Certificate on PIM Training Course

Module 5- Introduction to Canal System, Definitions and Units

Topic 5.4: Units in Irrigation Management & conversion factors



Units of Area Measurement & Common Conversion Factor

Area: - A bigha is a local unit of field measurement which varies from region to region whereas acre & hectare are the standard units of area measurement.

In most of the states in India the irrigation assessment is done in area-based units. In few parts of states of Maharashtra & Gujarat, volumetric based assessment of irrigation is in practice. The area units be converted as follows,

1sq foot (Sq ft)	= 0.093 sq meter (Sq m)
1 Bigha (Pucca)	= 20 biswa. = 2531.93 Sq m = 27225 Sq ft
1 Acre	= 1.6 bigha = 32 biswa=4840 sq.yards
	=43560 sq. feet = 40700 sq. meter = 0.4070 ha =10 sq. chain (gunter)
1 Hectare	= 10,000 sq. meter=100x100 meter
	=2.47 Acre
1 Sq kilometer	= 100 hectare =10x10 hectare
1 Sq mile	= 2.59 Sq. Km = 259 hectare

If we have a piece of land of 0.6 hectares near urban habitat and we want to sell it out in shape of residential plots, then we have to divide it in pieces. For making it in shape of plots convert it into square meter which will be 0.6X10000= 6000 square meter from which 20 plots of 300 square meter may be sale out at prevailing rates.

If we want to sell this land as agricultural land, then we have to convert it into acres. Suppose there is a 0.6 hectares agricultural land, and we have small farmers who do not have much money and want only a piece of land then we have to convert it in acres which will be 0.6X 2.47(As a hectare consists 2.47)

acres) =1.48 acres say 1.5 acres then we can sale it in acres say one or two or any number plots.

Do yourself.

How much acre will be there in a land piece of 3 hectare?

Volumetric Units

The areas where the irrigation is being or will be assessed on volumetric basis, these units should be used.

1 cubic feet	= 0.0283 cubic-meter =1foot X 1foot X1foot = 6.24 Gallon
1000 liters	=1 cubic meter = 1mX1mX1m
1 gallon	= 4.546 liter
1 liter	=1000 cubic centimeter = 0.353 cubic feet
1-acre feet	= 1 acre X 1 foot=43560 cubic feet
1 cusec day acre feet)	= 86400 cubic feet =1 cusec running for a day (app 2

Reservoirs' capacity is measured in million-acre feet or thousand or million hectare meter.

For example, an outlet carrying a discharge of 12 liter per second runs 1 hour then it will carry a volume of water = $12X \ 3600$ (seconds in an hour) =43200 liter. If we want to convert it in cubic meter, then it will be (43200/1000) = 43.2 cubic meter since 1000 liters make a cubic meter. If this outlet runs for 10 hours, it will deliver volume = 10X43.2= 432 cubic meter and if it runs for 12 hour the volume will be 43.2X12= 518.4 say 518 cubic meters. If 1000 cubic meter costs Rs.2/= then cost of the water running out from an outlet which runs 12 hours will be (518/1000) X 2/= which will be Rs. 1.36 only

Do yourself.

Exercise: - If an outlet of 12 liter per second discharge runs for 20 hours how much will it cost the farmer if the water charges are Rs 2/= per thousand cubic meters?

Units for measuring running water.

Water conveyance capacity of a canal is measured generally in cubic feet or cubic meter per second for example a canal is described a branch carries a discharge of more than 500 cusec, a minor carries a discharge of less than 20 cusec or a river in flood carries a discharge of 300 cumec or so. In metric units now discharges are fixed in liters or cubic meters such as an outlet of 4" diameter discharges water @ 12 liter per second or a minor has a carrying cacity of 145 liter per second. Likewise, a distributary canal carries 12 cumec water. The discharges of tube-wells are also measured in liter per second or gallons per minute or gallons per hour.

1 cusec = I cubic feet water flowing in one second. Similarly 1 cumec is cubic meter water flowing in a second.

Large quantities of discharges is also measured in million cubic feet or million cubic meter per second.

1 cumec = 35.32 cusec

1 cusec hour= 1 cusec discharge flowing for an hour =1-hectare cm=100 cubic meter= 1-acre inch

1 cusecs = 28.3 liter.

If a minor of 3 cusecs discharge runs for 7 days how much volume of water will run in hectare centimeter and how much cubic meter it will be? = 3X7 = 21 cusec days =21X24 cusecs hours = 504 cusec hour = 504-hectare centimeter.

Also 1 ha cm =100 cubic meters therefore it will be 504X 100 =50400 cubic meter.

Do yourself.

Exercise: - A minor of 4 cusecs discharge runs for 10 days. How much hectare centimeter water will be flown out through minor? and how much cubic meter water will it be?