

COMMENT

A critique of environmental carrying capacity as a means of managing the effects of tourism development

In their paper on environmental carrying capacity, Brown *et al.* (1997) describe some of the negative impacts of tourism development and propose the carrying capacity framework for addressing these impacts. Though we agree that these impacts should be addressed, we feel that the carrying capacity approach is inadequate for the task in most situations. An examination of the steps that are necessary for establishing a carrying capacity illustrates why this is the case (further discussion is provided in Lindberg *et al.* 1997).

Firstly, issues and concerns must be identified. Following the Maldives example in Brown *et al.* (1997), pollution and stable visitor flows are concerns. Secondly, indicators for each of these concerns must be developed. For example, one indicator of pollution is tonnes per year of solid waste generated by tourist resorts in the Maldives. Thirdly, the desired level of each indicator must be established (this level or standard might be viewed as a maximum, minimum, or optimum, as appropriate). For example, the standard for this indicator might be 2000 tonnes per year. Fourthly, the relationships between number of visitors and each indicator must be identified. For example, the relationship between visitors per year and solid waste generated per year must be identified over the relevant range, which in this case would be in the vicinity of 2000 tonnes per year. Although this process may appear straightforward in concept, closer examination reveals the difficulty of applying it in practice.

Brown *et al.* (1997, p. 323) follow common practice in work on tourism that is based on carrying capacity, so it is instructive to review the process they followed in coming to their conclusion that 'the ecological carrying capacity has been exceeded' in the Maldives; one of the dangers of the carrying capacity approach is that the assumptions and process used to derive capacity often are not made explicit, and some of what follows is implicit rather than explicit in the Brown *et al.* (1997) presentation. Firstly, they focused on the concern that ecological degradation will negatively affect visitor numbers and thus economic impact. Secondly, they selected the indicator of visitors per year. Thirdly, their standard was no change, or a figure of 178 000 visitors per year. This set of 'concern, indicator, and standard' reflected a particular desired condition.

The problem at this point is that readers may mistakenly believe that the desired condition is objective ('scientific') and an appropriate basis for determining the 'true and unique' carrying capacity. Therefore, it is important to stress that the desired condition that was presented was inherently subjective, reflected the priorities of the authors, and but one of many. Other stakeholders, such as the government or residents of the Maldives, may have had and have very different views regarding desired conditions. As a result, they may develop alternative indicators and standards. For example, they may prefer a standard of 150 000 or 200 000 visitors per year, or they may prefer entirely different indicators, such as wages and profit generated by the tourism industry, amount of litter on beaches, and so on. A critical point is that concerns, indicators, and standards are inherently subjective and depend on the priorities and objectives of the diverse stakeholders. In tourism contexts, priorities and objectives typically vary amongst stakeholders, and the carrying capacity approach tends to ignore this variability.

Brown *et al.* (1997) then estimated that tourism-induced degradation would cause a reduction of 11 000 visitors per year. However, the leap from (1) the reported visitor survey data regarding evaluations of water quality to (2) the estimate of change in visitor numbers requires substantial assumptions. Indeed, the authors also present a second, lower estimate of 5000 fewer visitors per year. This particular indicator requires more information than is typical. For example, you must first identify the relationship between current visitor numbers and water quality, and then identify the relationship between water quality and future visitor numbers, with the latter relationship

incorporating the extent to which degradation in water quality will cause potential repeat visitors not to return, and the extent to which degradation will affect replacement of non-repeaters by other visitors. However, even relatively common and simple indicators require more information than currently exists at most sites. Though the relationship between tourism and the environment is increasingly being understood and quantified (Hammit & Cole 1987; Knight & Gutzwiller 1995; Mieczkowski 1995; Liddle 1997), there rarely are adequate data to make the estimates the carrying capacity approach requires with reasonable confidence.

The carrying capacity framework may work well in situations such as wildlife management in which there is widespread consensus concerning objectives and extensive data regarding use-impact relationships. However, it is not adequate to deal with the complexity of tourism-development situations, in which there is rarely either consensus or adequate data. Therefore, it is recommended that alternative phrases and processes be utilized. With respect to phrasing, it is more appropriate to speak of 'desired conditions' rather than of 'carrying capacity.' 'Desired conditions' illuminates the subjective nature of establishing objectives and helps focus attention on the objectives themselves, rather than on visitor numbers, which is only one of the many factors that determine whether objectives are being achieved. Indeed, visitor numbers may have far less effect than other factors, such as how these visitors and related infrastructure are managed. In other words, the attention should be on management outputs (conditions) rather than on inputs (visitor numbers).

With respect to processes, it is recommended that various management-by-objectives approaches be utilized, such as the Limits of Acceptable Change (LAC) or Visitor Impact Management (VIM) frameworks (Stankey *et al.* 1985; Graefe *et al.* 1990; McCool & Cole 1997). These approaches still require that the first three steps outlined above be followed, but they provide explicit processes for doing so. Because they focus on desired conditions rather than on visitor numbers, the fourth step is less critical. Indeed, they promote exploration and utilization of planning and management strategies other than restrictions on visitor numbers to ensure that standards are being achieved.

References

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KREG LINDBERG
 Riddervoldsgate 8
 0258 Oslo
 Norway
 Tel: +47 67 15 76 12
 email: kreg@online.no
 and

STEPHEN F. MCCOOL
 School of Forestry
 The University of Montana
 Missoula, MT 59812
 USA