

Interactive comment on “A dual-inexact fuzzy stochastic model for water resources management and non-point source pollution mitigation under multiple uncertainties” by C. Dong et al.

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We are grateful to Reviewer #1 for his/her helpful and insightful comments. The provided comments have contributed substantially to improving the manuscript. Accordingly, we have made significant efforts to revise the manuscript, with the details being explained as follows.

Point #1

COMMENT: Details need to be specified about how to mitigate non-point pollution in the case study?

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RESPONSE: We much appreciate the reviewer's helpful comment. Accordingly, we have added more explanations as follows:

Increasing population, diminishing supplies and changing climatic conditions amplify difficulties in resolving the conflicts between human activities and environment. Since agriculture is one of the most important water users, the farmland use arrangement can directly or indirectly influence the water resources utilization and environment. Specifically, the abuse of fertilizer and pesticide, can cause extensive anthropogenic non-point source pollution. Conversely, the water pollution control can also exert an impact on associated human activities, such as water allocation and cultivation. These all call for the need to integrate pollution mitigation efforts into the framework of water resources management.

Point #2

COMMENT: The title of constraint 5, i.e. Environment Constraints, should be replaced by another one that could precisely express the meanings of constraint 5.

RESPONSE: We are appreciative of the reviewer's suggestion. According to the reviewer's comments, we have specified Equation 6s as “Non-point pollution control constraints”.

Point #3

COMMENT: Table 7 contains the information about the interaction over consecutive planning periods, including the available water resources, confidence levels, and inexact allocation schemes. These were not provided in Results Analysis.

RESPONSE: We much appreciate the reviewer's helpful suggestion, and have updated the corresponding paragraph as follows:

In this research, four pi values are defined, including 0.01, 0.05, 0.10, and 0.15. Generally, a higher pi value indicates a higher probability of constraint violation, resulting in a larger volume of water supplies and a higher system benefit. As shown in Ta-

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ble 7, the quantity from surface drainage water in period 1 would be [20.73, 21.54], [21.07, 21.96], [21.25, 22.18], and [21.37, 22.24] million m³ under a pi level of 0.01, 0.05, 0.10, and 0.15, respectively. The corresponding volume of groundwater would be [28.33, 29.14], [28.69, 29.62], [28.87, 29.88], and [29, 30.05] million m³. Similarly, when the pi value changes from 0.01 to 0.15, the amount of river water would increase from [102.79, 107.79] to [104.61, 109.38] million m³. From periods 1 to 3, a downward trend would be observed for the amounts of water supplied. For example, under a pi level of 0.01, the amount of groundwater would be [28.33, 29.14], [26.52, 27.61], and [21.91, 24.16] million m³ in periods 1 to 3, respectively. Such a decrease is probably contributed by the advancement of water-saving techniques and the improved efficiency in water utilization.

Point #4

COMMENT: What are the data sources in tables 1 and 2?

RESPONSE: We are grateful for the reviewer's insightful and helpful comment. Accordingly, we have added the reference to table 1 and 2, as well as the cited reference in the revised manuscript.

Dong C, Huang GH, Tan Q, Cai YP. Coupled planning of water resources and agricultural land-use based on an inexact-stochastic programming model. *Front. Earth Sci.*, 8(1), 70-80, 2014.

Point #5

COMMENT: The sentence "the solutions obtained from ICCP and DIFSP will be compared to demonstrate the application of this developed method for supporting the planning of water and farmland use system" on page 5 should be polished in terms of grammar, logic, and terminology.

RESPONSE: We much appreciate the reviewer's helpful suggestion, and have revised this sentence to "the solutions obtained through the existing ICCP method and the

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DIFSP approach proposed in this study will be compared to demonstrate how DIFSP would improve upon ICCP in the planning of water and farmland use system".

Point #6

COMMENT: It was stated on page 10 that "the dynamics of the water resource and agricultural land use management system makes it critical to clarify the interactions between various components and those intimately involved in the planning process". Could authors provide more details about "dynamics" and "interactions". Corresponding examples in real cases would be much helpful for readers.

RESPONSE: We fully agree with the reviewer's comment. Accordingly, we have briefly explains this as follows:

However, in real world problems, various components in the water resource and agricultural land use management system impact each other, which inevitably leads to complexities and dynamics. For example, the interactions between population and water supplies can directly cause complex water utilization among various end-users. This makes it critical to clarify the interactions among system factors and those intimately involved in the planning process (Chung et al., 2008).

Point #7

COMMENT: I am confused about the statement "Depending upon the use pattern, surface water can be sent directly to consumers or through a water treatment plant" on page 11. What is a use pattern in real-world water resources allocation systems? Why is there a difference between supply processes of surface water? What are the driving forces for such a difference?

RESPONSE: We much appreciate the reviewer's careful review. In general, 'use pattern' indicated in the original manuscript referred to different intended uses of water resources. According to the reviewer's helpful comments, we have revised this sentence as follows:

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Depending upon different intended uses for end users, surface water can be sent directly for industrial production and irrigation, or should be treated prior to drinking and other uses.

Point #8

COMMENT: What are potential limitations of the developed method? Could it be reliable for any real case of water resources and farmland systems management?

RESPONSE: We are grateful to the reviewer for his/her concerns. The developed DIFSP method can be effective and reliable for addressing real-world problems of water resources and farmland management systems, as it is capable of tackling the highly uncertain parameters that are common in those systems and pose challenges to the related decision-making processes. However, successful application of the developed method relies on the screening and adoption of practical approach as well as the accessibility of sufficient samples for obtaining the distribution information of lower and upper bounds of RBIs.

Generally, we are deeply grateful to Reviewer #1 for his/her insight and careful review. His/her comments have greatly helped improve the paper.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/11/C448/2014/hessd-11-C448-2014-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 987, 2014.