CHAPTER 6

SUMMARY

Dredging is a major human intervention leading to changes on the face of the (aquatic) environment. This is an artificial operational procedure requiring skilled manpower towards successfully achieving multiple objectives. Upto very recent times, developmental issues were projected in conduct of dredging with little care for the environment. Now a days, with increasing awareness on environmental issues, impact studies play an important role in execution of projects which invariably also addresses questions connected with dredging and environment (Hummer, 1997). The dredging impact assessment primarily looks into areas of negative impacts arising out of environmental issues. At Cochin harbour, where DIA has great relevance could serve the operators, managers and policy makers alike with valuable data, priceless information, experimental inputs and analysis of the hydro-system so as to evolve a judicious plan programme for the region. The salient features of DIA are summarized hereunder.

(A) The scientific objectives of conduct of DIA has been defined as identification of process - outcome - assessment - impacts at Cochin harbour.

(B) Identification of impacts and relevant assessment parameters have been made.
Monitoring and assessment based on surveys/field experiments/laboratory analysis has been successfully carried out.

The dredging process, among other outcome(s) at Cochin harbour includes sediment removal, navigation, land reclamation, harbour expansion and a few related developmental schemes.

Assessment has been based upon studies on current and salinity alterations, turbidity development, transparency shift, excavation of bottom materials, nutrient release, chlorophyll content, bottom fauna abundance and noise.

For each parameter listed above both negative and positive impacts have been critically assessed.

Existing issues and recommendations on mitigation measures have been suggested.

The DIA has helped to deduce the following major negative impacts:

1) Excessive turbidity values are of great concern.
2) Increase in extinction coefficient inhibits productivity.
3) Pigment level changes are expected concurrent with alteration in chlorophyll content.
4) Benthic fauna has been greatly affected.
5) Extension of dredging to other areas of the harbour and backwaters would definitely bring about ecosystem disturbances.
6) Dredging brings about local turbulence leading to changes in intensity of mixing.
7) Bathymetry and bed configuration changes may have impacts on inlet stability and estuarine embanks.

(I) Two parameters namely current and salinity have helped to deduce the influence of hydraulic control on estuarine processes vis-a-vis dredging operations. The flood tidal currents are identified as the causative agent to transport material from offshore to boundaries within the harbour area and salinity alterations bring about changes in flocculation and sedimentation features in this tropical estuarine harbour.

(J) Nutrient recycling is quite evident at Cochin harbour due to dredging operations.

(K) Textural characteristics of bottom sediments are relatively less affected by dredging operations in Cochin harbour.

(L) Generation of noise due to operation of dredgers is engulfed in the city cacophony and does not bring about annoyance.

(M) Appeal on aesthetic values are offended at times due to unethical disposal techniques.
The DIA has helped to deduce the following major positive impacts:

1) The excavation activities are conducive to harbour operations.

2) Round the year marine navigational facilities are afforded by maintenance form of dredging at Cochin harbour.

3) Unquantified amounts of toxic substances, if any, is being removed from within the harbour region.

4) The artificial operations regulate the amount of material made available to the nearshore regions.

5) The dredged spoil, at times, is made available as material for land reclamation towards the growth of the metropolitan.

6) Low noise operation is a positive achievement.

7) The dredging operations do not interfere with historical and archaeological packages which are numbered but significant around Cochin.

Salt silt wedge studies have led to the understanding on the development of turbidities in the vertical and on the longitudinal extent towards upstream, during premonsoon.

The siltation study at a capital dredged site has helped to evolve a picture on the sedimentation pattern within the channel. Restoration of the dredged site after a period of intermittent dredging coincides with seasonal availability of sedimenting material.
(Q) To a certain extent ecosystem disturbances are unavoidable in light of (beneficial) development; compromise on bottom fauna warrants careful attention.

(R) Mitigation measures and alternate approaches call upon the implementation of programmes to control the amount of suspended solids reaching the dredging zone and to apply the most appropriate mode of excavating mechanisms.

(S) The feasibility of use of sand clay pumps or mud cat dredgers may be attempted.

(T) Control on material movement into the channels could possibly be minimised by sediment curtains or silt traps or passive devices like current deflecting wall.

(U) Agitative dredging during ebb tide in the approach channel of Cochin harbour is a highly skilled professional operation which would considerably reduce the silt movement through the tidal inlet into the inner channels of Cochin harbour.

(V) The DIA has successfully reviewed the contemporary status of dredging at Cochin harbour to delineate the degree of success/failure and highlights the need towards the development of a policy framework to address and evolve a criteria based evaluation of dredging operations under DIA so as to bring about ecofriendly mode of environmental management.

(W) As concluding remarks, studies have revealed that dredging activities at Cochin harbour evidence environmental degradation. However, there are distinctive positive
benefits too. Contemplating that this artificial activity had been implemented since four decades or more, in varying scales of intensity, it remains to be an accepted fact that a "static environmental equilibrium" do exist between natural retrogressive tendencies and stressful conditions arising out of desilting mechanisms. Possibly a time has now come forth to preserve and improve the harbour scenario by means of applying state of art technology. Such an approach would facilitate upgradation of the present environment and also pave the way towards better and healthier developmental enterprises for the region as a whole.