Lake Chilika: GIS and the Challenge of Spatial Management

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1. INTRODUCTION

The use of Geographical Information Systems (GIS) for a range of terrestrial spatio-temporal analyses has grown exponentially over the past three decades. This growth has occurred as a result of the system’s proven capabilities at resolving an ever widening range of problems, plus the fact that the system can be utilised for modelling and other predictive purposes. Growth has been supported by rapidly decreasing costs and by the promotion of GIS through publications, education and conferences. The use of GIS for analyses or modelling in aquatic environments has been rather slower to emerge. This is largely a function of the fact that, from a cost viewpoint and from a ‘mapping capability’ perspective, data here is much more difficult to acquire. Thus, in aquatic environments, everything moves or is mobile including both the environment itself and those objects within it. Despite these difficulties, for the past 15 years GIS has been increasingly utilised for work in both marine and freshwater environments, and there is now a huge literature that can testify to its success.

One of the most significant lessons learned from the Chilika experience is the vital role that scientific information can play towards achieving good management. (Ghosh, 2003). Here is recent recognition that the Lake Chilika area is a classic case where innovations such as GIS offer the potential for huge management advantages and progress towards the assumed goals of

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sustainability and restoration. The author goes on to note that “the lessons learned (from all the previous studies in the lake catchment) show how scientific research and application can lead to better management in a wetland ecosystem.” The issues of how to achieve better management through the realisation of a dedicated GIS for the Chilika lagoon form the substance of this paper. In more detail, the paper will attempt to further elaborate why a GIS is necessary for improved lake and catchment management, and it will exemplify the range of potential tasks that a GIS might accomplish. However, accomplishing these tasks will not necessarily be easy; so it is important that any instigators of a possible “Chilika GIS” are cognisant of some of the challenges that must be faced. The paper concludes with some ideas on a potential implementation strategy for a “Chilika GIS”.

2. WHY UTILISE A GIS FOR THE MANAGEMENT OF LAKE CHILIKA?

Initially, it might be useful to mention that virtually all of the problems that are manifest in the catchment area of Lake Chilika originate from the terrestrial areas, i.e. from the land. However, most of the problems are actually manifest in the lake. This gives a vital clue as to the direction in which the attention of managers should be directed. If the land areas, from the perspective of sustainability, can be successfully managed, then most of the aquatic problems will be coincidentally solved. So any “Chilika GIS” must be concerned with the whole catchment of the lagoon.

In the total lagoon (lake) catchment there is a matrix of inter-related problems that lead to major spatial dis-equilibrium\(^2\). Problems may be manifest (and illustrated) as ‘causal linkage chains’. For instance, we can illustrate two of these by tracing backwards to an original cause:

(a) *Sedimentation*. Excessive silting > stream sediment load > inflow via catchment run-off > increased plowing/soil exposure > natural vegetation removal > need for cleared land plus fuel and timber > land needs > population increase.

(b) *Wildlife depletion*. Hunting or over-fishing > need for food > population increase.

There are many other chains, some of which are simple and others are complex. However, they are nearly all interlinked and ultimately derive from population pressures. This is, of course, a large problem that faces both India and the planet!

\(^2\) The inter-related nature of the problems was recognised by the Ramsar Advisory Mission who visited the lake in December, 2001. Their concerns have been noted at the web address: http://ramsar.org/ram/ram_rpt_50e.htm