Some experiences in Desalination of water during Recovery and Rehabilitation Period of Nargis (Severe storm striken in Delta Area in Myanmar)

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1.Introduction

1.(a) Global Water (acc . To E.T.Chanlett)

- 160 million cubic kilometer of water on and in earth.
- 0.5% is readily accessible for man's use.
- 97% in the oceans and seas.
- 2.25% is in snow and ice.
- 3% rated as fresh.
- 1/10 of the total fresh water is estimated to be in ground water strata (2,500 ft) below the surface
- a safe with drawl = 0.5×10^{10} million gal/yr without saline water intrusion
- Rain and snowfall recycle (12×10^{10} million gal/yr.)
- ¾ of this falls on ocean and sea.
- (3×10^{10} million gal/year)precipitates on land

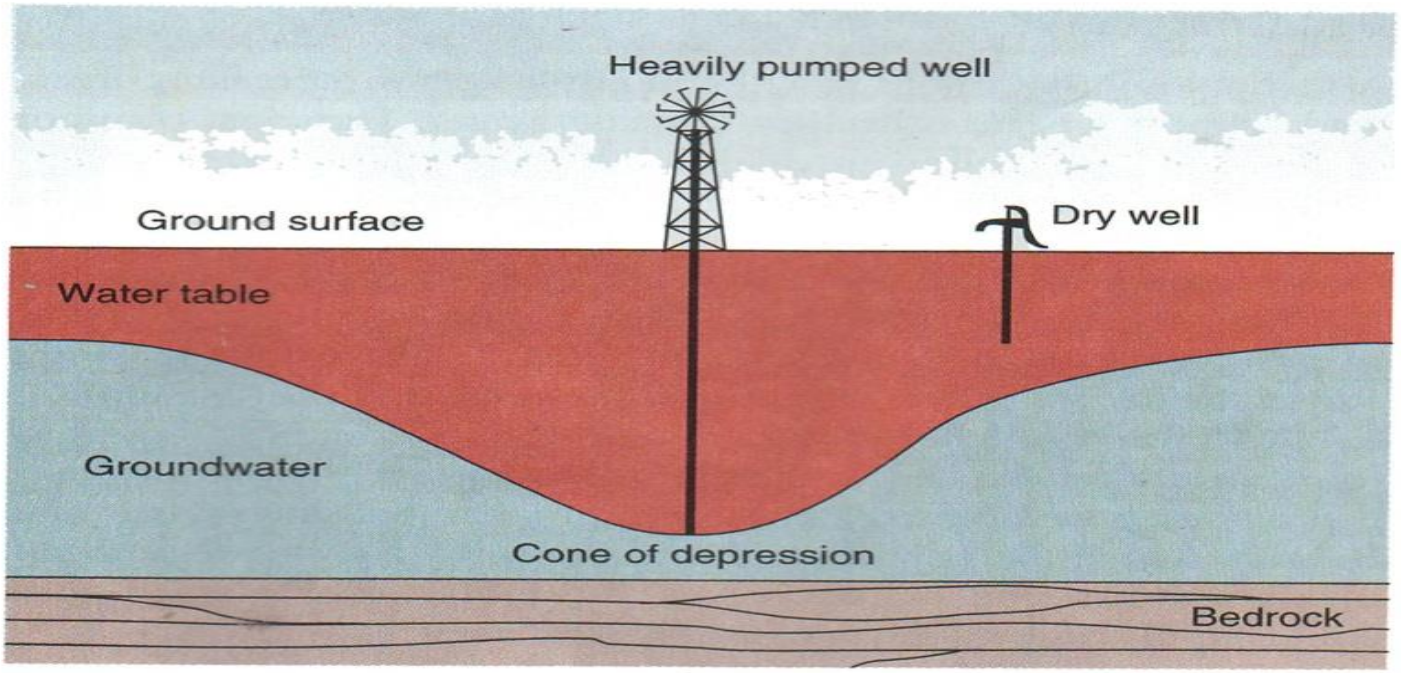


Figure 19.14
A cone of depression forms in the water table under a heavily pumped well. This may dry up nearby shallow wells or make pumping so expensive that it becomes impractical.

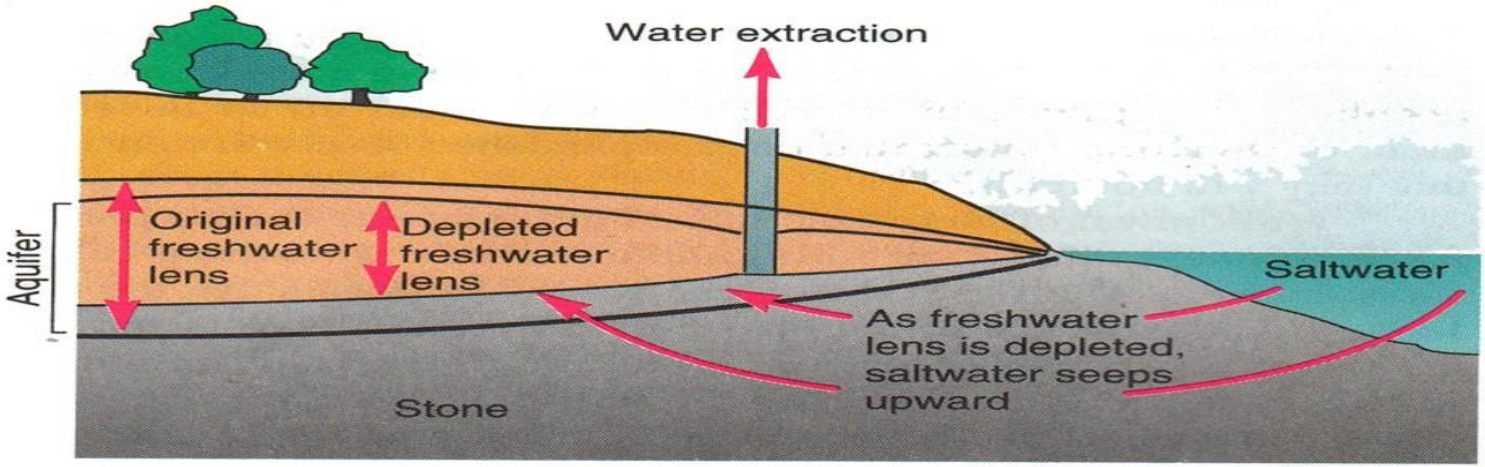


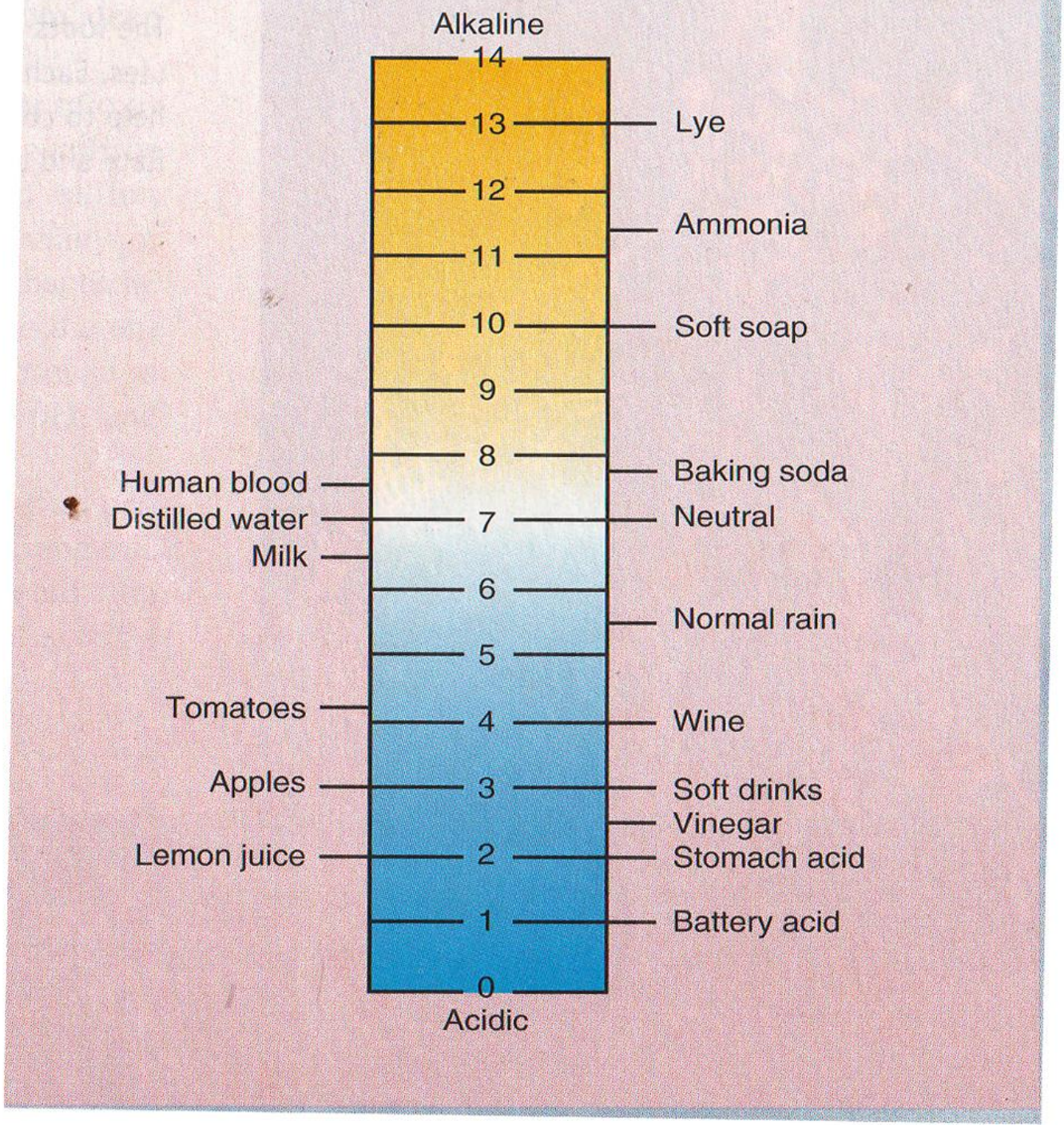
Figure 19.16
Saltwater intrusion into a coastal aquifer as the result of groundwater depletion. Many coastal regions of the United States are losing freshwater sources due to saltwater intrusion.

1.(b) Water is importat?

- Can’t live without it but it could kill you.
- 69% water constitute in human body.

  15% loss ⟶ fatal
- Water is the primary component of cells and make up 60 to 70 percent (on average) of the weight of living organisms.
- Water is the medium in which all of life’s chemical reatction occur.

- It fills cells, giving form and support to many tissues.
- Inorganic liquid in nature, solvent in which most substances must be dissolved.
- Water molecules themselves can ionize
- Cohesive molecules ⟶ highest surface tension ⟶ capillary action PH balance
- Water has a high heat capacity moderating effect on their local climates
- Floating ice insulate underlying layers.
- Vapor – laden air inhibits the rate of evaporation


Alkaline
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Acidic
Lye
Ammonia
Soft soap
Baking soda
Neutral
Normal rain
Wine
Soft drinks
Vinegar
Stomach acid
Battery acid
Human blood
Distilled water
Milk
Tomatoes
Apples
Lemon juice

2. Fresh water shortages

- water shortages for three reasons.

(rising demand, unequal districbution, increasing pollution)

- ‘’In the next two decades, the world will be faced with a water crisis of unprece dented dimensions” (UNCED, 1992)

- “It was projected that more than a billion people would face absolute scarcity of water by 2025”. (World water Commission, 1990)

မြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်

MYANMAR GUIDE MAP

တိုင်းဒေသကြီးနှင့် မြည်နယ်
မြေပုံလမ်းညွှန်

What is evaporation?

- A change of state of liquid ⟶ gas (vapor)
- Occurring at high temperatures (≈melting point of solid)


AYEYAWADY REGION
AYEYAWADY REGION
MOUTH OF AYEYAWADY
Pet ye
MYAN AUNG
Te gyi gon
Ka naung
Po su gyi
In bin
Shwe kyin
Myin wa daung
Tu gyi
Me za li gon
IN GA BU
Kwin gauk
LE MYET HNA
Ta lok taw
HIN THA DA
Aing tha byu
Ka mauk su
ZA LUN
Kone pyin
NGA THAING CHAUNG
Hne kyo
YE GYI
A htaung
KYON PYAW
DA NU BYU
A thok
Thon gwa
Thaung gyi
Kyon ta ni
Baw mi
THA BAUNG
KYAUNG GON
Set kaw
NYAUNG DON
Ma gyi
Pa thwe
KAN GYI DAUNG
A kyaw
Me za li
Chaung tha
Shaw pya
Be ga yet
PAN TA NAW
EIN ME
Shwe myin din
Tha yet gon
Kywe don
Sit chaung
Ngwe saung
Kyet paung
PA THEIN
Shwe laung
Ye le ga le
Ma let to
Sin ma
Shan ywa
MA U BIN
Lu gaung gyun
WA KE MA
Shwe daung hmaw
Tha ya wa
Nga yok kaung
NGA PU DAW
MYAUNG MYA
Yon daung
Wa phyu taung
Taung ga le
Pyin ywa
KYON MA NGE
Kyaik pi
KYAIK LAT
Kon tha
DE DA YE
Kwin bat
MAW LA MYINE KYUN
Myin ka gon
Ohn bin
Kya gan
PYA PON
The gyaung
Ywa thit
Kan be
BO GA LE
Kyon det
Tha mein taw
Thon gwa
LA BUT TA
Hlaing bon
Myat thar
Ka ma ga lu
Taw hla
Pa Thein River
Kyon ka dun
Zi gyaing
Pyin ka yaing
Set san
Pa ya hla
Kyun pya thet river
Ka la hteik
Nay grace point
Hwa za
Sa gyet
Thit pok
Maw tin sun
Pyin za lu kyun
Mein ma hla kyun
Daw nyein
Ka don ka ni
Bird Sanctuary
Taungpain
Sa lu zeik
Leik kyun
Ywe
Ael gu ar dar
Zeik ma
Kyaunk tan
Mayam
Thet ke thaung
Htattayar Island
Pya ma law River Mouth
Pyin sa lu River Mouth
Bo ga le River
Pyapon river mouth
Than dl River

Actual and potential process for separation of water form saline waters

A. Evaporation or distillation single and multistage flash evaporation

B. Freezing

C. Solvent Extraction

D. Osmosis

E. Ion exchange Electro dialysis and etc.

Water Use by Sector

- Domestic, industry, agriculture
- Third World countries typically allocate only about 10% of their water withdrawal to industry.

Examples of water use		
	Liters	**Gallons**
Home use:		
Bath	100-150	30-40
Shower	20 per min	5 per min
Washing clothes	75-100	20-30
Cooking	30	8
Flushing toilet (once)	10-15	3-4
Watering tawn	40 per min	10 per min
Agriculture and food processing:		
1 egg	150	40
1 ear corn	300	80
1 loaf bread	600	160
1 pound beef	9500	2500
Industrial and commercial products		
1 Sunday paper	1000	280
1 pound steel	110	32
1 pound synthetic rubber	1100	300
1 pound aluminum	3800	1000
1 automobile	380,000	100,000

Countries with the greatest water shortages	
Country	**Liters**
Djibouti	19
Malta	85
Qatar	103
Kuwait	104
Liberia	111
Barbados	195
Singapore	211
Saudi Arabia	254
United Arab Emirates	293
Jordan	342
Israel	382
Yemen	460

Mitigation of Water Shortage

- Minimizing water usage.
- Largest domestic use is toilet flushing (eg. 13000 gal/yr)
- Lesson evaporation of water sources. (eg. Shadeballs spreaded over pond surface)
- Develop new water sources. (eg. ‘ Solar Still’)
- Simplest solar – evaporation process is the evaporation of water from a shallow pan exposal to the sun and covered with sloping glass sheets. The evaporated water condenses on the sloping glass sheets and runs down to collecting channels at the base of the covers.

Mitigation of Water Shortage

- About 0.63 lb of water can be produced per day per square foot of evaporator pan.
- efficiency 35%
- average solar energy (1500 Btu / ft^2/ day)
- 1 lb of water at 68º F requires 1050 Btu.

Prototype

- After Nargis, rach and every water sources were contaminated with if loaded water.
- Amar village people in Delta Region have to drink pond water with even 400 salinity.
- So, WHO introduced solar still in that area.
- Before actual construction, prototype was made and experimental testing was alone.
- Simple solar Evaporation process is the evaporation of water from a shallow blackended pan expose to the sun and covered with sloping glass sheets (as shown in Fig.) and runs down to collecting channels at the base of the covers.

ကမ္ဘာ့ ရေရေး ၂၀၁၇ (မြန်မာ)

မြန်မာနိုင်ငံအင်ဂျင်နီယာအသင်း

နေစွမ်းအင်ကို အသုံးပြု၍ ၊ရေငံမှ
ရေချိုသို့ပြောင်းလဲခြင်း။

ရေအရင်းအမြစ်အသစ်များကို ရှာဖွေ
ဖော်ထုတ် အသုံးပြုခြင်းဖြင့်၊ ရေရှားပါး
မှုကို အံတုကာ ကွယ်ကြပါစို့။

Result found

- Salt reduction efficiency is about 76%
- First water flow in the collecting channels took toomuch time to occur.
- Yield of fresh water is less.
- It improves quality of water and increase quantity.

Comments & Suggestion

- Yield (or output) of fresh water is low because only a simple transparent plastic is used instead glass sheets.
- Taking too much times depends on the extent of area exposed to sun light.
- A modification is necessary to make.
- Though it can be applied for household use, using at community level is better.

Thank you for your attention