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2 **Supplementary Information for**

3 **Water resource utilization regimes at a basin scale: transition framework and development** 4 **traps**

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8 **This PDF file includes:**

9 **Supporting Information Text**

10 test

11 **Methods S1. Definition of study area**

12 The study area is the Yellow River Basin (YRB), which has experienced the most intense water exploitation and the most
13 dramatic shifts of management regime (Supplementary Fig. 1A). According to ecological zoning, landscapes types, water
14 resource zoning et al., the Yellow River Basin can be divided into four different regions (supplementary Fig. 1B), which has
15 been widely recognized (ref.). Using this division, there are also some differences of nature between different regions regarding
16 water utilization regimes (supplementary Fig. 2):

- 17 • **Source Region (SR):** Over 50% of natural runoff was produced in this region. The most ecology function here is water
18 conservation, as sparsely populated and less economically developed.
- 19 • **Upper Region (UR):** With the highest per capita irrigated land area, there are numbers of large irrigation lands in
20 this region. However, because of backward production methods, efficiency of irrigation are used to be very low.
- 21 • **Middle Region (MR):** Crossing Loess Plateau, famous rich-sand area, Yellow River loads most of its sediments here
22 with the highest soil erosion risk. To reverse this situation, the grain for green project changed the water utilization here
23 strikingly.
- 24 • **Lower Region (LR):** With dense population and the traditional agricultural trajectory, lower region used to be the
25 largest water use region. However, as the industrial transformation going, proportion of agriculture keeps decreasing,
26 but LR is still the largest water use region in each aspect.

27 **Introduction of Yellow River Basin.**

28 **Subarea of Yellow River Basin.**

29 **General situation of water use in the YRB.**

30 **Methods S2. Detailed information on dataset and processing**

31 Since the Yellow River Basin consists of ten provincial areas, the above division can also maintain broad consistency with
32 administrative divisions. Add a materials' subsection if you need to.

33 **Methods S3. Water Utilization Regime Index**

34 Add a methods subsection if you need to.

35 **Stress: SFV-index.** Various metrics, therefore, proposed for water stress (e.g. water scarcity, water stresses index, scarcity-
36 flexibility-variability index), where the dimensions of human impact are increasingly valued. Among of them, by taking changes
37 of water flexibility and variability into account, the scarcity-flexibility-variability (SFV) index focus more on dynamic responses
38 to water resources in developing perspective, which considered a valid indicator of temporal changes in water stresses.

39 **Tendentiousness: Non-provisioning share.**

40 **1. Methods S4. Water Management Practices**

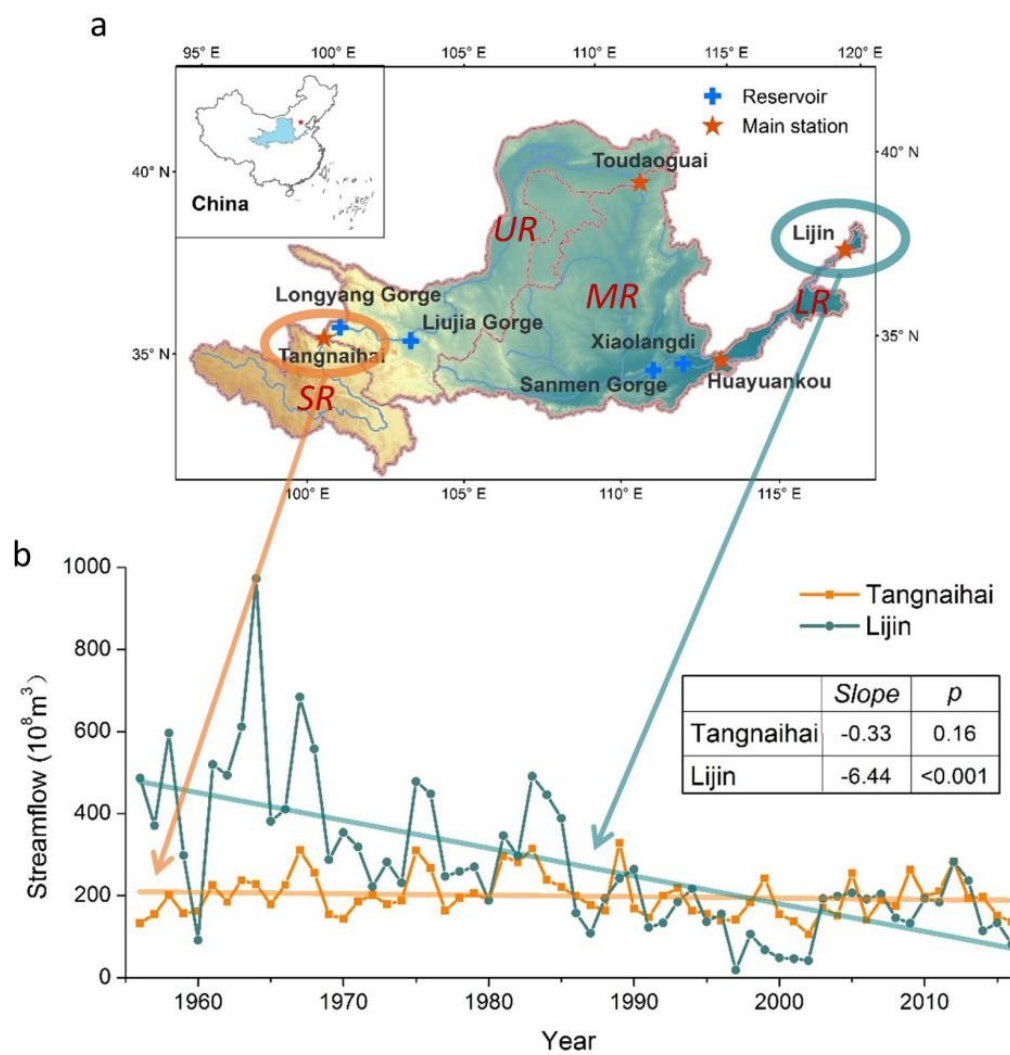


Fig. S1. Yellow River Basin

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Placeholder fig

Fig. S2. Different regions

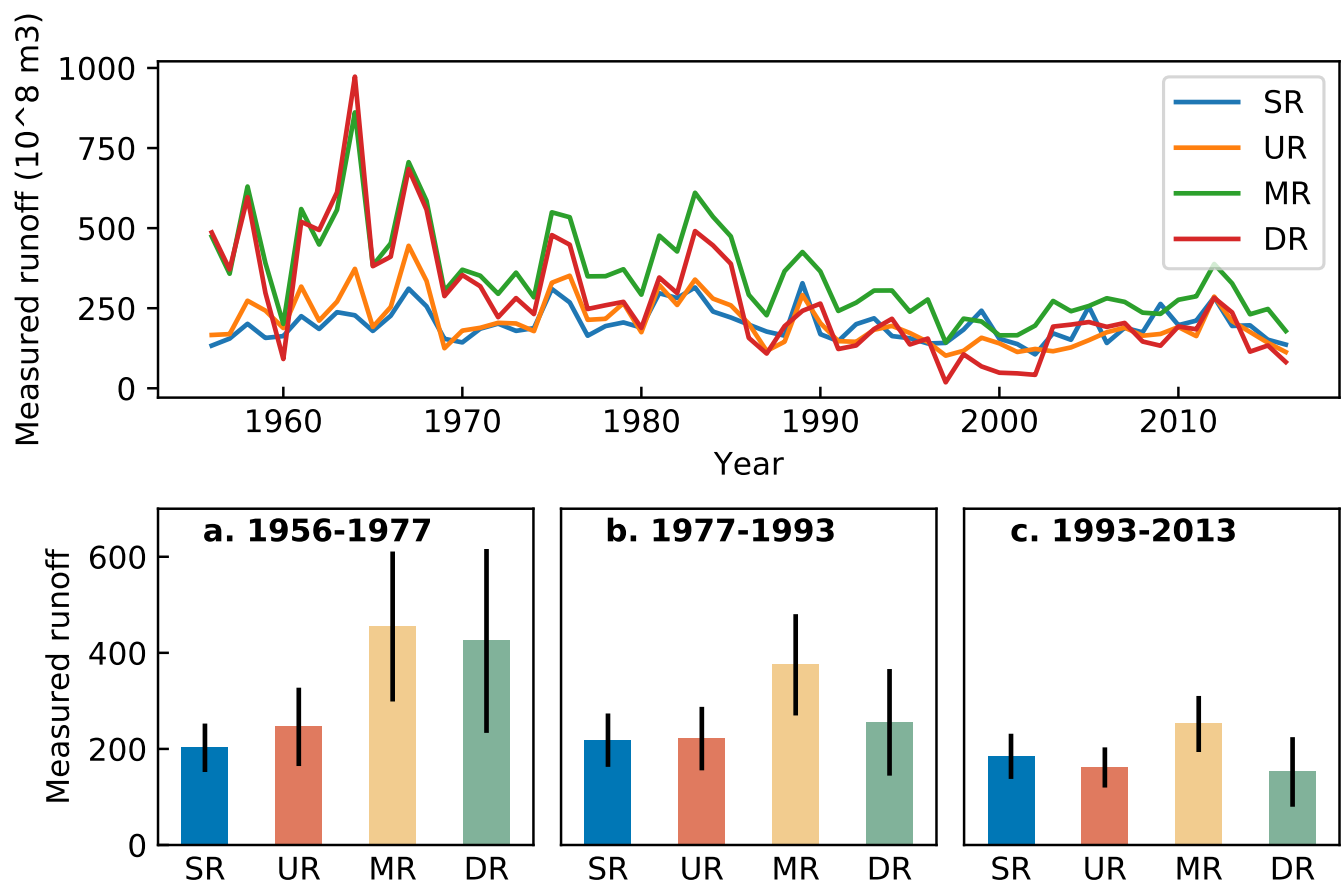


Fig. S3. Natural measured runoff of Yellow River within different periods.

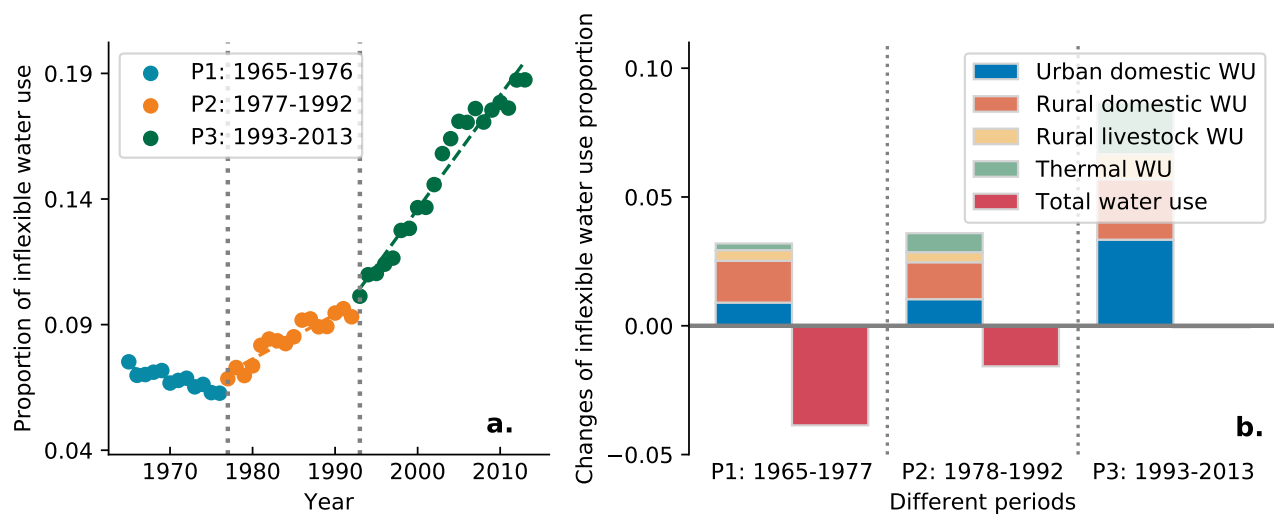


Fig. S4. Flexibility

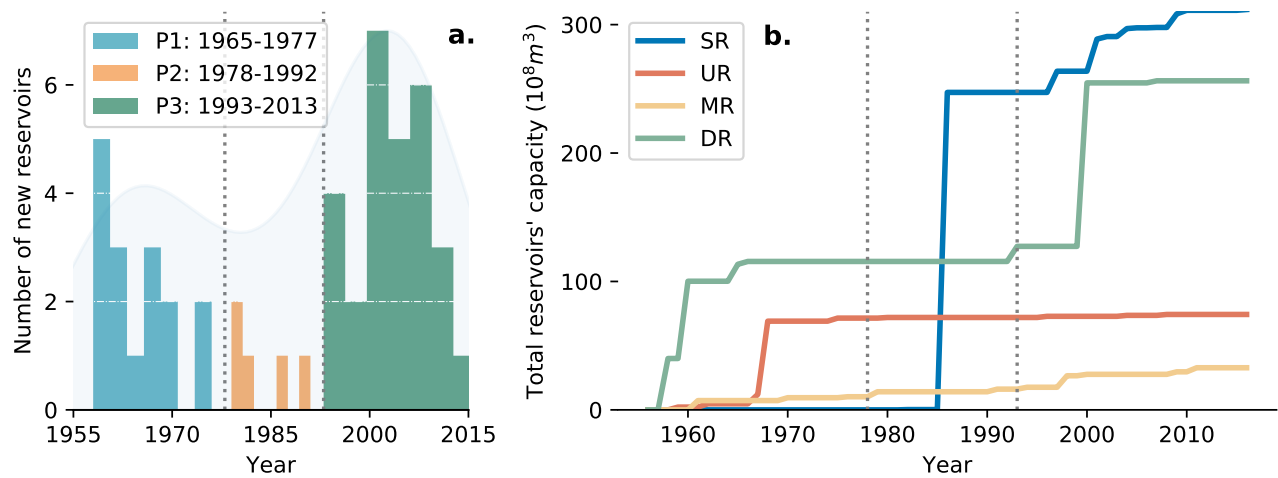


Fig. S5. Reservoirs and accumulated storage

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Fig. S6. technological solutions and water conservation practices

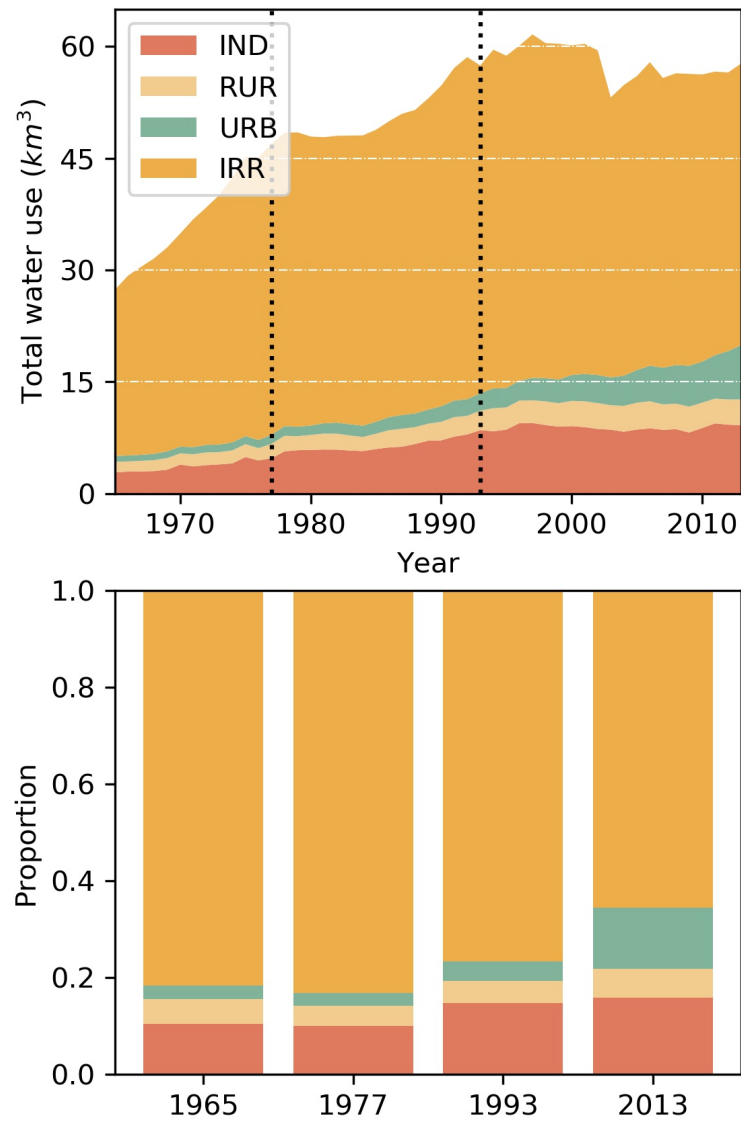


Fig. S7. Proportions of water use between the different sectors

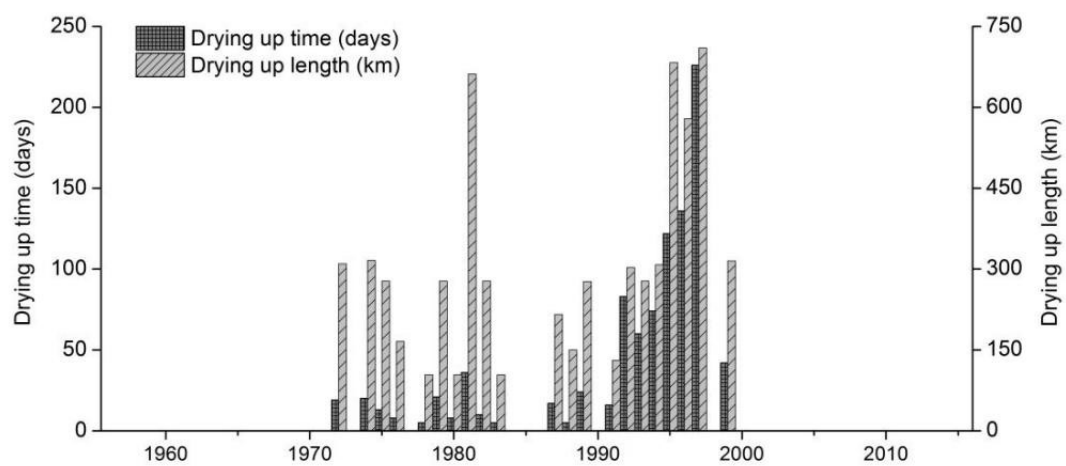


Fig. S8. Severe runoff outages and groundwater depletion

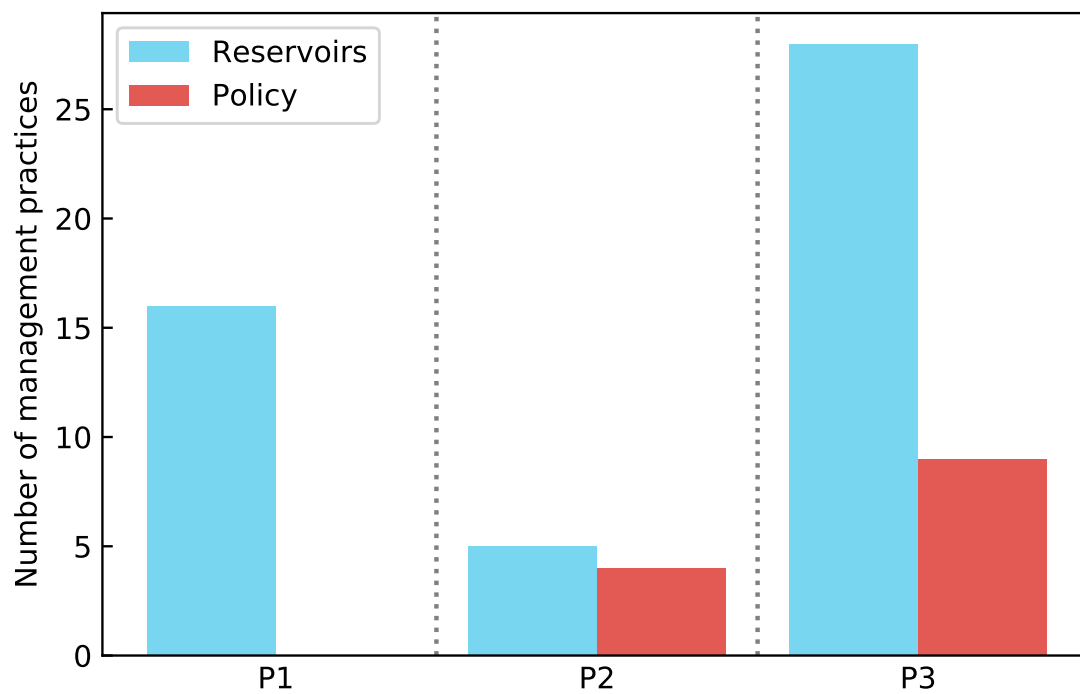


Fig. S9. Number of management practices in different periods, including policy and reservoirs.