Hydrol. Earth Syst. Sci. Discuss., 8, C3598–C3602, 2011
www.hydrol-earth-syst-sci-discuss.net/8/C3598/2011/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Assessing water resources management and development in Northern Vietnam" *by* A. Castelletti et al.

Anonymous Referee #1

Received and published: 23 August 2011

This paper is about multi-objective optimization of reservoir operation in Northern Vietnam. The Hoa Binh reservoir in the Da River (tributary of the Red River) is used as case study and three policy objectives are taken into account: hydropower generation, flood control and water supply. The reservoir dynamics are modelled with a daily mass balance equation and the downstream river network is modelled with artificial neural networks. The operation is optimized using a multi-objective genetic algorithm (MOGA) and the effects of limited forecast information and reservoir capacity are further explored using deterministic dynamic programming (DDP). The paper is well written and structured and within the scope of HESS. General comments, specific comments and technical corrections are given below and should be addressed by the authors.

General comments

- The authors mention in the introduction that only two papers on the operation of the Hoa Binh reservoir have been published and that their paper is a step forward in different ways. The paper can, therefore, be regarded as a novel contribution for this particular area. However, it is unclear whether similar studies have been done for other river basins (i.e. reservoirs) in the world using the same or similar models and algorithms. Therefore, please provide an overview of the most relevant studies focusing on other reservoirs in the world and indicate the differences of those studies compared to the study reported in this paper. This might also reveal the methodological novelty besides the study area related novelty.

- The immediate costs associated with the three policy objectives are calculated using simplified equations including some rough coefficients. The reservoir and downstream river network are simulated with relatively simple models as well. This is acknowledged by the authors. The relative simplicity of the models has not be a limiting factor of this study. Moreover, the evaluation shows that the models generally are quite accurate. However, this might be caused by the overlap of the evaluation period and the calibration period. In particular, the values of the coefficients used in the calculation of the immediate costs (alfa, beta, delta, n, m) seem to be somewhat arbitrarily chosen. It is recommended to assess the sensitivity of the results to different values of these coefficients (and for different months) to test the robustness of the results. What is a plausible range for these coefficients? What is the corresponding uncertainty in the results?

Specific comments

Title

- p7177: The title can be more focused on the topic of this paper: multi-objective optimization of reservoir operation in Northern Vietnam.

HESSD

8, C3598–C3602, 2011

Abstract

- p7178, l1-13: Try to incorporate more specific information about methods and results in the abstract. The current version of the abstract is too general.

Introduction

- p7178, l21-25: Could you quantify the importance of hydropower as primary renewable energy resource and the importance of irrigated agriculture as economic driver?

- p7179, l11-12: Try to formulate a more specific objective of this paper, the 'current management of the Red River Basin' includes much more than the optimization of the Hoa Binh reservoir described in this paper.

- p7180, l4: Please provide a brief outline of the paper here.

System and models

- p7181, l13: Please explain ". . . but not with the timetable."?

- p7181, l21: What are the units in equation (1)?

- p7185, l16-18: What do you mean with ". . . the feasibility constraints in computing the actual release are not estimated properly."? And how is the outflow of the Da catchment estimated?

- p7186, l8-10: What is the model performance on a daily basis?

- p7186, l21: Please use another symbol for parameters ei since this symbol is also used for surface evaporation in equation (4).

- p7187, l13-15: Which residuals are minimized? Are the policy objectives (hydropower production, flood control, water supply) taken into account in this optimization (minimization)?

Re-operation of the Hoa Binh reservoir by MOGA

HESSD

8, C3598–C3602, 2011

- p7189, 111-13: Why is MOGA used?

- p7189, l22: Are parameters a, bi, ci and di the same as the parameters in equation (7)?

- p7189, l26: What do you mean with "... under exam."?

Tables and figures

- p7199, Table 2: How have these 20 operating policies been defined?

- p7201, Figure 1: Please provide the complete Red River basin including the Chinese-Vietnamese border, the catchment borders and the delta area.

- p7202, Figure 2: This figure should be self-explanatory, i.e. the reader should be able to understand the figure and caption without reading the main text. This is currently not the case.

Technical corrections

- p7179, l16: delete "from"

- p7179, l23: "Hoa Binh reservoir" instead of "Hoa Binh"

- p7179, l26: "these results" instead of "this results"

- p7182, l25: "one single" instead of "on single"

- p7183, l11: What is the meaning of the question mark?

- p7184, l11: "The physical model" instead of the "The physical system"?

- p7185, l1: "dynamics are" instead of "dynamics is"

- p7185, l25: Shouldn't it be "hydraulic head difference" instead of "hydraulic head"?

- p7186, l18: "based on a feedforward" instead of "based on feedforward"

- p7187, l13: "trial and error" instead of "trail and error"

HESSD

8, C3598–C3602, 2011

- p7189, l11: “we used a Multi-Objective” instead of “we used Multi-Objective”
- p7189, l17: “thus a small number” instead of “thus small number”
- p7191, l6: “threshold” instead of “thereshold”
- p7191, l11: “to an imperfect” instead of “to imperfect”
- p7191, l11: “inputs” instead of “input”
- p7194, l13: Please reformulate this part of the sentence.
- p7194, l7: “construction” instead of “constiruction”
- p7195, l19: “De Kort, I.A.T. and Booij, M.J.” instead of “De Kort, I. and Booij, M.”
- p7195, l23: “Draper, A.J. and Lund, J.R.” instead of “Draper, A. and Lund, J.”
- p7196, l6-7: What kind of document is this?
- p7196, l8: “Stedinger, J.R.” instead of “J. R. S.”
- p7196, l15: “Kipkorir, E.C.” instead of : “Kipkorir, E.”
- p7196, l24: “Ngo, L.L.” instead of “Ngo, L.”
- p7196, l26: “Ngo, L.L.” instead of “Ngo, L.”
- p7197, l11: Is Toan et al. (2010) still in press?
- p7197, l15: “Lindenschmidt, K.-E.” instead of “Lindenschmidt, K.”
- p7206, Figure 6: “horizontal axis” and “vertical axis”

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 7177, 2011.