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Interactive comment on "Sustainable management of river oases along the Tarim River in North-Western China under conditions of climate change" *by* C. Rumbaur et al.

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We really appreciate the valuable comments of the two referees. These comments really helped to improve the paper. In the following we have listed the answers of the authors of the paper.

The paper deals with a broad interdisciplinary topic on a remote region in China, where scientific knowledge is scarce and global water resource problems and climate change problems are increasing during last decades.

ABSTRACT: Main problem and aim is well written, but single disciplinary results from the consortium are not deeply interlinked for common interpretation und main result

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statement. It ends in an aim, and not in a result conclusion or home message, related to the regional problems.

The abstract is rewritten and the remarked points are added.

INTRODUCTION: Region and problem statement with increasing water resource conflicts is documented in a short sufficient manner. In relation to the multiple result description research aim is too descriptive and must be more related to the international problem of Integrated watershed management and Ecosystem services.

The introduction is rewritten the research aim is stated in the new chapter called "Project description and research sites" (line 131 to line 182). The aim and the content of the paper is also closer related to the interlinkage between the hydrology and ecosystem services. METHODS AND STUDY SITES: In a broad manner the used methods for a multidisciplinary research group, written for each discipline, are documented precise and sufficient. Regional, global datasets (climate, hydrology, satellite images e.g. MODIS, own plot analysis, agro-economic statistics), own questionnaires for household analysis and models (e.g. SWIM, STARS, CCLM, MIKE-SHE) were used to analyze backward LUC, trends in climate (T, R) and discharge and forward with climate emission scenarios future climate change (for water balance scenarios foreseen). Further on plot based detailed analyses of the riparian vegetation (with plant physiology monitoring) in relation to ground water level, summer floods and soil water development were done. Ways of stakeholder analysis (mainly because of political restrictions with scientists and official governmental people) and data management are also well signed out.

Thanks.

RESULTS: According to the methodical subchapters the results are described for the different disciplines, with a lot of very interesting detailed new results (e.g. influence of glacier melt of a sub-basin on the discharge dynamic and development, role of glacier lake outburst floods, ground water level and distance to main river channel for vitality

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and juvenile trees in the riparian ecosystem, high increase of large farmland with cotton etc.).

Some remarks on this: text and tables to prove the water use efficiency of irrigation methods are not sufficient - which water consumption have the different crops?,

The text and tables to prove the water use efficiency and the water consumption of cotton production is added (line 696 to line 717). The authors assessed only the water consumption of cotton as this is the main and most important crop in and for the region. Data and discussion to the amount of capital investment to improve irrigation systems is missing, how different farm types have possibilities for water sharing?

Data is added in line 724 to line 726. “Fixed investment costs for the drip irrigation system were estimated between 180 and 350 US-$ ha-1 a-1 by Wang et. al (2012).” role of soil salinization in a spatial sense and in the agro-economic role is to short discussed;

The role of soil salinization is added in line 718 to line 721 and in table 1 (line 703) p. 1244 row 1-7 reference to tables is missing;

The reference to tables was added. in the WTP method (p. 1246) the comparison of Xinjiang and Peking seems strange - there is no description on actor analysis and how the respondents were selected?

It is now explained in line 884 to line 895): “The overall social benefits from a large-scale environmental project in an ecological sensitive region will accrue not only to the people on site but also in other parts of the whole country. That is at least what is to be expected. While the people living on site will benefit from an improved water management directly there are also benefits from such a project which have nothing to do with the direct utilization of the Tarim water and the ensuing ecosystem services. Also people living in Beijing care for what is going on in the Tarim area and what the living conditions of the local people are. From the perspective of Beijing citizens

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"desertification" was the most serious environmental problem occurring in the Tarim area (cf. Figure 14). A possible explanation for this result might be that many parts of China are endangered by desertification. Sandstorms can even be experienced in the city of Beijing (from the Gobi Desert). Therefore also people living in Beijing were willing to contribute financially to an improvement of the water availability situation in the Tarim area." Fig. 10 and 11 gives only general information on environmental questions of whole arid/semi-arid China - not related to the research area and project aims.

The figures 10 and 11 changed now to figures 13 and 14. The descriptions of the figures relating to the region were added. Chapter 4.3 and 4.5 are only weak related to the main aim and topic of water use conflicts and competition (see Introduction).

In chapter 4.3 and 4.5 text was added to establish the relation to the overall goal of the paper and to the water issues in the regions. In chapter 4.3 the relation to water management and the salinity problem of soils are added. The impact of increasing salinity on crop yields is shown. The costs of the two main irrigation strategies, drip irrigation and flood irrigation, are analyzed. In chapter 4.5 it is directly related to the improvement of the environment in the Tarim River Basin and the reason why people in China's capital are also willing to pay for the improvement in Xinjiang.

DISCUSSION and OUTCOMES: In relation to the detailed result documentation this chapter is really rough, to short and general. Discussion with literature references must go more in detail and must focus on the linking up of the single disciplinary results (e.g. future change in discharge regime and consequences on irrigation agriculture; more reservoirs and dams - dangerous consequences for the Tugai forests ...). In the discussion the planned outcomes (e.g. steps for the DST) are discussed, not the results. This chapter must be written new, the written content can be used for an outlook and conclusion chapter.

The chapter was written new and the decision support tool was moved the results section. Difficulties in an interdisciplinary and intercultural project and how these difficulties

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are solved were inserted. The strategy of the upcoming implementation of the project's results is shown. The impact of the climatic change on the hydrologic regime of the Tarim River and the consequences of the change in river run-off to the irrigation agriculture are discussed. Consequences of the changing discharge regime, especially for the Populous euphratica tree and the restoration of Populous euphratica forests, will be shown more in detail. In the end the willingness to pay for the restoration and preservation are

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Interactive comment on Earth Syst. Dynam. Discuss., 5, 1221, 2014.