CHAPTER 8

CONCLUSION

8.1 GENERAL

Chennai Basin is one such area which comprises of ephemeral to intermittent rivers along with a good groundwater resource. The floods occurring in these rivers were mitigated and utilized to augment the groundwater resources. The major conclusions of this research are given in this chapter.

8.2 FLOOD ATTENUATION

The floods in the four rivers were assessed through modelling at selected nodes along the river. The floods generated at the head, middle and tail reach of the rivers were computed. In general, the research has indicated that the flood generated at the head reach of the rivers could be attenuated. Accordingly, the flood was attenuated at Chembarambakkam on river Adyar, at Korattur on river Coovum and at Poondi on river Kosasthalaiyar. The peak discharge was attenuated within a range of 8% to 10% of the peak value. This limitation was enforced to ensure the safety of the people and livestock in these locations.

The flood hydrograph developed through modelling was segmented into channelflows and bankflows by considering the hydraulic geometry of the river cross-sections. This approach enabled the characterizations of the four rivers as influencing either channel flows or bankflows. This
characterization resulted in the identifications of the head reaches of the rivers as the main cause for the floods in the river. Further, all the three rivers with the exception of river Araniar facilitated the attenuation of the floodflow component of the hydrograph at the head reaches of its course. The computed flood hydrograph was related to the hydraulic geometry of the river to identify measures to attenuate the flood at the head reaches of the river course.

8.3 AUGMENTATION OF GROUNDWATER RESOURCES

The groundwater resources of the Chennai basin were evaluated. The shallow unconfined aquifer that provided the required water supply was characterized as a regional system through groundwater modelling. This modelling predicted the present state of the groundwater resources. It also indicated the feasibility of augmenting the groundwater resources. The output of the model enabled the identification of the recharge and discharge locations of the groundwater basins of the study area.

The recharge location for augmenting the groundwater by utilizing the attenuated flood was identified. The soil and hydraulic properties of the aquifer and the output of the model were used to identify these locations. The attenuated flood was conceptualized as the augmented head at the recharge locations. Thus, augmented groundwater head was applied by converting the existing new Bangaru channel into a recharge channel. The New Bangaru channel, also known as link channel, connects the Korattur anicut of river Coovum with the Chembarambakkam reservoir. The results obtained indicated that the attenuated flood can increase the groundwater level by 3.5 to 5m.
8.4 CONJUNCTIVE MECHANISM

The conjunctive mechanism of the drainage basin was identified through this research. This mechanism will fulfill the long felt need of attenuation of flood flow for conservation purpose. The surface flow modelling projected the dynamics of floodflow in relation to the hydraulic geometry. The conjunctive action of all the rivers in sustaining the components of hydrograph, namely baseflow, interflow, valley flow, bankflow, and flood flow. The research findings have shown the distributed functioning of the four rivers in sustaining the channel and bankflow components of the basin hydrograph. This also brought out the need to attenuate the floodflow component of hydrograph. The head reaches of the river was observed as the appropriate locations for flood attenuation.

The groundwater analysis showed that the wells located both in the transition and dynamic zones are influenced by the augmentation. Thus, these findings brought out the effectiveness of conjunctive mechanism. The research has proven the conjunction of floods in the head reaches are effective in recharging the dynamic groundwater areas located in the middle reaches of the river.

The Thirumaizhisai region of River Coovum is considered important in attenuating the floods of the basin. The conjunctive mechanism resulted in an increase in groundwater table between Thirumaizhisai and Thamaraipakkam by 2m resulting in net recharge volume of 12 Mm$^3$.

The research study confirms that the attenuated flood at the existing new Bangaru channel will recharge the groundwater system in the well fields located between River Kosasthalaiyar and River Coovum. The flood waters can be recharged by modifying a reach of 10 m and up to a depth of 5 m for percolation structure within the channel. The new Bangaru channel will hence
perform a dual role of mitigating the flood and augmenting the groundwater resources.

Thus, this research provides a viable solution to mitigate flooding of the Chennai rivers by using this flood water to augment groundwater resource.