

Interactive comment on “Resolving conflicting objectives in the management of the Plastiras Lake: can we quantify beauty?” by A. Christofides et al.

Anonymous Referee #1

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Comments to the paper “Resolving conflicting objectives in the management of the Plastiras Lake: can we quantify beauty?” by A. Christofides, A. Efstratiades, G.-F. Sargentis, D. Koutsoyiannis, and K. Hadjibiros.

The paper addresses an important and central challenge in environmental management, and touches on the field of multi-criteria decision-making, which deserves attention in natural science journals like Hydrology and Earth System Sciences.

Structure: The paper is basically structured with an initial problem definition that states the decision problem, which is to set the minimum water level goal of Lake Plastiras, and three decision objectives: maximum water release, water quality and landscape quality. Three measures of goal attainment are proposed: Reliable yield (hm³), time

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distribution of landscape quality classes, and mean summer chlorophyll- concentration ($\mu\text{g/L}$). While reliable yield can be measured in monetary units, and landscape quality is discussed in considerable detail, there is no discussion of water quality. The authors then provide a multi criteria tableau for deciding the minimum lake level. Since water quality is satisfied anyway, however, it is dropped from the criteria list and there are essentially only the two first decision criteria to consider. To arrive at a conclusion, it is necessary to weight the criteria, and the authors discuss several ways to do this, including traditional economic methods as well as multi criteria decision-making methods (MCDM). This discussion appears to be the core of the paper. The conclusion reads: “Most of the authors of this paper agree that there is not much point in attempting to quantify the non-quantifiable aspects of the problem; we believe that the decision should be justified by using simple words to explain the choice that has been made after deep, holistic understanding of the problem, and this is what we have attempted to do in this paper.”

Discussion: The paper appears to have a double purpose:

1. Decision level: To argue for a minimum water level goal of 784 m in Lake Plastiras through a deep holistic understanding of the problem.
2. Meta level: To argue for holistic analysis in environmental management problems.

The authors do a good job at describing landscape value as a function of water level, but there is little effort at comparing this to the economic value of water release. Since this is the crucial issue, they probably would not convince a decision-maker that their recommended level is best.

The meta level argumentation suffers on several points: The authors do not state who the decision-makers are, which has an important bearing on any discussion of economic WTP-methods versus MCDM, both with regard to process and ethics. They seem to confuse prescriptive and descriptive decision theory. MCDM never claimed to be a method describing how decisions happen, but rather how one should proceed

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if one wants to be rational (Keeney, R., Value-focused thinking. 1992, London: Harvard University Press.) MCDM's agenda is to be of assistance in those cases where there are too many decision criteria to make a holistic understanding possible, and a case with only two decision criteria can therefore not be used to reject the method in general. (This may not have been the authors' intention, but this needs to be made clearer). They should discuss when they think holistic methods can be applied.

Finally, there is little attempt to substantiate the answer to the question in the title: can we quantify beauty? I find no convincing arguments, one way or other. A recent article that answers "Yes", is Rodger Doyle: Measuring Beauty. Scientific American. May 2005.

Conclusion: Since the authors come very close to framing the problem for MCDM analysis, it would be interesting if they could do the following:

1. Explain the decision-making process, including who makes decisions, and the role of facilitators or analysts.
2. On this basis, argue for a decision-making approach rather than a cost-benefit approach.
3. Explain how a holistic method can be used to trade water release off against water level.
4. Apply MCDM methods in the trade-off process, or propose how that could be done.
5. Discuss the merits of the holistic method versus MCDM.

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