

Flood Mitigation: Expectation and Fact

We all have suffered the recent flood directly or indirectly. Different group of people have different view towards flood's cause and thoughts for remedial measures for future.

As a Civil Engineer I have worked with major canal network system and have manually calculated flood discharge of sub branch canal of Saurashtra Branch canal (SBC). SBC is a major branch canal of Narmada canal system of Gujarat State, India.

In designing canal, we always emphasized importance of safe operation.

After studying the factual data of Wivenhoe Dam, I have concluded that there was enough safety assembly to attached with Dam was missing!!! Surprised?

To come to the point, I would like to relate present technical data of Dam and what amount of rainfall can cause what effect on topography, people and life.

The data of Wivenhoe dam as below is taken in consideration from SEQ website to predict rainfall and it's consequent effect on topography.

- Catchment area: 7020 km²
- FSL:R.L 64m
- Full supply capacity: 1.16MML
- Additional flood blocking capacity: 1.45MML

The FSL R.L 64m I assumed as top of the water line after storing flood water i.e $1.16 + 1.45 = 2.61\text{MML}$

The normal storage is 1.16MML and flood storage is 1.45MML.

Assuming that catchment area 7020Km² is comprises total storage of dam i.e 2.61MML.

So, what height of rainfall is enough for taking normal full storage to full reservoir level i.e from 1.16MML to 2.61MML.

To get the height of water to raise capacity from 1.16 to 2.61MML.

$$\begin{aligned} &= \frac{1.45 \times 1000000 \times 1000 \text{ m}^3}{7020 \times 1000 \times 1000 \text{ m}^2} \\ &= 0.21 \text{ m} \end{aligned}$$

It means that 200mm (8 inch) of rainfall over area 7020km² region is enough to take normal storage to full reservoir level. It can be happen in 1 hour or 1 week.

Fortunately, the distribution of rainfall seldom has equality. Also the releasing of water from Dam makes space for additional flood water storage.

The problems only can be occurred when there is flood in down stream of Dam. Means if Brisbane river and Bremer River along other small streams flooded due to heavy rain in the Catchment area and due to high tide water can not disperse in sea and on the contrarily sea water enters in river and rise the level. All things can be happen together and they will worsen the situation. At that time it would be very difficult for staff to safely operate the Dam.

We must think about emergency exit of reservoir's water if above mentioned situation is not predictable. We must think about safety of people, their property, repairing expenses of infrastructure and psychology trauma the human and animal life suffers due to such disaster.

My personal opinion is that we engineer should check opportunity to construct escape canal from Dam. This escape canal can be of any length with calculated discharge capacity. It can be used as irrigation, navigation canal. It should be tailed to a man made reservoir or natural reservoir safely. Mostly, where is arid region and rainfall is very little is the suitable location to tail this canal. This canal can turn dry region to green and liveable area. Extensive investigation, design data, crossing of natural courses, river, road, rail and underground as well as overhead services to be considered in design of this canal.

But if the escape canal is not constructed then it will be very difficult to prevent December 2010 flood like situation in Brisbane, Ipswich and Toowoomba region.

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