
DENR		
MWSS		
MGB		

Table L-5 PARTICIPANTS OF PCM WORKSHOP

Moderator S. Hanada co-moderator.

Name Nickname	Agency/ Organization	Specialization	Interests/Hobbies, Others
Evangeline Dacanay Vangie	MWSS	Project Management and Planning	Reading, bowling
M.L. Borja Mandy	Bureau of Soils and Water Management	Soil and Water Eng'g Hydraulics	Biking, Reading books, Gardening
Oscar O. Carpio OCA	Bureau of Soils and Water Management	Soils and Water Conservation Water Management	Basket ball
Jose Dimeratic Joe	MWSS	Water Supply Project Development & Management	Driving cycling
Isabel V. Bagayoro	MWSS - Regulatory Office	Water Quality Regulation	Reading
Lope Vallenas	National Water Resources Board	Water Resources Aspects	Dart, Bowling
Emerson M. Colonia Emer	JICA Study Team	Irrigation	Water Districts Bowling, Dart
Dennis Costelio Dennis	NEDA - Infra	Infrastructure Planning	Bowling, swimming
J. Sese Judy	Bureau of Research & Stds. Research & Development Div.	Materials Quality Control	Reading Books
Virgilio Ocampana Ver	FMO-RWS DPWH	Planning Programming	Tennis
R. Javelosa Roc	MGB	Geomorphology	Reading
A. Espiritu Cleto	Bureau of Research & Stds Research and Development Div.	Hydrology	Reading Magazine
Allan Barcena Allan	Forest Mgt. Bureau	Forest Management	Reading
Ramon G. Ramero Mon	NWRB	Water resources Aspects	Chess, Bowling
Evelyn V. Ayson Eva	NWRB	Water Resources Aspects	Bowling
Arlene C. Diaz/Arlene	NWRB	Water Resources Aspects	Reading
Jorge Matea	MWSS Regulatory	Water Resources Aspects	Reading
Florimel R. Balbedina Mel	NWRB	Water Resources Aspects	Reading
Jesusa T. Roquel/Jessy	NWRB		
Isidra D. Penaranda/Edsie	NWRB	Water Resources (Project Evaluation)	Reading
Isidra D. Penaranda/Edsie	NWRB	Water Resources (Project Evaluation)	Reading
Godofredo Carpio/Freddie	Presidential Task Force on Water Resources Development & Mgt.	Hydrogeology	Hiking Mountaineering, Singing, Sketching, Running (sports)
George A. Thiam/George	Forest Mgt. Bureau	Forest Management	Tinkering
Rogelio Ocampo/Roger	Orig - WSS - PMO	Water Supply Planning Prog.	Reading Hiking
Frankie Arellano			
Ma Elena B. Pargilgan Ellen	Manila Water Service, Inc. *MWSI	Planning & Design Dept. "Water Supply"	
Susan Abaso	NWRB	Data bank spec	Programming
Kenji Suzuki	JICA Expert		
F. Katayama	JICA Study Team		

Table L-6 PARTICIPATION ANALYSIS OF EACH ORGANIZATION (OVERALL)

Detailed Participation	Characteristics of the Groups	Constraints	Needs	Potentials
NWRB	Coordination	Lack of manpower	Public awareness on agency's existence	Data provider
	Regulatory	Insufficient budget	Strengthening of the power and functions	WRAP
	Government agency		Quality data	Expertise
			Additional funding	
NEDA	Planning agency			
	Coordinating agency			
Congress/Senate	Influencial	With vested interest	Sector situation (Information)	Enact laws
				Approve budged
			List of projects to be implemented in their areas of jurisdiction	
MWSS		Social political constraints in project implementation		
MWSI	Water supply	Concession agreement	Government guarantees	service expansion
		Regulations tariff		
		Water shortage	Water supply facilities	Water resources development

Table L-7 CATEGORIZATION OF PARTICIPANTS

Beneficiaries	Affected groups	Potential opponents	Decision makers	Funding agency
Women/children	DOH	MGB	PTFWRDM	LWUA
	NGO			
	Cultural minorities	Media	DENR	GOJ
Water user's association		Cultural minorities	Contractors	
Irrigators association			BRS	
Investors			DA	
			LGU's	BSWM
			DOH	
			DILG	
			DTI	
			BSWM	

Table L-8 DETAILED TARGET GROUP ANALYSIS

	Constraints	Needs
MWSS	Low Water Supply	Develop New Sources
	Water Quality Problems	Improve Water Facilities (Pipes, etc.)
	Concession Agreement	Upgrade Water Facilities
	Water tariff	Service Area Expansion
	High Non-Revenu Voates	Improve Collection
	High investment for long payback period	Reservoir/Dam
	Illegal service connection	Water supply strategy
	No revenue water	Obtain Water Rights
	High Water Leakage rate	Control groundwater abstraction of private wells
	Old water supply facilities	
	Water Rights	
	Shortage facilities	

Table L-9 PARTICIPATION ANALYSIS OF INSTITUTIONAL ASPECTS (Water Resources Management) (1/3)

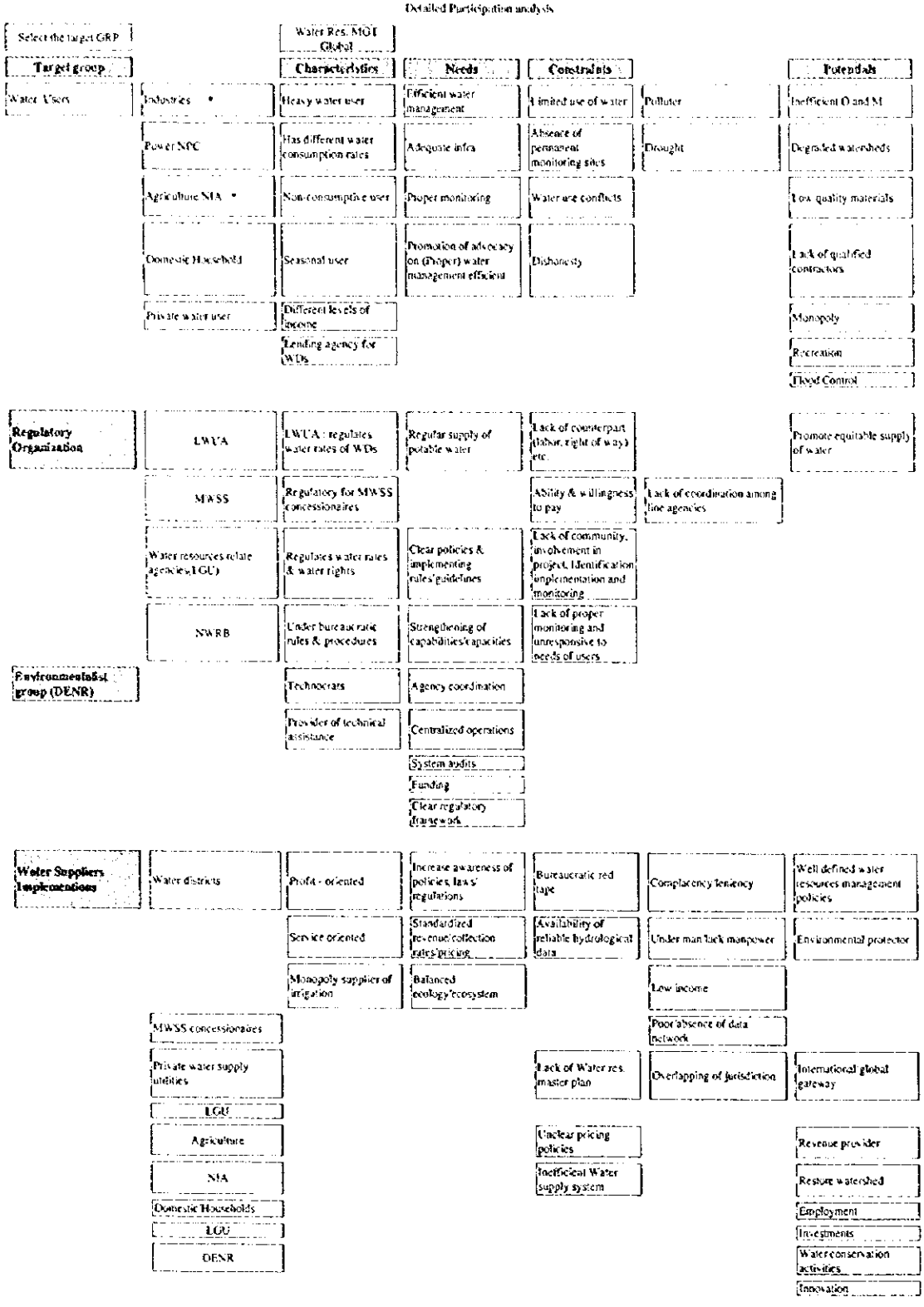


Table L-9 ***PARTICIPATION ANALYSIS OF IMITITUTIONAL ASPECTS***
(Water Supply) (2/3)

Beneficiaries		
	MWSI	
Affected groups	Deepwell Operators	Metro Manila Residents
Decision Makers	Industrial Commercial Users	DOH
Community Leaders	Manufacturer of Bottle Water	
Potential opponents	Golf Cources	
Implement Agencies		

Detailed Participation Analysis of Megapolico Second

Detailed Participation Analysis	Characteristics of the groups	Needs	Constraints	Potentials
M. Manila residents Low	Low income	Adequate water supply	Inadequate water supply	Capacity to pay
Middle	Middle income	Sufficient income	Inadequate income	Ability to fetch water
High	High income			
	They take a bath more often			
Industries	Profit-oriented	Economic incentives	Government regulations	Generation of income provision of goods/services
		Capital/workforce	Financial/	Business & technical skills
NGO	Active	Funding	Limited funding	Good organization
	Aggressive	Government support		Generates favor

Table L-9 PARTICIPATION ANALYSIS OF LMITITUTIONAL ASPECTS
(Irrigation Water Demand) (3/3)

Target Group	Characteristics	Needs	Constraints	Potential
Farmers Nationwide T.G	Hard working	more water for irrigation	Inadequate irrigation water supply	Hardworking
	Average income is low	Adequate irrigation facilities	Inadequate irrigattion facilities	Food supply producers
	They own a parcel of land.	Farming equipment	Unirrigted farms	Higher production
		Technical assistance	Peace order situation	
		Information dessimination	Low income	
		Farmer trainings	Change in Development policies	
			Lack of technical know-how	
Irrigators Association	Maintain facilities concerning irrigation	Systematic collection of fees	Collection of fees (Water Charge)	Contributors of taxes
	Cater problems to the LGUs	Able and capable leaders/officials of the association	Poor management of Water supply	
	Collects irrigation service fee	Alternative water source	Inadequate irrigation water supply	source of financial assistance
		Regular meetings/dialogue		
Farmer's Cooperative	Source of financial assistance from a common fund	Systematic collection of loans	Insufficient fund	
			Uncollected loans	

Table L-10 Problem Analysis (Overall) (1/4)

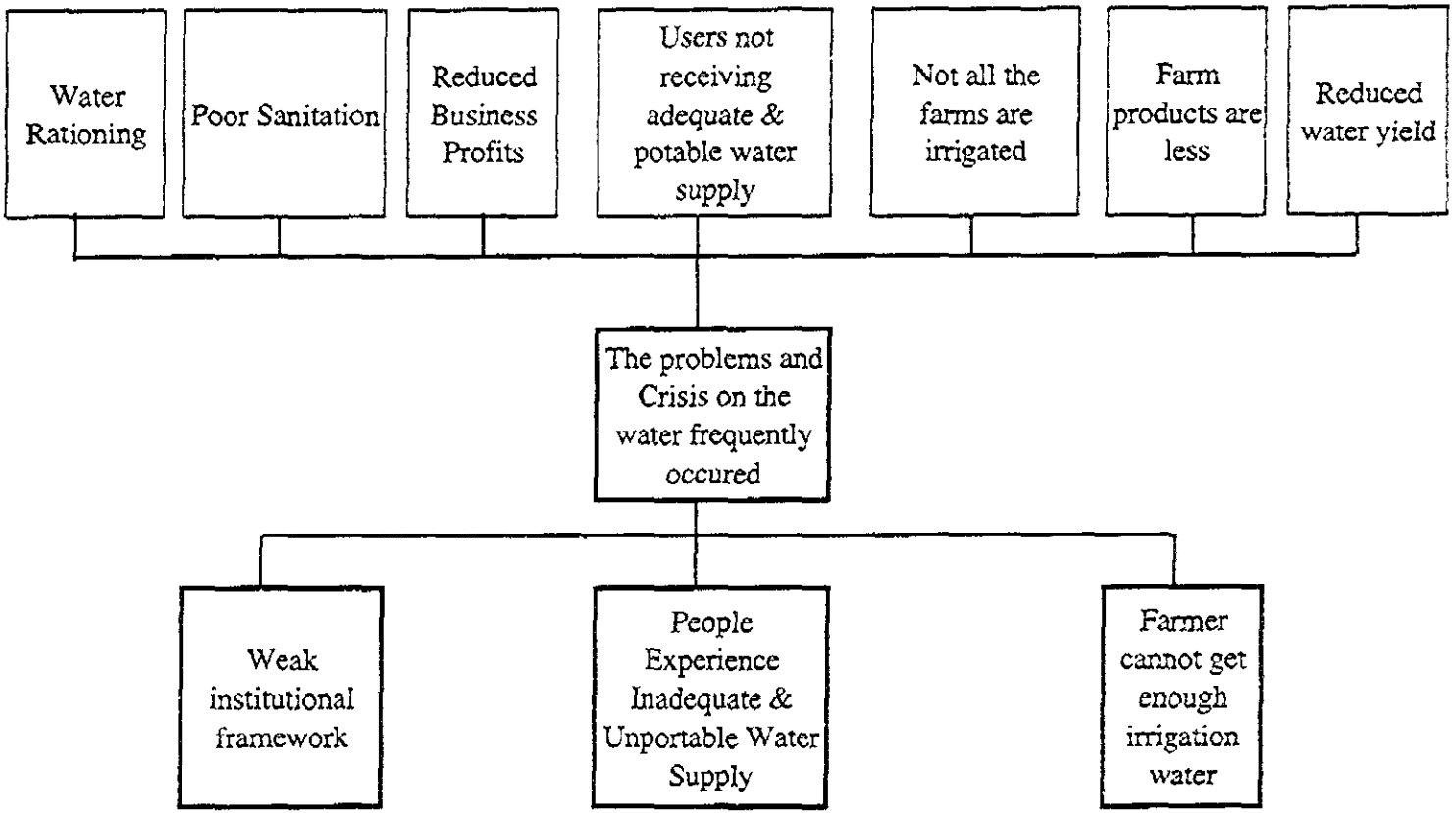


Table L- 10 PROBLEM ANALYSIS (Water Resources Management) (2/4)

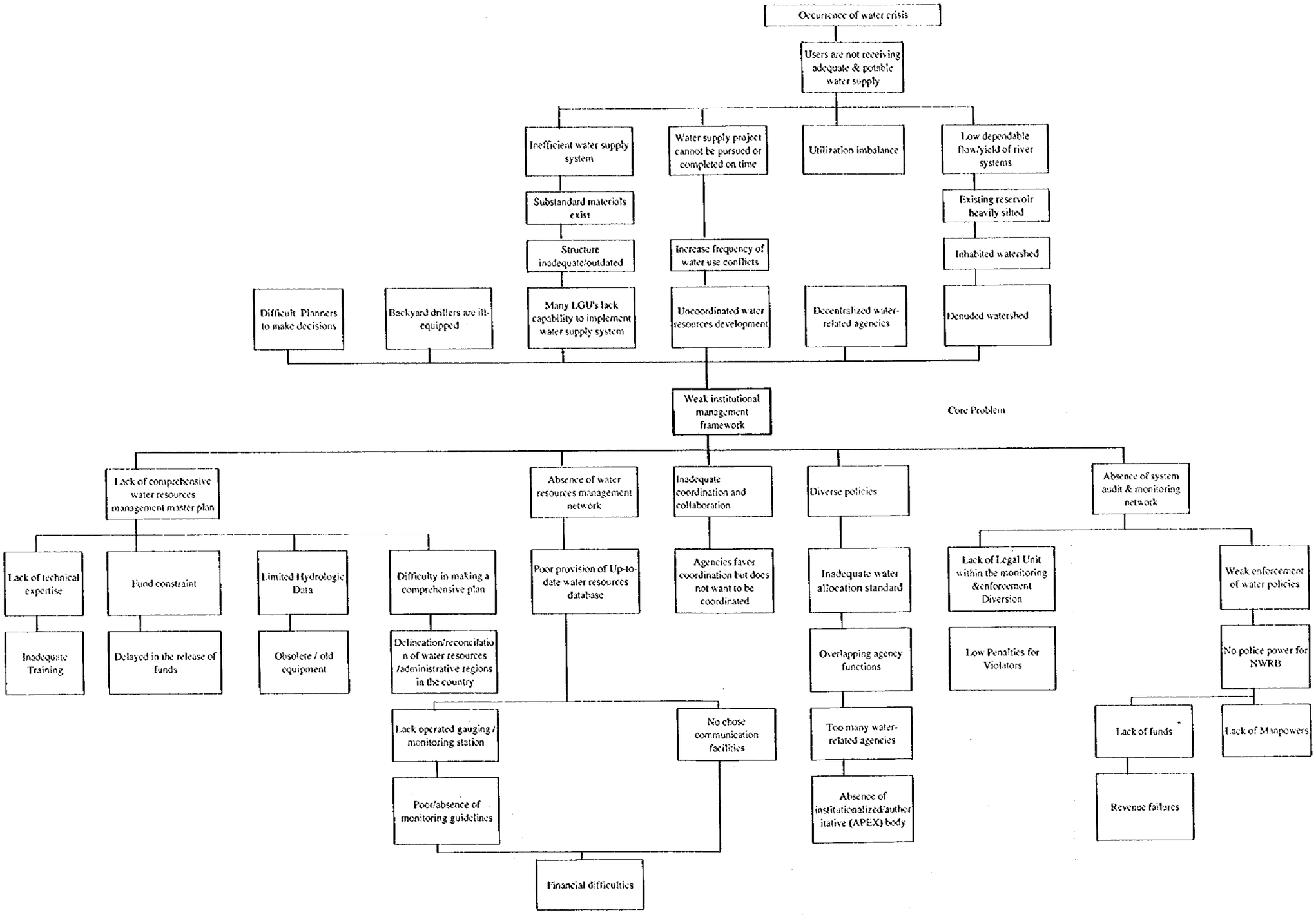


Table L-10 Problem Analysis (Water Supply) (3/4)

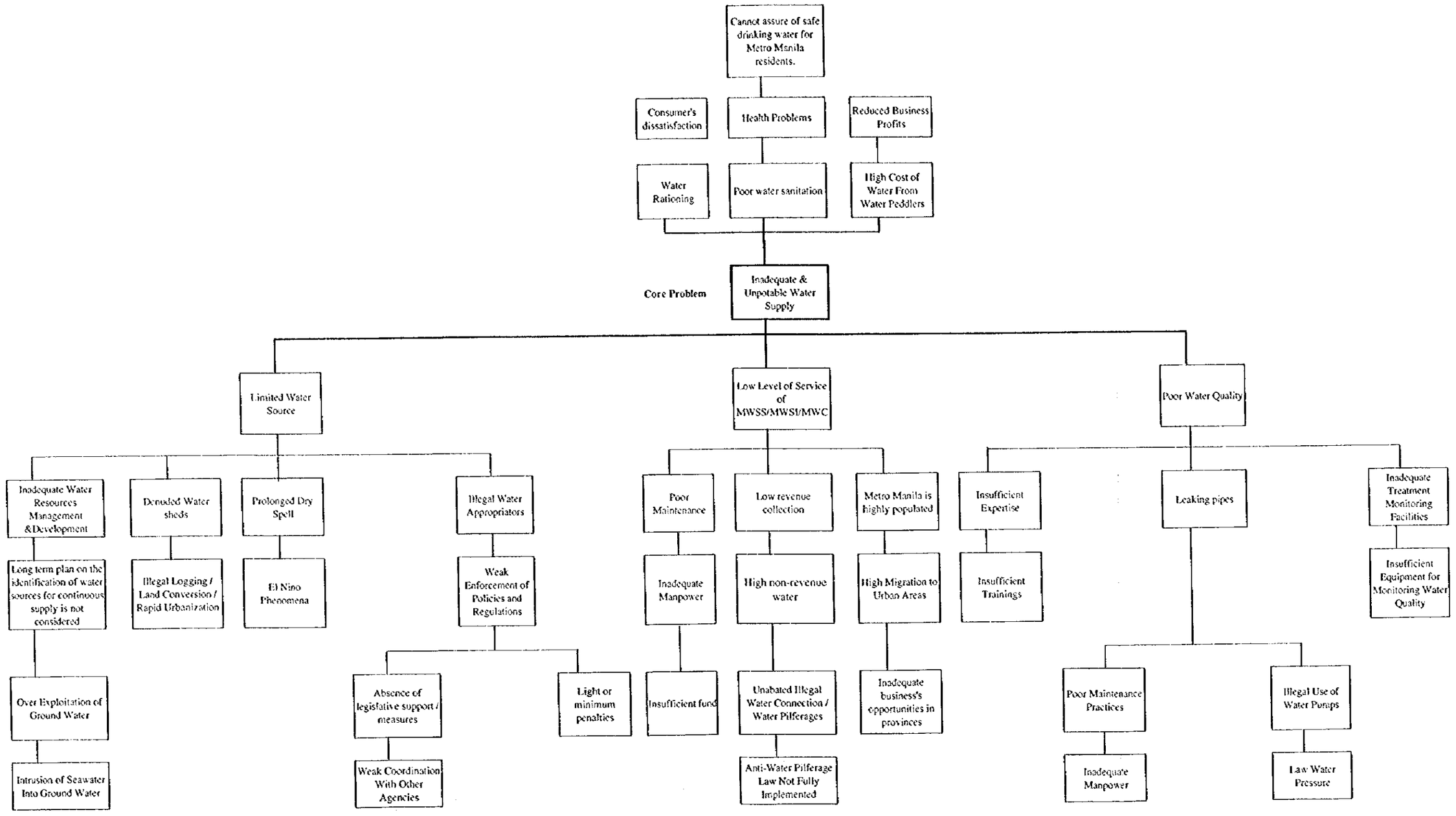


Table L-10 PROBLEM ANALYSIS (Irrigation Water Demand) (4/4)

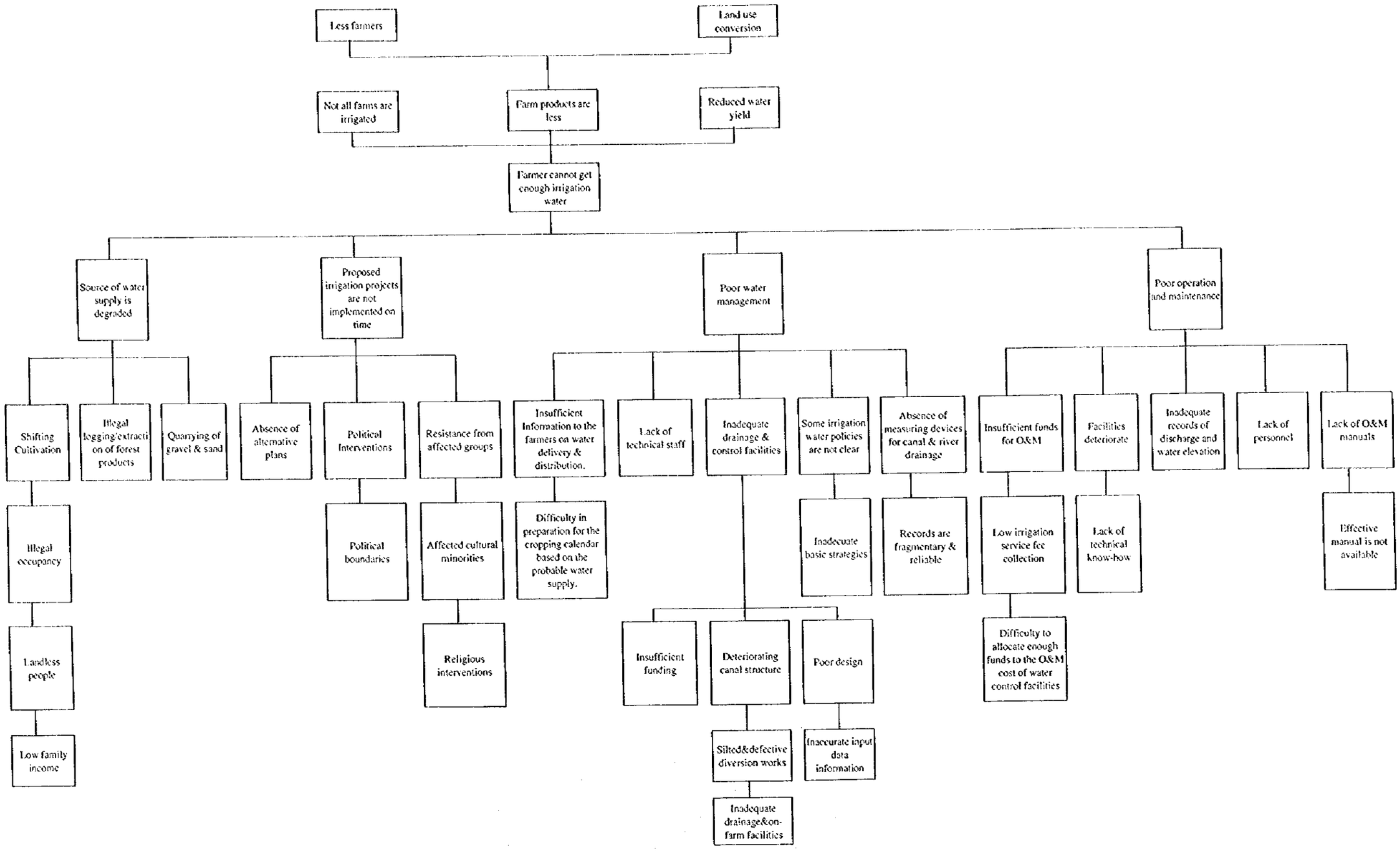


Table L-11 OBJECTIVE ANALYSIS AND SELECTION OF APPROACH (Water Resources Management) (1/3)

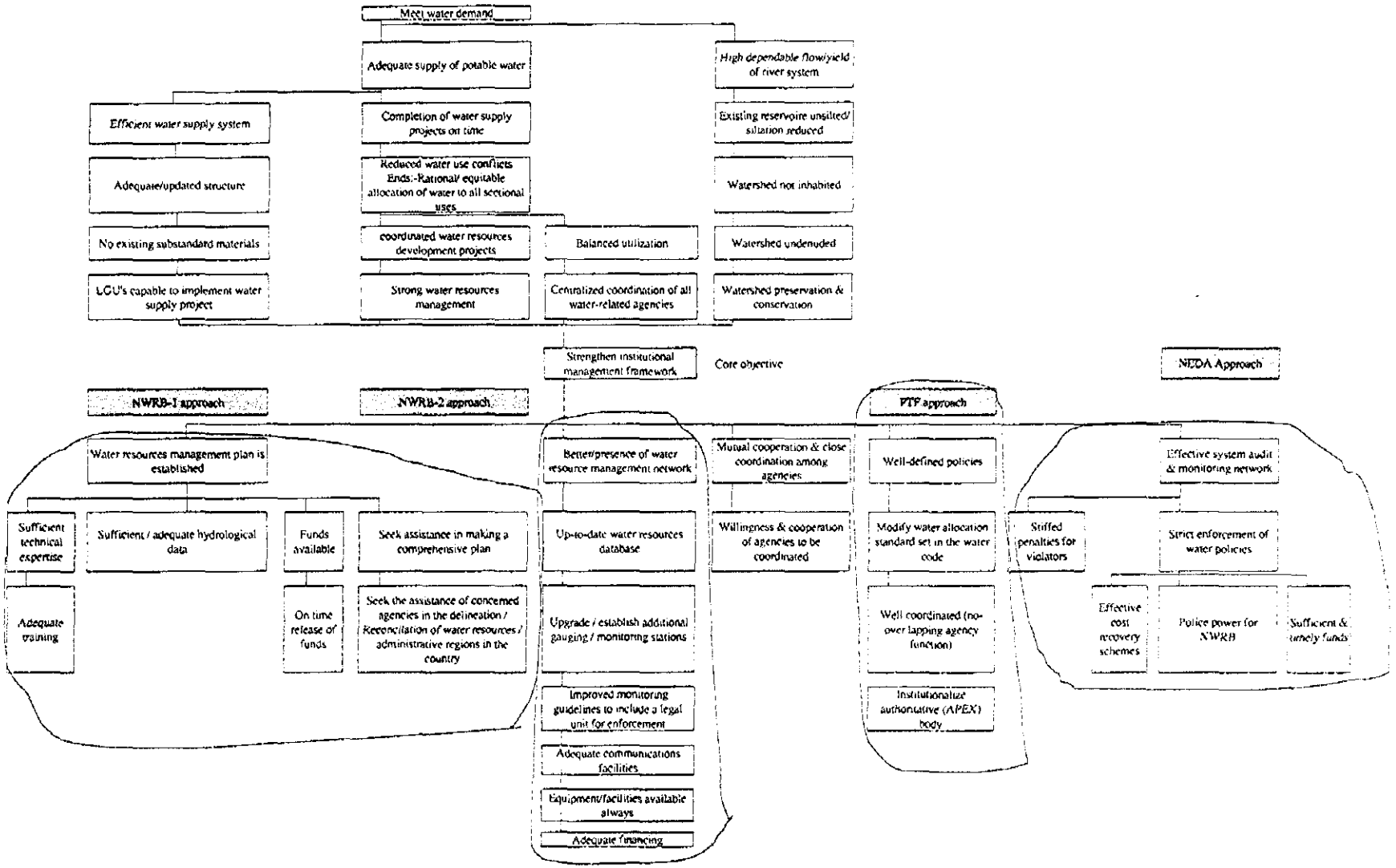


Table L- 11 OBJECTIVE ANALYSIS AND SELECTION OF APPROACH (Water Supply) (2/3)

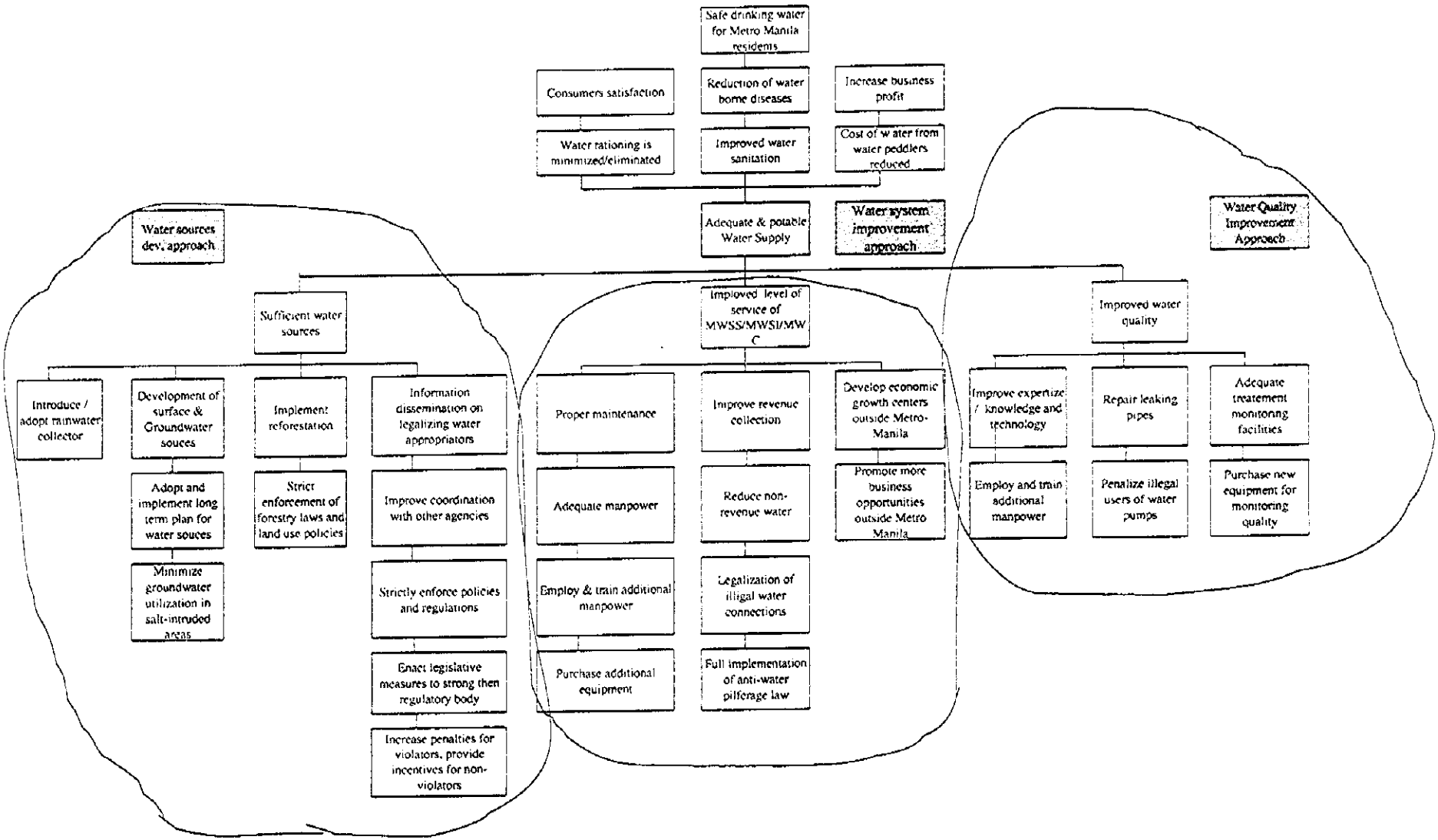


Table L-11 OBJECTIVE ANALYSIS AND SELECTION OF APPROACH (Irrigation Water Demand) (3/3)

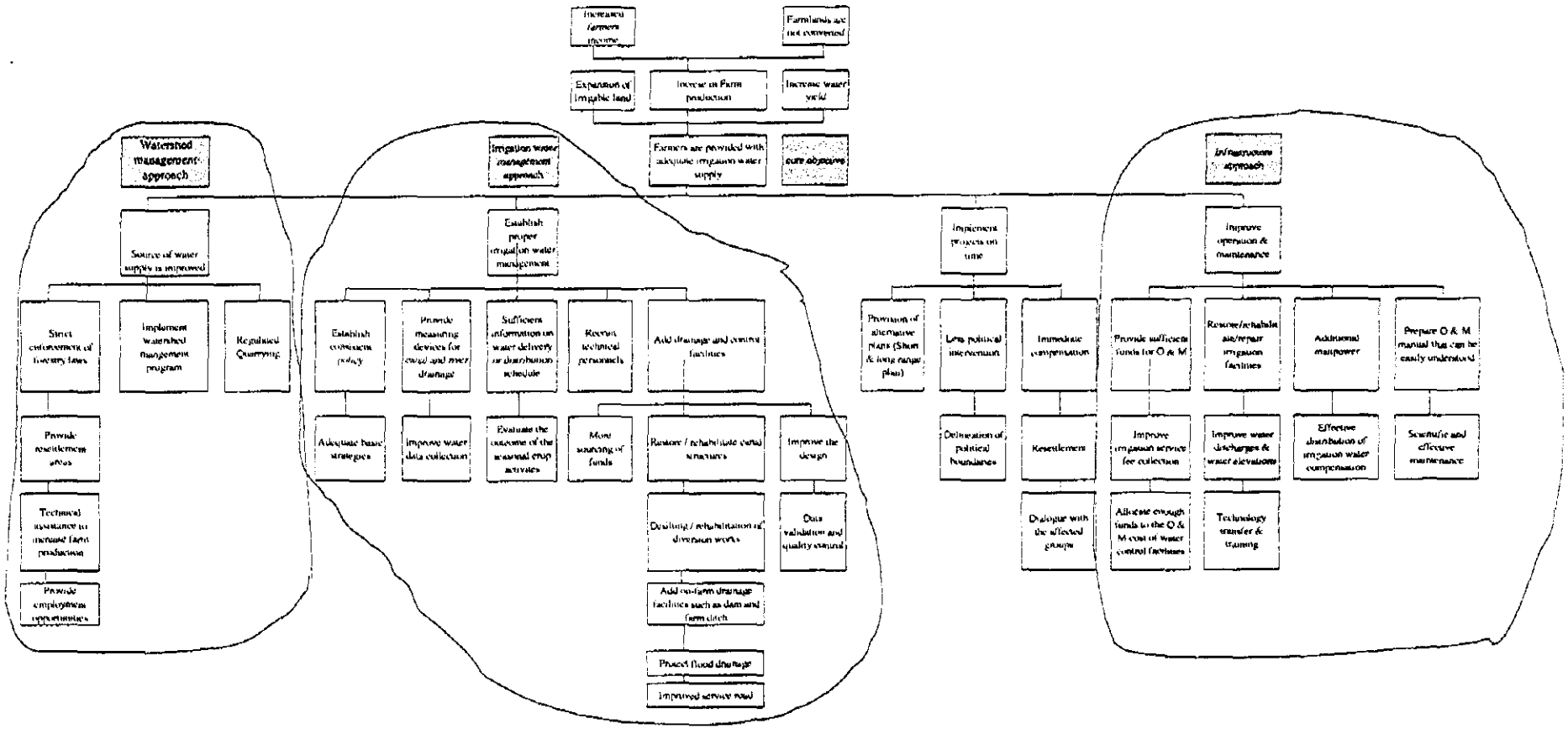


Table L-12 ALTERNATIVE ANALYSIS (Water Resources Management) (1/3)

	NWRB-1 Approach	NWRB-2 Approach	PTF Approach	NEDA Approach
Priority	High	High	High	High
Inputs	Technical assistance	- do -	- do -	- do -
	Consultancy services			- do -
	Equipment's			- do -
Technical Aspects	Hi-Tech	- do -	- do -	- do -
Target Group	All water sectors	- do -	- do -	- do -
	Economic sectors			
Social factors	Low	- do -	- do -	
Environmental Aspects	Low	- do -	- do -	
Financial/Economic Aspects	High			
Achievement	Sure			
Others				

Table L-12 ALTERNATIVE ANALYSIS (Water Supply) (2/3)

	Water Sources Development Approach	Water Quality Improvement Approach	Water System Development Approach	Water Services Development Approach
Priority:	High	High	High	High
Target Group:	MWSS Service Area	High	High	- do -
Inputs:				
Technical Aspects:	High Technique	High Technique	High Technique	- do -
Environmental Aspect:	Displacement of people	- do -	None	- do -
Financial Aspect:	B/C≥1	B/C≥1	B/C≥1	- do -
Achievement	feasible	feasible	feasible	- do -

Table L-12 ALTERNATIVE ANALYSIS (Irrigation Water Demand) (3/3)

	Watershed Management Approach	Irrigation Water Management Approach	Infrastructure Approach
Priority	High	Medium	Medium
Size of Target Group	All beneficiaries	All beneficiaries	All beneficiaries
Input	Manpower funding	Manpower funding	Manpower funding
Technical Aspect	Conventional	High	High
Environmental Aspect	High	High	High
Achievement (Success)	High	High	High
Economic/Financial Aspect	High	High	High

Table L-13 PROJECT DESIGN MATRIX (Water Resources Management) (1/3)

Narrative Summary	Verifiable Indicators	Means of verification	Important assumptions
Overall Goal			
No water crisis	Adequate supply of water coverage by 2025.	Survey record for COSMOS	
Project Purpose			
Strong Institutional Established framework	No conflict of functions.	Feedback study	
	Adequate framework for integrated water resources management with capable regulatory and institutional system.	Survey Record	
	Master plan report		
	BILL (WRAP) Passed into law		
	Hydrological data network		
Outputs			
1. Formulation of master plan	Master Plan study conducted in 1999	Master Plan	No El Nino occurrence
2. Presence of institutionalized Authoritative (APEX) body WRAP	Bill Passed in 1998	Report	
3. Strengthened NWRB	Increasing staff	Report	
4. Establish/Improved hydrological data collection network	Network completed by 2000	Report	
Activities	**INPUTS**		
1-1 Undertakes master plan study			
2-1 Legislative addition			**Preconditions**
3.Monitoring			All proposed recommendations are implemented
			New administration fully supports existing programmes

Table L-13 PROJECT DESIGN MATRIX (Water Supply) (2/3)

Narrative Summary	Verifiable Indicators	Means of verification	Important assumptions
Overall Goal			
Sufficient & potable water supply in Metro Manila	By 2025 , 100% of service area is covered.	Data from NSO MWSS MWSI/ MWC	Socio-economic assumptions are not changed
		Feedback from clients	Consistent government support
		Survey Records	non-occurance of El. Nino
Project Purpose			
Provide safe and adequate drinking water for Metro Manila Residents	100% of service area is supplied by 2025	Data from NSO MWSS MWSI/ MWC	
Outputs			
1. Adequate water Sources	Adequate water supply infrastructures are constructed	DOH Survey Data	
2. Good water quality	Reduction of Water born diseases	establish MWSS complain Center	
3.High level of service	Complaint are reduced x%	Media	
Activities	**INPUTS**		
1. Formulate/implement Water Resources Master Plan	Wells/Dams/Reservoirs		Tools and spare-parts are supplied and cleaned in time
2. Implement modern treatement process	Treatment facilities		**Preconditions**
3. Strict implementation of anti-pilferage law	Pumps pipelines pumping stations		Funding is secured
4. Implement sufficient preventive maintenance program	Well trained manpower		
5. Training of staff on new technologies	Improved data collection		
6. Reforestation			
7.Conservation Plan and Information Campaign			
8. Periodic monitoring			

Table L-13 PROJECT DESIGN MATRIX (Irrigation Water Demand) (3/3)

Narrative Summary	Verifiable Indicators	Means of verification	Important assumptions
Overall Goal			
Farm production increased	Farmers in come will increased by x% by 2025	Production record	No El Nino/El Nina
Increased farmers income			
Project Purpose			
Farmers are provided with irrigation water supply	100% of the area is provided of water by 2025	Production record	No El Nino/El Nina
	180% cropping intensity in the service area by 2025	Project record in NIA	Farmers have enough production inputs
	Yield/ha is 7.5 metric tons/ha per cropping before year 2025	Yield record of National souses	Improved farming technology will be maintained
Outputs			
1. Adequate irrigation facilities provided	100 new projects and 50 is carried out rehabilitated projects by 2025	*Inventory Reports*	*Construction money is secured*
2. Improved water management	Sufficient water supply is made by 90%	*Survey report*	
3. Facilities restored			
4 Rehabilitated watershed			
Activities	**INPUTS**		Reforestation Program
			Preconditions

Table L-14 INTEGRATED PROJECT DESIGN MATRIX (1/2)

Narrative Summary							
Overall Goal							
Urban life is stabilized.		Agricultural productions is increased.					
Project Purpose							
Safe & adequate drinking water for Metro Manila Residents and farmers in the basin is provided.							
Outputs							
INSTITUTIONAL ASPECT		**Water Resources Development ASPECT**			**IRRIGATION ASPECT**		
Master Plan on water supply for M.M. is formulated.	Water-related institution(NWRB) is strengthened.	2 Water sources are developed adequately.	Over-exploitation of groundwater cease.		3 Adequate irrigation water is supplied to farmers.	Operation and maintenance of irrigation system is improved.	
Strong institutional framework is legally established.	Hydrological data collection network is established and improved.	Water delivery service improved to high level.	Less saline water intrusion into aquifer.		Proper irrigation water management is established.	Sediment inflow into reservoir is reducing.	
Institutionalized authoritative (APEX) body, WRAP is established.		Water quality is maintained well.			Source of water supply is improved.		
Activities							
Conduct master plan on the water resources development including the Agos river basin to Metro Manila.	Add legislative procedure.	Establish information system on water delivery & distribution schedule.	Implement modern treatment process on water pilferage.	Establish conservation plan for integrated water resource management.	Improve low farm efficiency and high conveyance loss.	Establish monitoring system on water resources management program.	
Conduct Feasibility Study on the priority project(s) resulted by the Master plan study.	Send WRAP bill into cabinet.	Establish Hydrological gauging station.	Training of staff on new technologies.	Carry out Information campaign	Improve deteriorated canals and related structures, drainage systems and service roads.	Train workshopexperts.	
Implemnt water resources development on schedule.	Attach the NWRB to the Office of the President.	Monitor compliance, accumulate pertinent water data.	Establish strict implementation of anti-water pilferage law.	Carry out Reforestation activities.	improper land management practices.		
	Elevate the status of the Executive Director of the NWRB to the member of the Board.	Detailed geological investigation.	Issue licenses to parties requiring permits for groundwater.	Ban uncontrolled forest fires.	Train O&M field personnel as well as the Ias to raise capability.		
	Include NWRB in the membership of the ICC Technical Committee, particularly in deliberating on the water supply and water resources.	Employ more technical staff.	Reduce the loss due to illegal pipe connecting and water tapping.	4. Implement sufficient preventive maintenance program.			
	Create a Legal Affairs unit in NWRB to handle litigation and conflict resolution on site and at the national office.	Carry out training NWRB staff on new technologies.		Stop shifting cultivation, illegal logging, unmanaged grazing.			
	The Director General should have the rank of a Cabinet Secretary.	Establish program on management practice.		Implement effective forest protection schemes.			
		Establish Field Offices and allocate the corresponding budgetary requirements.		Adopt various erosion control measures/ practices by the DENR and PG.			
		Mobilize the community-based decisions on planning studies for the development and management of the water resources in their					
		Resolved conflicts and conduct community based consultations in planning the resource					

Table L-14 INTEGRATED PROJECT DESIGN MATRIX (2/2)

Verifiable indicators		Means of verification		Important assumptions		
By 2025 , 100% of service area is covered	Farmers income increased 10% in 2010.	STATISTICS by NSO/MWSS/MWSI/ MWC	Mass media Report	Socio-economic assumptions are not changed.		
No Water Crisis occure.	Yield/ha is attained 10% in 2010.	Monitoring record at MWSS		Consistent Government Support.		
Water supply capacity to Manila reserved at year 2000, '05, '10, '15, '20, '25 is as follows; 42.50, 65, 70, 80, 90m3/sec	Composition of Water quality is improved 10% by 2010.	Project Monitoring Report		No damage by flood.	Annual population growth is not exceeded by 1.6%.	The unaccounted-for water ratios will decrease to 30% in Metro Manila.
Service Coverage by MWSS is at 80% in 2025.	Complaints Reduced to nil by 2015.	Data from NSO/MWSS/ MWSI/ MWC		the contamination of river water with the non-treated municipal sewage.	Water consumption per capita is estimated by MWSS at 258 lpcd;	Water demand per head for MetroManila is not increased drastically
Reduction of Water born diseases.	Number of well utilization increased 156 wells(59%) to 200 in year 2010.	establish MWSS complain Center	Survey Record	Some large-scale storage type projects for water resources region III are under construction or going to be implemented.	Casecnan Transbasin project	San Rouge multi-purpose dam project
Number of NWRB staff increased by 50% in '99.	Hydrological Meteorological agencies are established by year 2000.	Progress/ Annual Report		No El NINO	The no significant adverse effects on natural and social environment.	The proposed BOT projects could complete the tasks on schedule.
Low efficiencies in municipal and irrigation water supply are to be improved and the rate of loss in the municipal water supply shrink to 20 to 30% in the year 2025.		DOH Survey data		Population in Metro Manila will not increase extraordinary.	About 30% of groundwater for the industrial purpose could be reused recycling 3 times for the same purpose until 2025.	The first priority is given to the impounding dam scheme of NPC and NIA.
		MWSS Complaint Center		New administration supports existing policies and [illegible]	Population owng to groundwater does not expand.	

INPUTS				Preconditions			
Master plan study team	Construction cost for dams/ wells/ reservoir	Agno	Balog-Balog Multi-Purpose Dam ProjectSan-Roque Multi-Purpose Dam Project	Construction of Umiiai tranbasin PJT conducted on schedule.	Construction of the Umiray-Angat Transbasin Project by MWSS is on schedule.	Local government and resident in reservoir area accept.	the sectoral annual Gross Domestic Product (GDP) growth rate: High Low
Treatment facilities	Cost for water Treatment facilities, pumps, pipelines	Pampanga	Balintingon Multi-Purpose Dam ProjectBayabas and Massin Dam Project	Trained staff remain working.	MWSS implements the Laguna lake and Manila Water supply Project III (MWSP III).	No environmental impacts.	Industrial sector 8.70% 5.90%
Pumps pipelines pumping stations		Passig-Laguna	Laiban Dam Project			Foundation of the Laiban dam and its reservoir area are not causing the water leakage problem.	service sectors 7.20% 5.80%
Trained manpower.		Amnay-Patric Amnay	Multi-Purpose Dam Project			The socio-economic framework follows NED Agrowth scenarios.	agricultural sector 4.40% 1.80%
Dam engineer		i)Kaliwa-Kanan Transbain Project				The unaccounted for water is estimated to be 30% on an average for municipal water supply.	
		ii)Kanan-Umiiay Transbasin Project					
		iii)Pampanga-Novaliches Water Supply Project					
		iv)Kaliwa-Cogeo Water Supply Project					