CHAPTER 6

RECOMMENDATIONS AND CONCLUSION

On the basis of information gathered and the results obtained through the analysis, the following recommendations can be suggested for the conservation of the wetlands and paddy lands along with measures to avoid the adverse impacts.

6.1 RECOMMENDATIONS

1. Delineate and map the wetlands and paddy lands of the state.

2. Regulate and control the driving forces that stimulate conversion of wetland and paddy area to avoid their concentration in a particular area.

3. The wetlands shall be maintained as such and there shall be total prohibition on reclamation of such wetlands or removal of any minerals from them.

4. As far as possible the paddy lands shall also be maintained as such and they shall be used for the cultivation of paddy alone.

5. Land must be treated as a natural resource and land use planning must be converted into resource planning rather than being a zoning exercise. Open lands suitable for buildings should be brought under land adjustment or land pooling schemes, so that private owners can make their developed land for utilization.

6. Flood run off should be stored in bioretentions, infiltration trenches etc for the purpose of water recharge and for obtaining extra benefits of flood reduction. Encourage rain water harvesting and watershed management wherever required. Efficient water supply scheme and sewerage system must be developed for the area having population above one lakh.

7. The tendency of people residing near paddy lands to reclaim lands shall be discouraged.
8. Awareness campaign should be conducted among the people about the consequences of the reclamation of paddy lands. This can be done through NGOs and Kudumbasree units working with in the LSG.

9. In unavoidable situations which warrant the conversion of paddy land for the development, the resulting impacts due to conversion will be estimated before the conversion. This research has developed a reliable system for estimating the impacts due to conversion using the driving forces (which are easily available) and a Land Conversion Matrix Model for making decisions, this model can be used at any part of the country and at any level.

10. Proper mitigation measures are recommended to avoid adverse impacts due to land conversion

6.1.1 GUIDE LINES FOR MITIGATION OF IMPACTS DUE TO THE CONVERSION

To mitigate or reduce the adverse impacts due to the selective conversions, the hydrology of the site developed due to conversion shall mimic the predevelopment site hydrology. This can be accomplished through proper site design which minimizes the hydrologic impact created by the site development and then providing control techniques to mitigate the unavoidable disturbance to the hydrologic regime. As the major impact associated with land conversion is the increase in surface runoff, techniques to reduce/mitigate runoff problems should be coupled with site development process. Techniques that store, infiltrate, evaporate, and detain runoff shall be introduced. Use of these techniques helps to reduce the surface runoff, avoid flooding and ensure adequate groundwater recharge. Such a site design allow for full development of the property while maintaining the essential site hydrologic functions.
An outline of the steps to achieve the above goal is given below:

1. Identify the applicable zoning regulation for land use. The zoning regulations are to be checked before the development whether that particular use is permitted in the area.

2. Prepare a development envelope for the proposed site. The plan prepared should conform to the zoning regulations with respect to setbacks, open space and other site requirement.

3. Since drainage is the main design element, use the concept of minimum impervious areas in the site design. Provide narrow roads, reduced parking, select the house type, size and shape which reduces roof top impervious.

4. Develop a preliminary Site Layout Plan. After delineating the development envelope and minimizing the total site impervious, a preliminary site lay out plan shall be developed and compare the pre and post development site hydrology to ensure whether the desired objective is achieved.

5. Provide controls to mitigate the unavoidable disturbances to the hydrologic regime.

The hydrological impacts can be reduced or additional environmental benefits can be achieved through -

- Avoid soil compaction to maintain the infiltration capacity of the soil.
- Avoid the use of conventional storm water drainage systems.
- Direct rooftop and land surface runoff into properly designed and constructed bio-retention facilities/infiltration trenches/dry wells/cisterns that are strategically located in the site itself to capture the runoff before it reaches the storm water drainage. These practices by storing runoff facilitate ground water recharge, alleviate flooding, water logging and erosion problems.
- Carefully locate the impervious areas so that they drain to natural soil or vegetated areas.
- Avoid construction of roads through sensitive areas.
- Provide vegetated or grassed open drainage systems for conveying surface runoff between plots and along roadways. This decreases the vulnerability of flooding and reduces the need for conventional storm water drainage systems.
- Revegetate graded areas, preserve existing vegetation. It will reduce the peak discharge rate by creating added surface roughness as well as providing for additional retention, reducing the volume of surface water runoff.

6. Develop the Integrated Site Layout Plan incorporating the control measures.

After incorporating the required practices to mitigate the adverse impacts, the designer can complete the Integrated Site Layout with necessary construction details.

6.2 CONCLUSION

This research work has succeeded in estimating the impacts on natural and physical resources due to the conversion of wetlands and paddy lands by integrating a comprehensive set of scientific methodologies with ground truth verification and to recommend suitable guidelines for their conservation and wise use. The major driving forces leading to the conversion were found to be the population growth, unique settlement pattern, the urbanization trend, and change in the agriculture sector, industrial growth, and mining of mineral resources. The impacts due to the conversions were experiencing in the forms of reduction in ground water recharge, water scarcity, flooding, water logging, salinity intrusion, and the settlement of foundation leading to the cracks in buildings. The physical resources like water supply and sanitation facilities etc also were found to be experiencing pressure due to these conversions and not sufficient to cater the needs.

The research has established that the major reason for the impacts due to the conversion of wetlands and paddy lands was the hydrologic alterations caused to the environment due to the
human activities arising from the driving forces. As the hydrologic performance can be evaluated through the surface runoff volume, the relation between the driving forces and surface runoff was established to estimate the impacts in future. The concept of concentration index was used due to the multidimensional and interdisciplinary nature of the contributing factors. Different methods were employed but in the absence of knowledge about explicit relationship between the impacts and the driving forces, the usefulness of Support Vector Machines (SVM) was examined and it established the relation and performed the prediction with good accuracy. The studies led to the development of a Land Conversion Matrix model which enables the planners and decision makers to take decisions in unavoidable situations which warrant the reclamation of paddy fields. Recommendations were suggested for the conservation of wetlands and paddy lands and for avoiding the adverse impacts due to selective conversion of paddy lands so that it may yield the greatest continuous benefit to the present generation while maintaining the needs and aspirations of the future generations.

The Kerala Government has recently promulgated The Kerala Conservation of Paddy Land and Wetland Act 2008 to conserve the paddy land and wetland and to restrict the conversion or reclamation. As per section 10 of the Act, the Government has power to grant exemption to reclaim paddy lands, if such conversion or reclamation is essential for any public purpose. While taking up such reclamation works a reliable system for decision making and for assessing the impacts of conversion on the physical and natural resources are necessary. Thus this research work also proves to be a scientific solution for exercising the discriminatory power of the Government.