LOCAL DEVELOPMENT II — PROVINCIAL

مشروع التنمية المحلية

FINANCED BY U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
مصدر التمويل : الوكالة الامريكية للتنمية الدولية

MANUAL:

RURAL WW PROJECT PLANNING

Funded Under

USAID Contract Number 263-0182-C-00-8041-00
Project Number 263-0182-3-60054

December 1991
EE5-09

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٨ شارع الفواكه / مهندسين . القاهرة / تليفون : ٣٤٨٢٢٤٧ . ٣٦٠٢٥٤٥ / فاكس : ٧١٨٩٨٦ / تلكس : ٩٣٠٣٧

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Introduction

In order that development may proceed in a logical fashion within a particular sector, some kind of planning must be implemented. In its simplest form, planning can take the shape of a needs assessment. The purpose of this manual is to assist planners and decision makers in conducting a simple needs assessment survey for the water and wastewater sectors of rural Egypt.

This manual is not intended to produce a definitive model of sector problems, but merely to provide an introduction to the types and extent of the problems villages experience. For example, by undertaking an assessment it may become obvious that a village's predominant problem is solid waste accumulation, or that while the village is well developed physically and socioeconomically, it lacks a constant water supply in certain areas.

While this manual is not a panacea for detailed planning, it is a useful tool which can be used to help prioritize village needs so that those most urgent are addressed first. The manual has also been designed to complement and form part of the detailed TOR which has been proposed for governorates to conduct sector-wide needs assessments and strategic planning.

Planners of village infrastructure projects can analyze the current status of water, wastewater and environmental pollution problems by answering three questions.

- ***What is the magnitude of the problem?***

To answer this, planners should compare a village with others in the same governorate, or with past conditions in the village itself. Then, *in quantitative terms,* they should try to express the severity of the problem and its negative impacts on village infrastructure and residents.

- ***What type of solutions have already been implemented?***

This is determined by identifying existing solutions to the problem and evaluating their effectiveness or shortcomings.

- ***What are the financial resources that will contribute to solving the problem?***

To solve village wastewater problems in the future, new projects must be designed to complement and integrate with current ones. Planners should identify current resources for topical projects, regardless of their origin, in order to identify what funds will be required in the future.

This manual is meant to help planners answer these three questions quantitatively.

SECTION 1

A Methodology for Determining the Magnitude of the Problem

Village water and wastewater problems can be attributed to several different factors relating to the physical, economic, and social development of the village, as well as its current environmental conditions. An analysis of the magnitude of water and wastewater problems in a village must take these factors into account. To make the analysis useful nationwide, the factors should be measured on a uniform scale.

Analyzing water and wastewater problems at the village level is a complex issue. To help keep the analysis simple, four data collection forms have been designed specifically for this task. Using these data forms, four indices can be calculated:

- A physical development index
- A water service index
- A social development index
- An environmental pollution index

Together, these indices cover the main factors related to water and wastewater problems in Egyptian villages.

PHYSICAL DEVELOPMENT INDEX

This index measures the extent of village development with respect to construction and population, service delivery, and the degree to which the village resembles a town or a small city. It is perhaps the most important index, as it correlates closely with all the other indices. For example, the extent of village development is often related to both the water supply and the degree of environmental pollution. Similarly, a well-developed village will usually have a large number of community facilities.

WATER SERVICE INDEX

To establish a water service index, one must determine the extent and availability of water supply (buildings served, hours available, and type of sources utilized)

related to the volume of wastewater discharged. This is a positive indicator that reflects the type of water and wastewater service required by the community.

SOCIAL DEVELOPMENT INDEX

This index measures the extent of village development in terms of amenities provided to the community by the private sector. It also gauges how much the community is paying for support services. Both of these indicate the ability of communities to pay for new utility services. They do not, however, indicate the willingness of the community to do so.

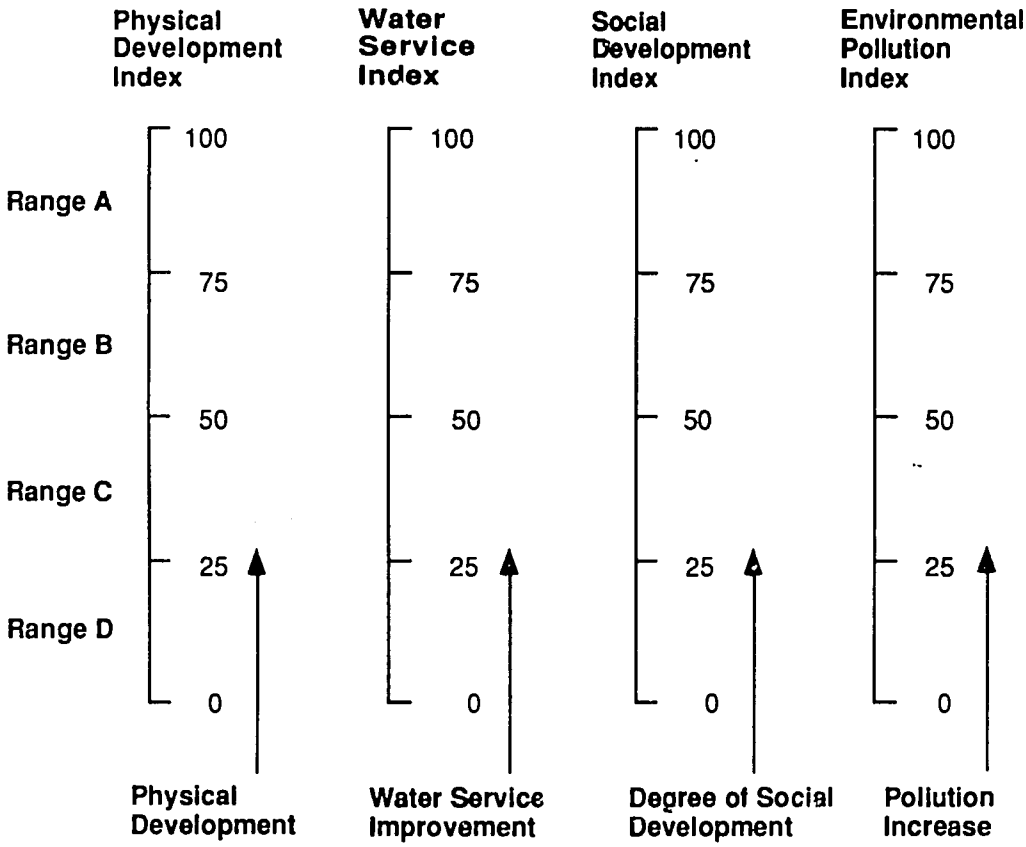
ENVIRONMENTAL POLLUTION INDEX

Visible signs of pollution in a village are an excellent indicator of the need for some form of wastewater or other environmental projects. Simple measures of the degree of pollution can be provided by noting polluted ponds of water, sullage or sewage, and accumulations of solid waste.

Figure 1 shows the scale used for each of the four indices. Each scale is graduated from 0 to 100 and is divided into 4 intervals: range A (75-100), range B (50-75), range C (25-50), and range D (0-25).

The first three scales are positive, in that moving from 0 to 100 indicates improvement. The fourth scale is negative, in that as you move from 0 to 100, the situation is deteriorating.

FIGURE 1: THE FOUR INDICES



Using the data forms that have been developed, the current state of each village can be described in terms of these indices. Some examples of how these indices work are provided in the following discussion.

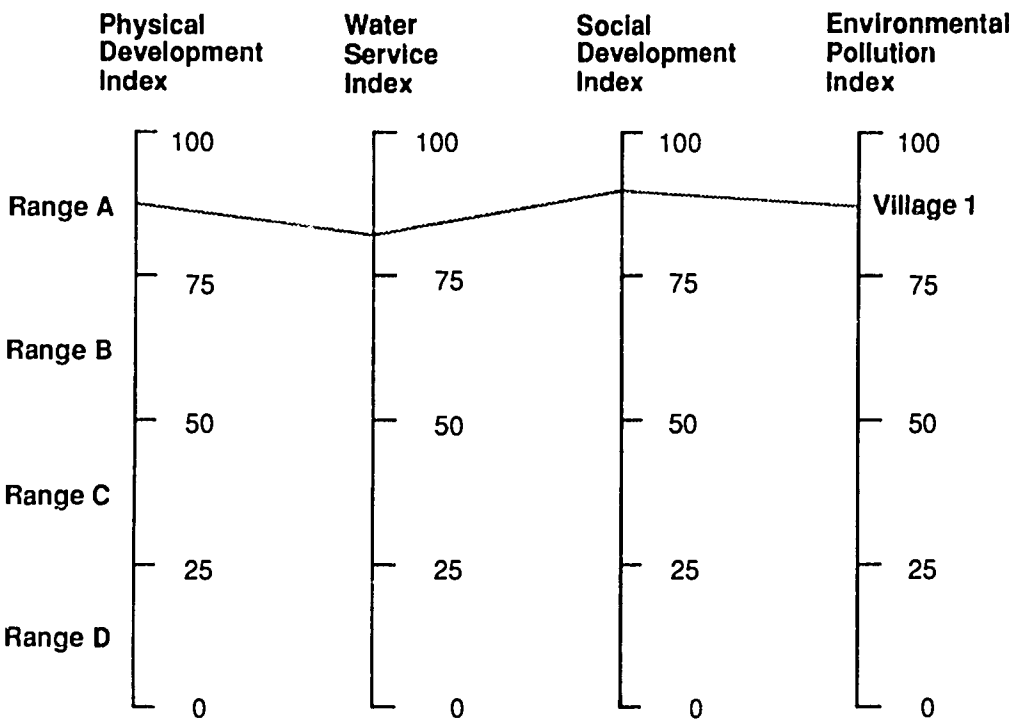
VILLAGE PROFILES: FOUR EXAMPLES

Village I

Village 1 has all four indices within range A. From this, we know the village is well-developed, with many amenities and features similar to a small city. It enjoys good potable water service, but also has serious environmental pollution from liquid and solid waste.

Some of these problems may be attributed to the side effects of a high rate of per capita water consumption and to a water network that serves most of the village houses.

FIGURE 2: VILLAGE 1 AS DESCRIBED BY THE FOUR INDICES



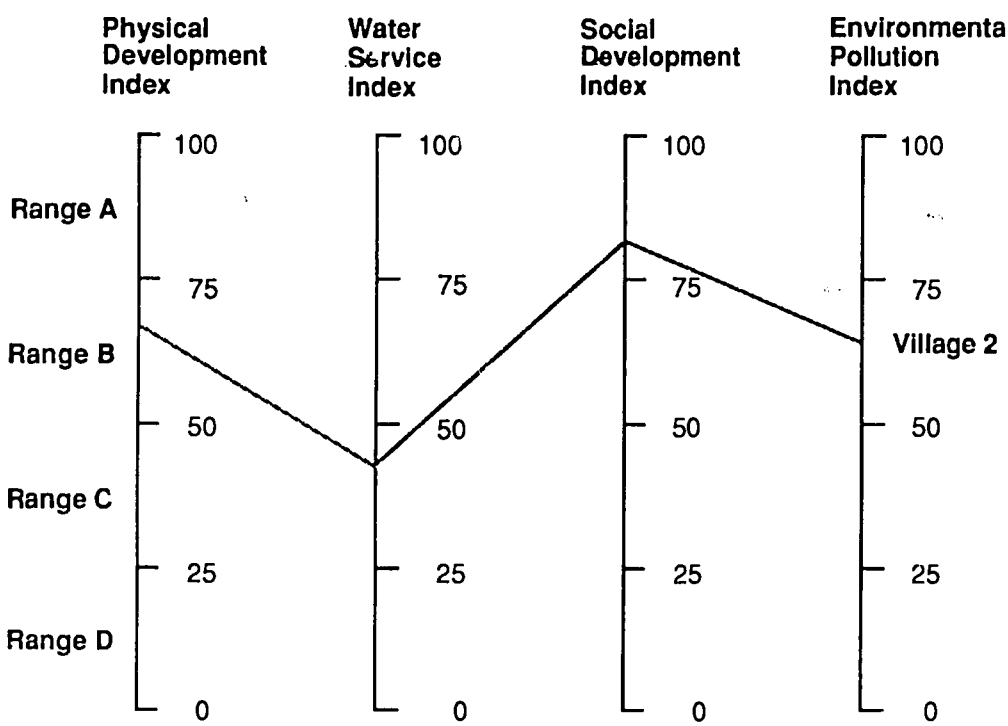
Village 2

Village 2 has index values as follows:

- Physical development index: A
- Water service index: C
- Social development index: A
- Environmental pollution index: B

Village 2 is fairly well-developed physically, with a significant number of social amenities. However, the village lacks adequate water service, and the water sector should be examined in detail. This village also suffers from intermediate environmental pollution problems and, in particular, high-level groundwater. This means that the cause of the problem is related to another water source, such as canal water or to the fact that the ground level of the populated area is below that of the planted area nearby.

FIGURE 3: VILLAGE 2 AS DESCRIBED BY THE FOUR INDICES



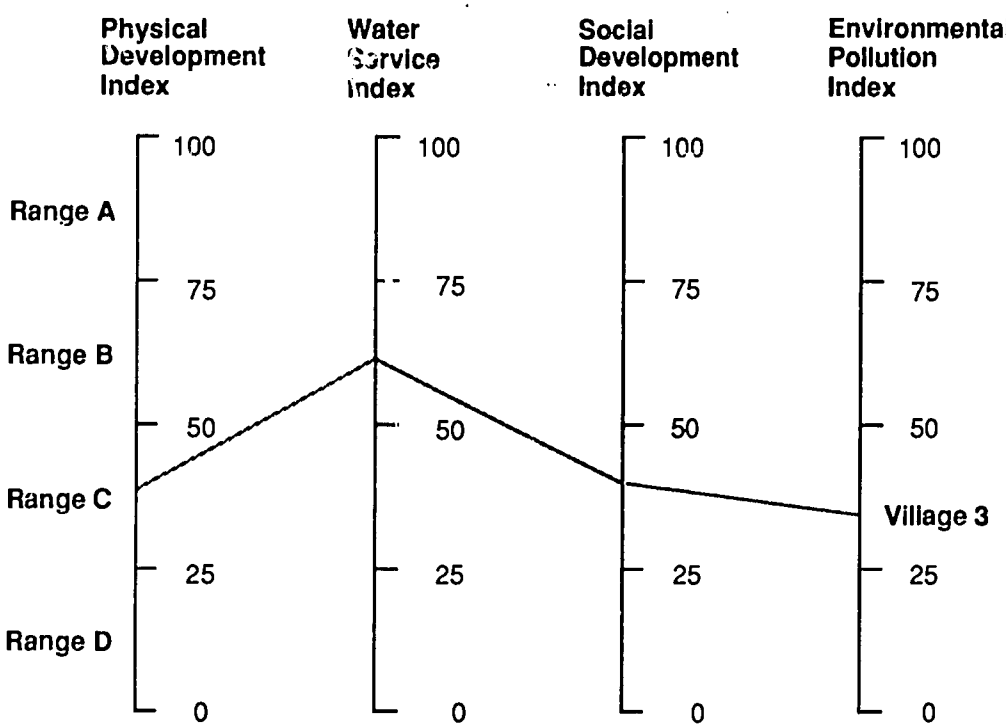
Village 3

Village 3 has the following index values:

- Physical development index: C
- Water service index: B
- Social development index: C
- Environmental pollution index: C

This village has intermediate physical and social development, with good potable water service, and no serious environmental pollution problems.

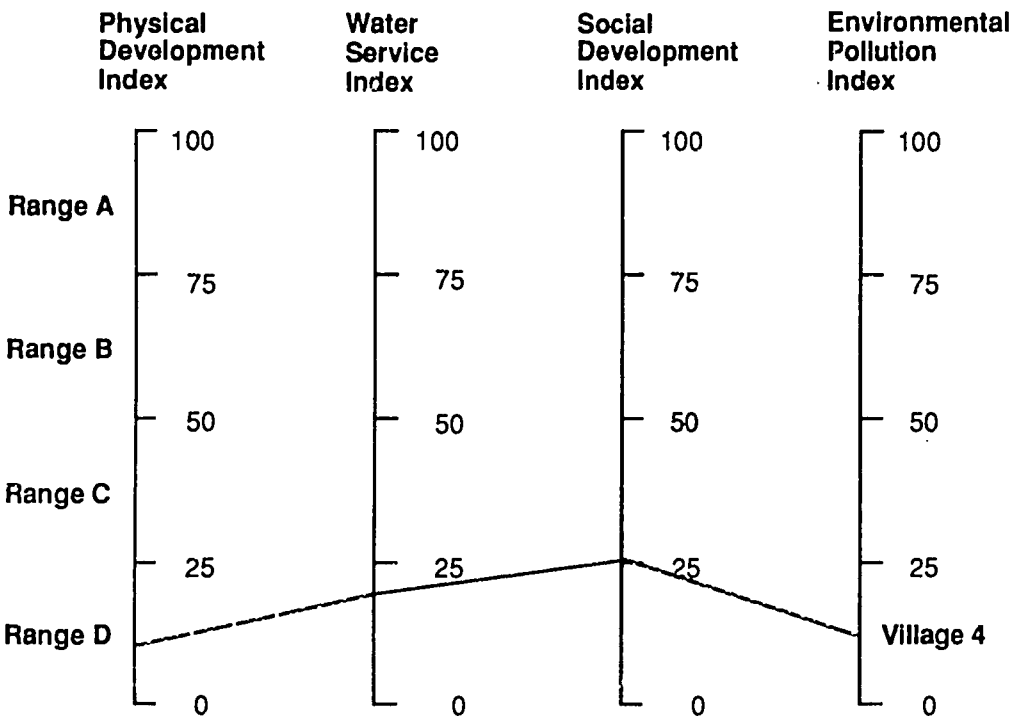
FIGURE 4: VILLAGE 3 AS DESCRIBED BY THE FOUR INDICES



Village 4 Village 4 has all four indices within the D range.

Physically, this village is underdeveloped, although its social amenities are slightly better. It suffers from a potable water shortage, yet it does not face any serious or environmental pollution problems.

FIGURE 5: VILLAGE 4 AS DESCRIBED BY THE FOUR INDICES



These examples show the usefulness of the four indices for describing the status of a village. They provide a simple means of quantifying problems and conditions, and allow decision makers to develop a simple needs assessment for use during strategic planning. But from what are these indices derived? The following discussion provides the key— easy-to-use data forms.

CALCULATING THE INDICES

Determining the Physical Development Index

This index incorporates a great number of factors, including various aspects of construction, service delivery, and production. Ten factors have been selected as most indicative of the extent to which a village is physically developed:

- Village size (population)
- Distance of the village from the city (physical/geographic dimension)
- Building water service connection rate
- Percentage of adobes
- Percentage of houses with electricity service connections
- Percentage of houses without cistern-type toilets
- Availability of educational services
- Availability of health services
- Availability of telephone services
- Availability of internal roads

A numeric value of one to four is assigned for each of the ten factors, and the values are added for a total index value. Table 1 shows the questionnaire that is used to assign values for the ten factors.

TABLE 1: CALCULATION OF THE PHYSICAL DEVELOPMENT INDEX VALUE

Factor	Data Source	Development Criteria		Points
1—Village size in 1990	1986 census with 2.7% increase/year added	> 30,000	☐	4
		15,000 - 30,000	☐	3
		5,000 - 15,000	☐	2
		< 5,000	☐	1
2—Distance from nearest city	Village index or markaz map	≤ 5 km	☐	4
		6 - 10 km	☐	3
		11 - 15 km	☐	2
		> 15 km	☐	1
3—Building water service connection rate	Village council subscriber unit or water bill collection authority	>70%	☐	4
		45 - 70%	☐	3
		40 - 45%	☐	2
		< 40%	☐	1
4—Percentage of adobes	Local council or field survey	≤10% (rare)	☐	4
		11 - 25% (low rate)	☐	3
		26 - 50% (medium rate)	☐	2
		> 50% (high)	☐	1
5—Houses with electricity service connections	Local council	≥ 80% (almost all)	☐	4
		50 - 79% (high)	☐	3
		20 - 49% (med)	☐	2
		<20% (low)	☐	1
6—Houses without cistern toilets	Local council	≤ 5%	☐	4
		6 - 10%	☐	3
		11 - 20%	☐	2
		> 20%	☐	1
7—Educational services	Local council	All phases: nursery, primary, prep & secondary; commerce, industry, agriculture; & Azhar	☐	4
		Primary, prep & secondary	☐	3
		Primary and prep.	☐	2
		Primary only or none	☐	1
8—Health services	Local council	Village hospital /health unit, pharmacies, private clinics	☐	4
		Health unit & pharmacies	☐	3
		Health unit only	☐	2
		None	☐	1
9—Telephone service	Local council	Automatic exchange	☐	4
		Manual exchange	☐	3
		Private exchange	☐	2
		No exchange	☐	1
10—Internal paved roads	Local council	> 2000 m	☐	4
		1000 - 2000 m	☐	3
		200 - 1000 m	☐	2
		< 200 m	☐	1
		TOTAL PHYSICAL DEVELOPMENT INDEX POINTS		

The planner checks the appropriate box and arrives at a total point value by adding all the points for the nine different factors. Table 2 can then be used to obtain a description of the physical development of the village.

TABLE 2: PHYSICAL DEVELOPMENT INDEX RANGES

Description	Physical Development Index Range	Numeric Value
Highly developed village	A	37-40
Village with medium development	B	28-36
Developing village	C	17-27
Under-developed village	D	< 17

Determining the Water Service Index

This index is based on the following six factors:

- Percentage of buildings 100 meters or less from the water network
- Percentage of buildings with service connections
- Percentage of buildings with multi-tap outlets (sink, bath, toilet, shower)
- Diversity of the village potable water sources
- Service continuity throughout the day
- Network pressure, determined by identifying the number of stories receiving water without using motors or pumps

Table 3 is used to assign a value of one to four points for each of these six factors.

TABLE 3: CALCULATION OF THE POTABLE WATER SERVICE INDEX VALUE

Factor	Data Source	Development Criteria		Points
1—Buildings ≤ 100 m from water network	Local council	> 90% 70-90% 50-70% <50%	☐ ☐ ☐ ☐	4 3 2 1
2—Buildings with service connections	Local council subscriber department or water bill collection authority	> 70% 45-70% 20-45% <20%	☐ ☐ ☐ ☐	4 3 2 1
3—Buildings with multi-taps	Local council	> 70% 40-70% 20-40% <20%	☐ ☐ ☐ ☐	4 3 2 1
4—Service continuity	Average supply time per day	24 hours 16-24 hours 8-16 hours < 8 hours	☐ ☐ ☐ ☐	4 3 2 1
5—Water system pressure	Stories receiving supply without using motors (in most houses)	4th floor and up 3rd floor 2nd floor 1st floor only	☐ ☐ ☐ ☐	4 3 2 1
6—Water sources	Water source identification	Special system with outside source from network or manual pumps Special system without outside source or manual pumps Village connected to outside system or to nearby city network with no local storage Weak connection with outside source, no piped water system	☐ ☐ ☐ ☐	4 3 2 1
		TOTAL POTABLE WATER SERVICE INDEX POINTS		

The planner uses Table 3 to assign a point value to each factor and adds all the values to arrive at a total index rating. Table 4 defines four categories of villages by the total point value. The index is positive, in that a high score indicates good potable water service.

TABLE 4: POTABLE WATER SERVICE INDEX RANGES

Description	Potable Water Service Index Range	Numeric Value
Village with excellent potable water service, including service connections, per capita supply, and water pressure	A	20-24
Good potable water service	B	14-19
Satisfactory potable water service, but could be improved by increasing supply and pressure, or by extending service connections to unserved regions	C	7-13
Village needs potable water service support, either from the source or network	D	< 7

Determining the Social Development Index

This index is dependent on eight factors:

- Monthly water bill
- Monthly electrical bill
- Monthly wastewater bill
- Cost of household vault evacuation
- Number of newspapers sold daily
- Number of cultural centers
- Number of private facilities available
- Presence of a local market

Table 5 shows how the magnitude of each factor can be identified and a score of one to four points assigned. When totalled, these points yield the social development index.

TABLE 5: CALCULATION OF THE SOCIAL DEVELOPMENT INDEX VALUE

Factor	Data Source	Development Criteria	Points
1—Average monthly water bill	Field Survey	Cost per family/month > LE 4 ☐ " " " " " " > LE 2 ≤ 4 ☐ " " " " " " > LE 1.2 ☐ " " " " " " > LE 1 ☐	4 3 2 1
2—Average monthly electrical bill	Field Survey	Cost per family/month > LE 6 ☐ " " " " " " > LE 4 ≤ 6 ☐ " " " " " " > LE 2.4 ☐ " " " " " " > LE 2 ☐	4 3 2 1
3—Cost per household for vault evacuation	Field Survey	Cost per family/month > LE 3 ☐ " " " " " " > LE 2 ≤ 3 ☐ " " " " " " > LE 1.2 ☐ " " " " " " > LE 1 ☐	4 3 2 1
4—Number of newspapers sold daily (Al-Ahram)	Field Survey	> 50% of households buy 1 ☐ 35 - 50% of households ☐ 10 - 35% of households ☐ <50% of households ☐	4 3 2 1
5—Number of cultural & youth centers • small *stadium?* ___ • cultural centers ___ • cinema ___ • video club ___ • youth center ___	Local Council	>4 ☐ 3-4 ☐ >2 ☐ 0-1 ☐	4 3 2 1
6—Number of private facilities: • private bakeries ___ • lawyer's offices ___ • boutiques ___ • workshop for refrig. ___ • workshop for TV ___ • jewelry shop ___ • gas station ___ • car repair ___ • banks ___	Local Council	>4 ☐ 3-4 ☐ >2 ☐ 0-1 ☐	4 3 2 1
7—Is there a weekly market in the village?		**Yes** ☐ **No** ☐	1 0
		TOTAL SOCIAL DEVELOPMENT INDEX POINTS	

The planner assigns a point value for each factor by checking the appropriate box on the questionnaire and adding all the points to produce a total value for the index.

Table 6 shows four categories of villages, with the highest point values assigned to those with the greatest degree of social development.

TABLE 6: SOCIAL DEVELOPMENT INDEX RANGES

Description	Social Development Index	
	Range	Numeric Value
Highly developed village	A	20 - 25
Village with medium development	B	15 - 19
Developing village	C	7 - 14
Underdeveloped village	D	≤ 6

Determining the Environmental Pollution Index

This index is dependent on seven factors:

- Extent to which high ground water causes areas of stagnant water throughout the village on a year-round basis
- Percentage of stagnant pools that are polluted with sewage or solid waste
- Number of house vaults directly connected to waterways in or around the populated area
- Severity of solid waste accrual in waterways in and around the populated area
- Extent of discharge of solid waste in the streets
- Extent of disposal of sullage in the streets
- Occurrence of human and animal waste in village streets

Table 7 shows how the magnitude of each factor can be identified and a score of one to four points assigned. These points, when totalled, yield the environmental pollution index.

TABLE 7: CALCULATION OF THE ENVIRONMENTAL POLLUTION INDEX VALUE

Factor	Data Source	Development Criteria		Points
1—Severity of the groundwater problem throughout the village as reflected in year-round stagnant pools	Field survey	Common Moderate Low None	☐ ☐ ☐ ☐	4 3 2 1
2—Percentage of stagnant pools polluted with sewage &/or solid waste	Field survey	> 70% 30-70% 5-30% <5 %	☐ ☐ ☐ ☐	4 3 2 1
3—Discharge of vault liquid waste into waterways	Field survey	> 70% of houses 30-70% of houses 5-30% of houses <5% of houses	☐ ☐ ☐ ☐	4 3 2 1
4—Discharge of solid waste into waterways	Field survey	Common Moderate Low None	☐ ☐ ☐ ☐	4 3 2 1
5—Solid waste accumulation in the streets	Field survey	Common Moderate Low None	☐ ☐ ☐ ☐	4 3 2 1
6—Sullage disposal in the streets	Field survey	Common Moderate Low None	☐ ☐ ☐ ☐	4 3 2 1
7—Presence of human and/or animal feces in the streets	Field survey	Common Moderate Low None	☐ ☐ ☐ ☐	4 3 2 1
		TOTAL ENVIRONMENTAL POLLUTION INDEX POINTS		

The planner assigns a point value to each factor by checking the appropriate box and adding the points to obtain the total index.

Table 8 shows four categories of villages, with the highest point values assigned to villages having the greatest environmental pollution problems.

TABLE 8: ENVIRONMENTAL POLLUTION INDEX RANGES

Description	Environmental Pollution Index Range	Numeric Value
Obvious general pollution, needing urgent and radical solution	A	25-28
Visible pollution but not yet at a drastic level	B	19-24
Limited pollution	C	13-18
Very little pollution, no problem yet	D	< 13

CALCULATING THE MAGNITUDE OF THE PROBLEM

To arrive at a quantitative measurement of the magnitude of the problem, two simple processes are required.

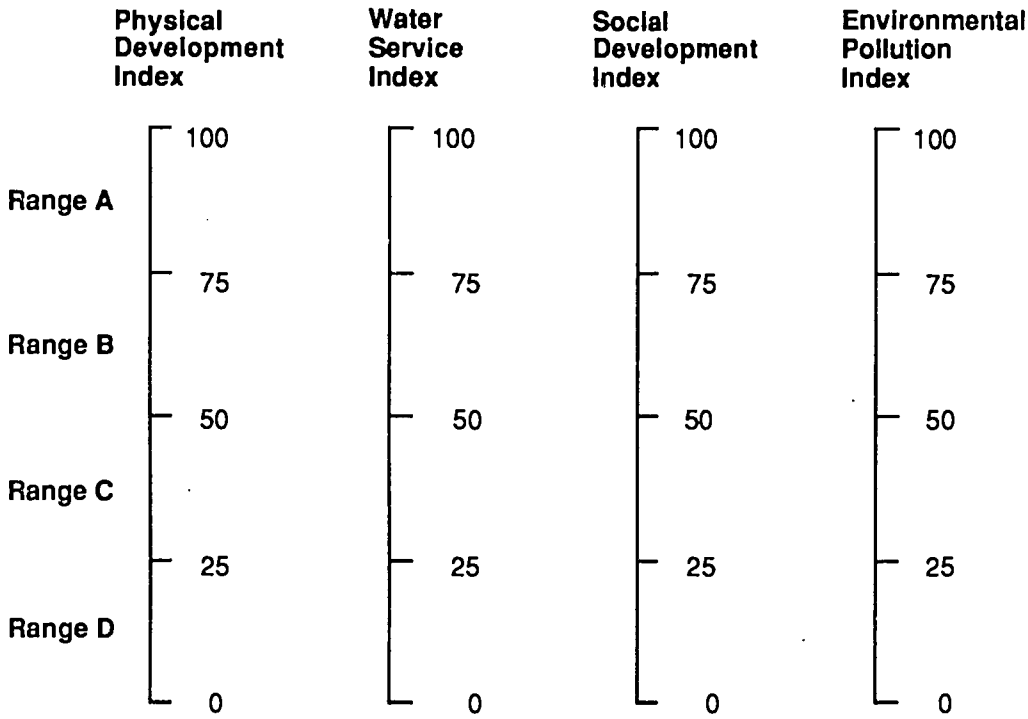
- Converting each measured scale to a percentage using Table 9
- Plotting the values of the four indices using Figure 6

TABLE 9: CONVERSION OF POINTS TO PERCENTAGE

Index	Points Calculated from Questionnaire	Conversion of Points to a Percentage	Percentage
Physical development index	( )	$\frac{\text{Points x 100}}{36}$	%
Water service index	( )	$\frac{\text{Points x 100}}{24}$	%
Social development index	( )	$\frac{\text{Points x 100}}{25}$	%
Environmental pollution index	( )	$\frac{\text{Points x 100}}{28}$	%

The resulting percentages are then plotted on the scales shown in Figure 6.

FIGURE 6: PLOTTING PERCENTAGES ON THE SCALES



SUMMARY OF PROCEDURES FOR DEVELOPING INDICES

- Fill out questionnaires for each of the four indices (see Tables 1, 3, 5, and 7).
- Convert the total index values to percentages, using Table 9.
- Plot the percentages on the scales in Figure 6.

SECTION 2

What are the Existing Solutions?

In the previous section, a method was presented that can help planners identify the magnitude of environmental pollution problems, and assess their relationships to potable water service and the physical and social development of a village. But what about past efforts to solve these pollution problems? Were such solutions radical or interim? Did they occur through governmental authority or popular effort? These are the questions addressed in this section.

DEALING WITH WASTEWATER PROBLEMS

The conventional solution for wastewater problems that villages have adopted for decades is simple, practical, and effective. Basically, it includes:

- Using latrine toilets connected to outside vaults where liquid wastes are collected
- Evacuating vaults once every several years and moving the product to fields
- Mixing the evacuation product with plant wastes or animal wastes to make compost
- Using this manure for planting purposes

With the exception of composting which is done in an unsanitary manner, this solution is still entirely effective in villages where no high-level groundwater problems exist. However, the situation becomes more complicated with an increase in population density, potable water consumption, and a high ground water level in the populated area.

Basic Elements

The elements of the conventional solution are essentially the same as those of any other wastewater solution, whether in the village or city.

- *Waste collection*: whether in a lavatory, vault, or manhole, this is a house-owner's responsibility
- *Conveyance*: manual or mechanical evacuation, or through any wastewater system

- ***Treatment***: may be a manure pile or a wastewater treatment station
- ***Disposal***: by using manure in agriculture, or by draining treated wastewater into a public drain and then using it in irrigation

Table 10 lists existing solutions for some village wastewater problems. Planners can fill in the comment column for each item on the list, so that a qualitative picture can be formed of a village's existing wastewater solutions.

TABLE 10: LIST OF EXISTING SOLUTIONS TO WASTEWATER PROBLEMS IN SOME VILLAGES

Element	Solution	Description	Comment on Application of the Solution in Appropriate Village
Collection	1) House lavatories	Local or European-type lavatory. Availability of such lavatories is significant in identifying the village's level of physical development	
	2) Vaults	Various types & sizes of house vaults; whether inside or outside the house. Some houses have no vaults and discharge waste directly to nearby waterways	
Conveyance	1) Manual evacuation	Locally manufactured tanks on carts drawn by draft animals; capacity, 1 m^3	
	2) Mechanical evacuation vehicle	5 to 7 m^3 capacity tank, drawn by tractor or trucks with tanks & suction pumps, such as imported type. Village does not need special vehicle if sharing this service with another village, or if provided part of the week by city.	
	3) Connections from vaults to nearby waterways	Some house owners are connected from house vault directly to nearby waterway, "exporting" the problem from the street to waterway. It is important to identify the percentage of these houses.	
	4) Gravity lines for streets, discharging directly to waterways	Some house owners jointly construct a gravity line, serving a particular street or houses in a region, to discharge waste through the slope to any waterway. The percentage of houses using this method should be identified.	
	5) Popular wastewater system serving part of the village	Similar to solution 4, but the system is larger and connected to cesspool and lifting pumps discharging wastewater through force main, outside the village site	
Treatment	1) Manure processing, to make use of vault evacuation product	Manure processing sites where people mix vault evacuation product with animal manure and vegetable waste to produce local manure	
	2) Wastewater preliminary treatment	Precipitation tanks to receive wastewater discharged from network, whereas sullage goes to waterways	
	3) Secondary treatment	Wastewater treatment station, constructed under studies and designs; composed of several phases and produces treated water per Egyptian standard specifications	

TABLE 10: LIST OF EXISTING SOLUTIONS TO WASTEWATER PROBLEMS IN SOME VILLAGES

Element	Solution	Description	Comment on Application of the Solution in Appropriate Village
Disposal	1) Raw wastewater discharge to nearby canal	Discharge may be at house, street, or village level; by any means.	
	2) Raw wastewater discharge to nearby agricultural drain	Discharge may be at house, street, or village level; by any means.	
	3) Partially treated wastewater discharge to any waterway	Discharge of partially treated wastewater to a waterway	
	4) Fully treated wastewater discharge to a waterway	Discharge of wastewater station product to a waterway	
	5) Government institutions wastewater discharge into groundwater, through caissons	Discharge by sinking caissons in groundwater (used in some regions to dispose of wastewater from mosques and schools).	

SO, WHAT ARE THE EXISTING SOLUTIONS?

The answer to the second question asked in the introduction to this manual—What type of solutions were already implemented?—can be summed up by identifying current solutions actually used in collecting, conveying, treating, and discharging wastewater.

Are They Sufficient?

Once the four elements are determined, they should be evaluated by considering them with respect to:

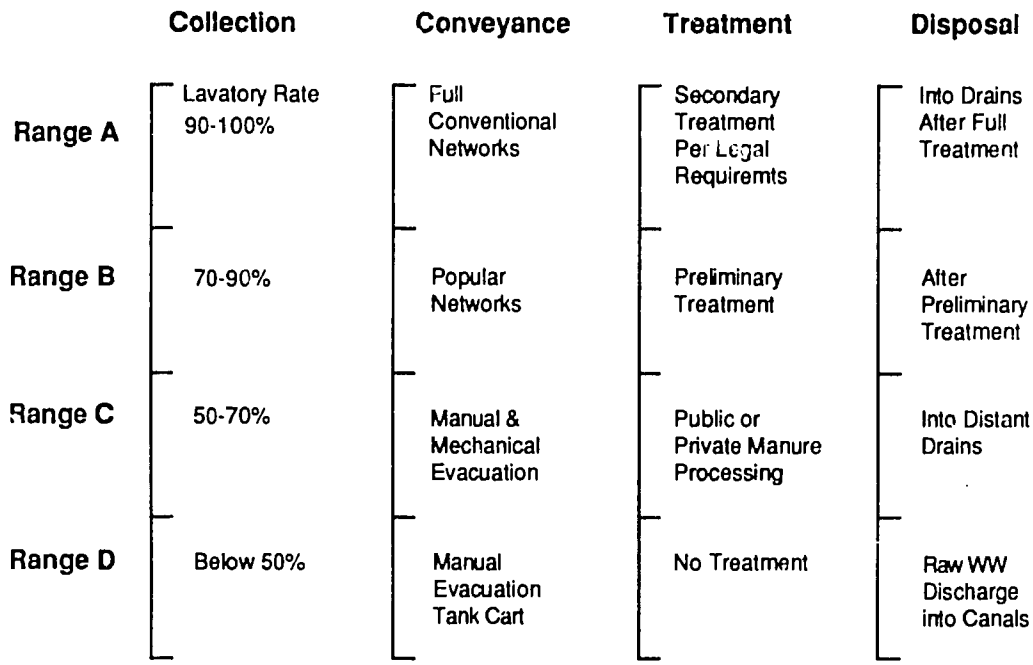
- The geographic area where the service or impact applies—the extent to which the solution is covering the problem and/or the number of beneficiaries
- The compliance of the solution with safety specifications and regulations controlling the discharge of wastewater to canals and drains

A short separate report covering these two issues should be prepared on each village.

Are they Interim or Permanent?

A village's relative position can be plotted on Figure 7 using four dots to represent its present situation. Solutions that are higher on the scale represent more permanent approaches.

FIGURE 7: RELATIVE SITUATION OF VILLAGE IN DEALING WITH WASTEWATER



SECTION 3

What Financial Resources Are Available to Help Solve the Problem?

To arrive at a complete picture of the environmental situation in a village, the financial resources—whatever their source—already devoted to solving wastewater problems must be identified. By determining the financial resources utilized from the different sources, planners can estimate what their future financial requirements will be with relation to solving the overall problem.

Current sources of physical resources or project financing include the following.

THE STATE'S PUBLIC BUDGET

Some villages in every governorate are financed through the current five-year plan of the National Organization for Potable Water and Sanitary Drainage (NOPWASD). One of NOPWASD's conditions requires local councils to provide the network and the land for a wastewater treatment plant. NOPWASD provides the plant itself.

LOCAL DEVELOPMENT PROJECT II (LD II-P)

This program has already financed several wastewater network studies and construction projects, or integral projects (networks and treatment plants).

POPULAR CONTRIBUTIONS

Popular contributions have financed several village wastewater network construction projects.

OTHER SPECIAL PROJECTS

Planners should determine whether or not a village is included in any special project, such as a WHO or UNICEF project in upper Egypt.

Table 11 provides a means of collecting data for projects that are under construction or approved for construction in the near future.

Estimates for popular contributions should be made for total possible and/or guaranteed contributions from the village population.

TABLE 11: LIST OF PROSPECTIVE FINANCIAL RESOURCES THAT MAY CONTRIBUTE TO SOLVING VILLAGE WASTEWATER PROBLEMS

Financing Source	Total Allocation (LE)	Project Name	Project Description	Project Current Phase	Scheduled Completion Date
State's Public Budget (Five-Year Plan)					
LD II-P Project					
Popular Contributions					
Other Special Projects					