

Interactive comment on “Establishment and maintenance of regulating ecosystem services in a dryland area of Central Asia: the Kökyar Protection Forest, Aksu, NW China, as an example” by S. Missall et al.

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General comment: Until now we have little knowledge as to the long-term impacts of infrastructure investments made during the early decades of the PRCh. Tens of thousands of land reclamation schemes, reservoir and road constructions, resettlements and afforestation schemes have been accomplished all over the country. To a large scale such projects had to follow the trial-and-error approach, relying mainly on local knowledge rather than on scientific data. A certain degree of waste in using human labour and natural resources was taken for granted. Any conclusive statements

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upon the gains and losses of such projects depended largely on the political context in which they were made. With this general experience in mind, the Kökyar paper has its merits, trying to specify costs and benefits systematically with the thoughtful analysis of the given vague and crude information in combination with on-site-investigations. It presents a rare example of research trying to discover the rationale hidden behind seemingly voluntaristic and arbitrarily decided “mass campaign”-projects. Specific comments: 1. I propose a brief separate chapter/subchapter on the historicity of the project. It cannot be understood without referring to the national campaign / project of the Three North Shelterbelts. Shelterbelts provided by regular tree plantations have proven their usefulness under the conditions of 250 – 400 mm of annual rainfall, where they may survive with some auxiliary irrigation. But tree shelterbelts under totally arid conditions are a different matter, relying fully on irrigation. Thus one may ask: Did the national (political) macro-climate in favour for shelterbelts eventually prevent the examination of other more sustainable options to reduce the impact of dusty and sandy storms on the urban fabric? Also the switch to the forest leasing system has its national context as it was gradually introduced nation-wide since 1986. 2. I also propose another separate chapter/subchapter on the definition of the meteorological event of dust and sand storms as well as on the specific local climatic, topographic, pedologic and hydrologic site conditions including earlier human impacts (overgrazing etc.). 3. The last paragraph of the text should be enlarged into a separate “Water” chapter discussing the water price issue (urbanites profiting from an almost non-existent agricultural water price). The authors mention the unbalanced distribution of water between upstream and down stream water users. This ethnic dimension of this imbalance - Han Chinese urbanites and farmers in Aksu versus Uighur farmers downstream – should also be mentioned. 4. Technical terms should also be given (in footnotes or in an annex) in Chinese. For instance “compulsory labour” in contrast to “forced labour”. Minor comments/questions and technical corrections 1675 On the one hand, the abstract is rather detailed and deserves some shortening, on the other hand it does not pose any guiding question. Would this be the question: To which extent is it possible to identify

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costs and benefits of an erosion control project within the given political and administrative framework of a remote Chinese city? 9 – 11: The abstract contains the apodictic statement: “The regulating ecosystem 10 services provided by Kökyar Protection Forest clearly reduce dust and sand storm impacts on Aksu City”. But neither here nor in the actual article do the authors present any empirical evidence. Thus it remains an open question, whether the claimed ecological services of the shelterbelt system are really provided. 23 The population figure of 570.000 refers to the total area of Aksu shi with more than 14.000 km². What is the population of Aksu’s actual urban core area to be protected by the Kökyar project? 1676 21 – 24 The introduction does not establish any link to the national Sanbei Fanghulin scheme. 1-3: The topographic information is too general. The local topography of the urban area is of greatest relevance for the degree of impact of the annual dust and sand storms (see first lines of 1679) 10: What is the official definition of a “sand storm event”? in 1685, 26, you speak of wind-born sand events. 20: Here you speak of dust storms. Is there any difference between a dust storm and a sand storm? 1677 12: “Hindukush–Himalaya–Tianshan region” What kind of region should this be? Dust and Sand Storms are primarily a meteorological event of the plains, not of high mountain areas. 13: “systematically examine the establishment process”: This bold claim raises high expectations. Again, as in the abstract: the introduction does not arrive at a research question. 18: data are drawn 19: survey on Kökyar farmers? Should it not be of ?? 18-20: Since the objective of the study is not well identified, the information on methodology is “hanging in the air”. Why interview farmers, why not meteorologists, medical doctors, old cadres? 21: What’s the meaning of “sound literature”? 1678 23: There is a national context for the Kökyar project: the 3 North shelterbelt system 1679 3: “Saline desert plateau” Such words suggest potential problems of salinization. Did they occur? They also suggest especially large quantities of irrigation water in order to “wash” the land to make it suitable for tree planting. But there is no mentioning of drainage facilities and drainage costs. 2-6 The question of site selection remains nebulous: Please include a graph showing major wind directions and velocities (should be combined with fig 2) and give some

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information on the nature and quantity . of “sand” and suspended dust. How reliable were the meteorological data? What about soils as a source for wind erosion and being exposed to salinization? 2: the relevance of local topography for the potential impact of the project is hidden behind the information, that the project was established on “a 20 m high saline desert plateau”. If I am not mistaken “high” here means 20 m high above the level of the Aksu River flood plain. 4: the plots of 0,5 – 1 ha exclude or include poplar plantations?? 11-12: the terms “ecological forest” and “economic forest” were introduced with the PRC forestry law (1984) please explain in foot note as many readers may not be familiar with this context. 25 Am I interpreting you correctly?: The new land-use-system is indeed a pure forestry system, (not agro-forestry, not silvo-pastoral) excluding cover crops (grain, fodder plants) and cattle breeding (sheep)???? Was water shortage the reason for omitting animals? 1680 25: You speak of irrigation canals but what about drainage canals? 1681 23: compulsory afforestation. What is the Chinese term (foot note)? Relation to yiwugong? 1682 4: suggests the participation of “workers”: Did farmers not participate? 19: “drinking water facilities” Where did/does drinking water for the isolated farm houses come from? How was/is it produced and distributed? 1683 25: In 1987 the leasing of reforested land to individual farmers began in many parts of China. It was apparently part of a national policy. 1685 1: how huge is huge? Can you give some approximate figures? 11: What means “extreme temperature alleviation”? 13: “wind speed reduction”? Where is the evidence? Experiments in Central Europe suggest reductions in the immediate vicinity of tree rows, but not at more distant places. Theoretically there is “air humidification” because of the evaporating irrigation water. But does it have an impact on the downtown climate? “air filtration”: The proportion of large particles (“sand”) will probably be reduced due to their deposition within and behind the shelterbelt. But there will be almost no impact on the quantity of suspended particles/airborn particulate matter. “soil fixation”: This is an important question: Did the advocates of the project consider the shelterbelt site itself as a major source of wind erosion? Or did they assume that the neighbouring lands are the source of wind erosion? In case of the last supposition did the project initiators

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also consider a restoration of the natural shrub vegetation in the erosion area? 15, 16: You speak of a “notable improvement of the dust and sandstorm situation”. This is a sweeping yet vague wording. It would be helpful and more convincing for the reader if you could briefly name some of the evidences provided by your sources. 28 how close is the “immediate vicinity”? 26 “wind born sand events” Could you provide a precise definition? Until now the reader has the impression, that the authors feel quite fine with the data provided by their sources. It is only now – rather late – that one learns more about the ambiguity of the sources, the terms and data. 1686 26 – 27: Earlier I asked for more detailed information about the local topography and site conditions: It is only now, that you inform the reader, that the project is located on “the largest dust fields in the region”. But then, it would be helpful to learn more about the characteristics of a “dust field” and the local dust fields in particular (proportion of clay/silt particles mixed with or without sand???). Table 2: Which year do you take as the base year for the inflation adjustment? Table 4: The figures must be explained. Figure 2 should be reproduced turned by 90 degrees (vertical arrow pointing towards North) and enlarged to better read the informations provided (contour lines). This map should be combined with a wind diagram.

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