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1 Influence of climate change and human activity on water resources in arid region of
2 Northwest China: An overview*

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8 **Abstract:** This study reviews the latest progress in research on climate change and water
9 resources in the arid region of Northwest China, analyzes the cause of water resource changes
10 within the region from the perspective of climate change and human activities, and summarizes
11 future likely changes in water resources and associated adaptation strategies. The research shows
12 that the climate in the region has experienced warming and wetting with the most significant
13 warming in winter and the highest increase in summer precipitation since 1961. Areas with the
14 most significant warming trends include the Qaidam Basin, the Yili River Valley, and Tacheng.
15 Spatially, the increasing trend in precipitation becomes increasingly significant from the southeast
16 to the northwest, and northern Xinjiang experienced the highest increase. Studies have shown a
17 decrease in headwater of Shiyang River because runoff is mainly based on precipitation which
18 shows a decrease trend. But an increase in western rivers was observed such as Tarim River and
19 Shule River as well as Heihe River due to rapid glacier shrinkage and snowmelt as well as
20 precipitation increase in mountain area. Meanwhile unreasonable human activities resulted in
21 decrease of runoff in the middle and lower reaches of Haihe River, Shiyang River and Kaidu
22 River. Finally, recommendations for future studies are suggested that include characteristics of
23 changes in extreme weather events and their impacts on water resources, projections of future
24 climate and water resource changes, climate change attribution, the selection of adaptation
25 strategies relating to climate change and social economic activities, and use of scientific methods
26 to quantitatively determine water resource allocation.

27
28 **Keywords:** Arid region of Northwest China; Climate change; Water resource; Human activity;
29 Adaption strategy

30
31 **1 Introduction**

32
33 The arid region of Northwest China in the north of the Tibetan Plateau, locates in the area of the
34 westerlies. Of all regions at the same latitudes, it is one of the most arid (with annual precipitation
35 less than 200 mm). The region covers the entire territory of Xinjiang, the Hexi Corridor in Gansu,
36 the Qaidam Basin in Qinghai, and areas to the west of the Inner Mongolia Helan Mountains (73°–
37 107°E, 35°–50°N) (Fig.1). The area covers an expanse of 2.352 million km², representing
38 approximately 24.5% of the entire national land territory (Zhang and Su, 1993). Due to regional
39 problems, such as the area being situated far from the ocean, the effect of Tibetan Plateau terrain,
40 and the underlying desert or Gobi surface, the arid region of Northwest China differs from other

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