

END OF COURSE PROJECT

K.K.Miglani

Group- 1

Objective of the Project

- a) Theoretical exercise for assessing the diverse effects
 - b) Practical one, that will provide you with the necessary tools to face a real evaluation event
 - c) To estimate the impact of drought on a hypothetical central American city
- Using ECLAC methodology

Impact of drought on a water supply enterprise in the affected city

- a) To make a projection of enterprise's increased expenditure (investment & operational)
- b) Reduced billing
- c) Discounting insurance reimbursements

Pre-disaster conditions

Population of city	-	40,000
Water supply source	-	A reservoir with a compact wall & 5 tube wells
Flow system	-	Gravity through 250mm & PVC pipe to water treatment plant. Wells discharge directly to reservoir
Capacity of wells		Average 6 ltr./sec.
Supply in 10 hrs.	-	$5 \times 6 \times 60 \times 60 \times 10 = 10,80,000$ = 10 lacs litres or one million litres
Regulation of water from reservoir	-	5.1 to 6.9 million ltr/day
Average demand of city	-	< 6 million ltr./day i.e. 150 ltr./person/day
Variations in supply		
Feb.	-	5.1 million ltr./day
May	-	6 million ltr./day
Aug.	-	6.9 million ltr./day
Dec.	-	5.1 million ltr./day
Operational revenue of Enterprise	-	US \$ 18665 in Av. Month
Govt. subsidy	-	US \$ 2500/month
	-	US \$ 21,165
Operating expenses	-	US \$ 13,007
Other expenditure	-	US \$ 7,375
	-	US \$ 20,482
Operational results	-	US \$ 783 (21165-20482)

Drought impact on system

Beginning of year 2001 rainy season

- Level of water in reservoir at low level
 - Rain in May 2001 - Normal
 - Supply of water - Usual
 - Drop in rain in June 2001 & rest of rainy season
-
- Enterprise Co. decided to reduce supply of water till reservoir level remained under expected level
 - Decided to increase operation of tube wells for 15 hrs./day
 - This increased the supply but could not compensate the reservoir deficit.
 - 4 new tube wells dug to 50 mtr. depth and 20 cm. having capacity of delivering flow of 6 ltr./sec. located in small shed nearby.
 - Two new tube wells started in Feb. & 2 in March.

Water Rationing

- Well operating hrs. increased in June.
- Reduced water supply to the city population.
 - 12 hrs./day June
 - Precipitation improved in July, Aug. & Sept, supply increased to 17-18 hrs./day.
 - Oct., Nov. – 14-16 hrs./day.

Effect on Financial situation of Water Supply Enterprise

- Financial situation of the company affected due to drought
- Subsidy continued.
- Income from billing fell
- Operation cost increased due to extra running of tube wells and installation of new tube wells.

[Above effects are of indirect nature according to ECLAC's clarification.](#)

- Accounts to be made for insurance company against the risks which cover 75% of direct losses (which was not the case with drought as well as increased operational cost or reduced income (excluding Govt's subsidy) as follows:
 - For first 6 months – 100%
 - During next six months – 67%
 - During the next three months – 33%
 - After 16th month – Nil

OPERATIONAL INCOME

Average monthly income from billing - US \$ 18,883
For 6 million liter. per day

Average monthly income on the basis of supply and demand, losses are given in table & graph below:

Month	Demand	Av. Monthly income actual in US \$	Supply	Av. Monthly income due to less supply	Loss in US \$
1	6.4	20122	3.3	10375	9747
2	6.7	21066	5.1	16035	5031
3	6.9	21695	4.7	14777	6918
4	6.5	20437	5.0	15208	5229
5	6.2	19494	4.0	12577	6917
6	6.0	18885	3.5	11005	7880
7	5.6	17607	3.9	12262	5345
8	5.3	16664	3.9	12262	4402
9	5.1	16035	4.1	12891	3144
10	5.5	17293	4.7	14777	2516
11	5.8	18236	4.2	13205	5031
12	6.0	18885	4.7	14777	4108
13	6.4	20122	6.4	20122	Nil
	Total	2,46,541		1,80,173	66,368

Foreign Reinsurance level

Local insurance company was reinsured externally with European construction with amount of reinsurance being 70% of the damage to be paid by the insurer i.e. (from table above).

1. Additional Investment & Operation costs

S.N.	Item	Cost		In US \$
1.	Drilling of 4 new tube wells & pipes for a well with a 200mm diameter and a depth of 50 meters	US \$ 12500 i.e. \$ 250 per mt.	12500x4	50,000
2.	Submersible pumping equipment with 6 ltr. Per second capacity and dynamic load of 40 mtr. each for new tube wells	US \$ 7500	7500x4	30,000
3.	12 HP Electric motors & auxiliary electric equipment with 45 KVA capacity for new tube wells	US \$ 5000	5000x4	20,000
4.	Shed or cover for equipment for new tube wells	US \$1800	1800x4	7,200
5.	Monthly cost of operation per well, at a ratio of 10 hrs. per day & working for 15 hrs./day	US \$ 215 for 10 hrs.	215x2x5 215x2x4 21.5x5x2x5 21.5x5x2x4 21.5x5x5x13	21,500 1,290 1,075 860 6987.5
Total				31,712.5
6.	Monthly cost of well operator, who services from 2 to 3 units for new tube wells	US \$ 300 for say 2 units – addl. expenses	Total Units 2 unit (A) \$ 150x5 2 units (A) \$ 150x4	750 600

(a) Investment on digging and equipment of new deep wells and their connection to the electric grid and the water treatment plant

Cost of drilling and tooling of 4 new tube wells for a depth of 50 mtr. using 20 cm of pipes worked out US \$ 1,07,200. Two were commissioned in February and two in March.

(b) Increased cost of old well system by increasing hrs. of operation.

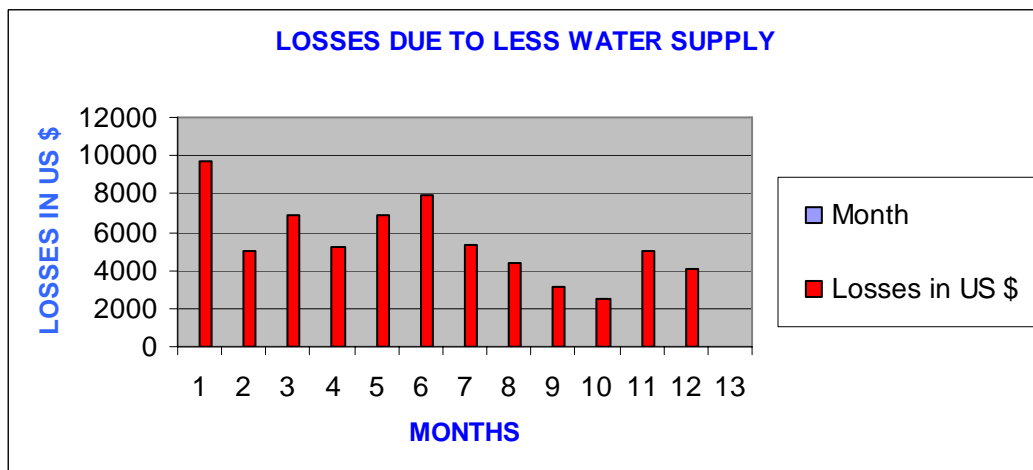
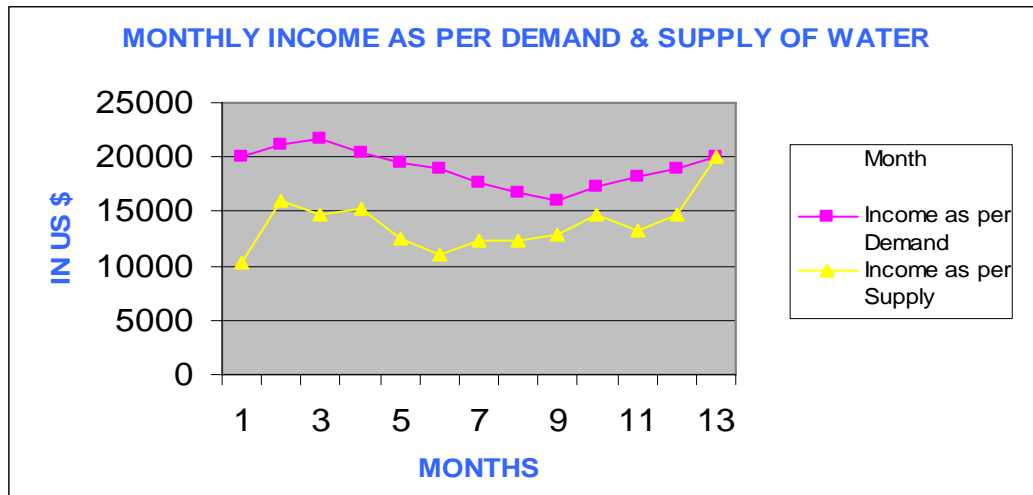
On the decision taken to increase hours of operation of system to 15 hrs./day from the level of normal 10 hrs./day of all 5 tube wells for 13 months. Additional cost of operations worked out to be US \$ 6987.5.

(c) Operation cost of new wells

Cost of operation of two new tube wells installed in Feb. & 2 in March for 15 hrs. a day worked out to be US \$ 24,665 per month.

2. Diminished income due to reduced billing for service

Following table and graph shows the average monthly income on the basis of the demand and supplies made to the city population.



From the above, it is seen that there were losses to the tune of US \$ 66,368 due to reduced billing as a result of less supply of water due to scarcity during the month of less precipitation (drought months)

Account of expenditures, earnings and Govt. subsidy

Expenses:

Item		In US \$
Operational expenses	13007x13	1,69,091
Other expenditures	7375x13	95,875
Cost of 4 new tubewells	107200	1,07,200
Operation of addl. 4 tubewells at 15 hrs./day		24,665
Operation of old tubewells for addl. 5 hrs. a day	21.5x5x5x13	1687.5
Operation cost of 2 to 3 units for addl. 4 tubewells		1350
	Total expenses	3,99,868.5

Income:

Tariff Billing = US \$ 1,80,173
 Govt. subsidy = US \$ 32,500
 Total = US \$ 2,12,673

Indirect losses = US \$1,87,195.5

3. Insurance cover for the direct losses = Nil

4. Insurance reimbursements – impact on external accounts:

(a) The value or part of the cost of equipment and materials imported, not produced in the country, and

Nothing has been mentioned in the given data regarding imports. It seems that the items which were required for augmenting the water supplies by way of installation of new tube wells must have been locally available.

(b) The part of insurance reimbursement that comes from external reinsurance

This covers only 70% of the indirect losses to be paid to the local insurer, which works out to be US \$ 1,31,036.85.
