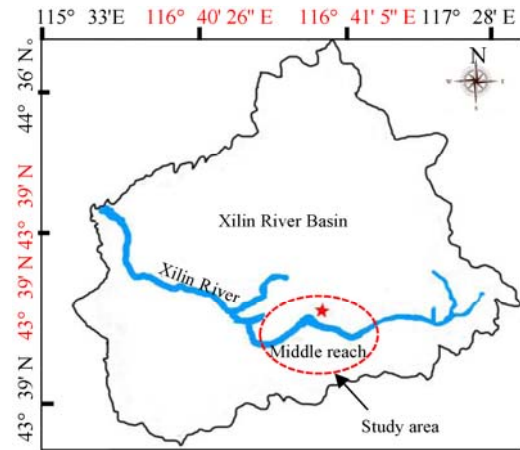


Additional Figures

Fig. S1. Geographical location of Xilin River basin (area of 3, 900 km²) inlaid in semi-arid typical steppe of Mongolia Plateau, China.



Additional Tables

Table S1. The basic information of 7 sampling sites along a geomorphological gradient from riverbed center (R1), riverbed edge (R2), oxlake bed (R3), river low floodplain (F1), river upper floodplain (F2), river low terrace (T1) to river upper terrace (T2) in Xilin River Basin of China.

Table S2. Top soil (0-10 cm layer) physicochemical parameters of 7 sampling sites along the geomorphological gradient from riverbed center (R1), riverbed edge (R2), oxlake bed (R3), river low floodplain (F1), river upper floodplain (F2), river low terrace (T1) to river upper terrace (T2) in Xilin River Basin of China.

Table S3. Adonis metrics-based dissimilarity analysis of the soil bacterial communities among riverbed center (R1), riverbed edge (R2), oxlake bed (R3), river low floodplain (F1), river upper floodplain (F2), river low terrace (T1) to river upper terrace (T2).

Table S4. Typical members of 10 bacterial phyla in the riverbed center (R1)-riverbed edge (R2)-oxlake bed (R3)-low floodplain (F1)-upper floodplain (F2)-low terrace (T1)-upper terrace (T2) continuum.

Table S5. Pearson correlations between soil physicochemical factors.

Table S1.

Geomorphological unit	Latitude (N)	Longitude (E)	Altitude (m)	Habitat type	Texture type	Dominant particles	Aggregates properties	Vegetation type
Riverbed center (R1)	43°36'36"	116°39'25"	1164		Sand	Sand particles	No aggregates	No plant
	43°45'32"	116°41'5"	1167					
Riverbed edge (R2)	43°37'33"	116°41'8"	1163	Aquatic	Silty loam	Fine silt and clay particles	Micro-aggregates (<250 μm)	<i>Juncellus serotinus</i>
	43°37'37"	116°41'19"	1166					
Oxlake bed (R3)	43°36'36"	116°39'25"	1164		Silty loam	Fine silt and clay particles	Micro-aggregates (<250 μm)	No plant with unnamed phytoplankton
	43°37'32"	116°41'5"	1168					
Low floodplain (F1)	43°36'36"	116°41'6"	1169		Sand	Sand particles	No aggregates	<i>Juncus effusus</i>
	43°37'31"	116°41'7"	1174					
Upper floodplain (F2)	43°36'35"	116°39'25"	1178	Hygic	Silty Sand	Coarse silt and sand particles	Macro-aggregates (>250 μM)	<i>Potentilla anserina</i>
	43°37'40"	116°41'12"	1185					
Low terrace (T1)	43°33'4"	116°40'22"	1186	Xeric	Loam	Fine silt and clay particles	Micro-aggregates (<250 μM)	<i>Leymus chinensis</i>

	43°37'41"	116°41'22"	1188								
	43°32'33"	116°33'30"	1195								
Upper terrace (T2)				Sandy loam	Coarse silt and sand particles	Macro-aggregates (>250 μM)					<i>Stipa grandis</i>
	43°35'56"	116°44'20"	1201								

Note: The longitude, latitude, and altitude of each sampling site were measured with global positioning system (GPS).

Table S2.

	Silt (%)	Clay (%)	Sand (%)	Moisture	pH	Salinity	TOC	TN	TP	Ammonia Nitrogen	Nitrate Nitrogen
	2-20μm	<2μm	>20μm	(%)		(mg·kg ⁻¹)	(g·kg ⁻¹)	(g·kg ⁻¹)	(g·kg ⁻¹)	(mg·kg ⁻¹)	(mg·kg ⁻¹)
Riverbed center	0.03±0.01a	0.00±0.00a	99.97±0.01a	17.90±0.04a	8.02±0.05a	0.30±0.04a	2.53±0.08a	0.42±0.04a	0.09±0.02a	1.05±0.04a	5.06±0.62a
Riverbed edge	4.43±0.11b	1.62±0.02b	93.96±0.13b	20.22±0.02b	8.35±0.02b	1.25±0.04b	7.17±0.01b	1.01±0.03b	0.24±0.02b	35.19±5.15b	12.37±3.74bc
Oxlake bed	4.54±0.10b	1.65±0.01b	93.81±0.09b	23.34±0.72c	8.71±0.04c	1.22±0.02b	24.47±0.13c	1.94±0.04c	0.35±0.02c	23.83±1.95c	8.24±1.69d
Low floodplain	1.55±0.03c	0.01±0.01a	98.45±0.04c	21.97±0.45d	8.65±0.05c	1.09±0.02c	8.94±0.11d	1.16±0.04d	0.28±0.02d	8.76±1.28d	5.23±0.66ae
Upper floodplain	17.59±1.69d	2.97±0.71c	79.44±2.33d	20.28±0.71b	8.60±0.08c	1.33±0.04d	10.88±0.15e	1.31±0.05e	0.34±0.03c	7.06±0.63d	9.39±1.06 bd
Low terrace	23.98±1.00e	14.26±1.12d	61.77±0.85e	15.53±0.26e	8.29±0.06b	1.81±0.03e	14.70±0.24f	2.87±0.05f	0.62±0.03e	6.31±0.55d	17.77±0.86f
Upper terrace	21.69±0.71f	6.06±0.51e	72.25±1.18f	14.51±0.21f	8.43±0.03d	1.77±0.03e	13.78±0.27g	2.56±0.06g	0.69±0.02f	6.96±1.12d	17.65±1.84f

Note: TOC: total organic carbon, TN: total nitrogen, TP: total phosphorus. Values were means ± standard deviation. Same and different lowercase letters respectively indicated insignificant and

significant differences of physicochemical parameters among sampling zones ($P < 0.05$) based on one-way analysis of variance (ANOVA) by Fisher's least-significant difference (LSD).

Table S3.

Adonis	Riverbed center (R1)	Riverbed edge (R2)	Oxlake bed (R3)	Low floodplain (F1)	Upper floodplain (F2)	Low terrace (T1)
Riverbed edge (R2)	0.001***					
Oxlake bed (R3)	0.001***	0.001***				
Low floodplain (F1)	0.001***	0.001***	0.001***			
Upper floodplain (F2)	0.001***	0.009**	0.115	0.004**		
Low terrace (T1)	0.001***	0.035*	0.856	0.014*	0.001***	
Upper terrace (T2)	0.001***	0.033*	0.858	0.007**	0.001***	0.001***

Note: *, ** and *** represent correlation at the 0.05, 0.01 and 0.001 level, respectively.

Table S4.

Typical members	Riverbed	Riverbed	Oxlake	Low	Upper	Low	Upper
	center	edge	bed	floodplain	floodplain	terrace	terrace
Average relative abundance ± standard deviation (%)							
<i>Chitinophagaceae</i> of	15.63±4.83a	0.28±0.10b	1.08±0.29b	1.67±0.08b	1.49±0.17b	1.26±0.18b	0.67±0.54b

<i>Bacteroidetes</i>							
vadinHA17 of <i>Bacteroidetes</i>	0.59±1.20a	8.73±1.05b	4.19±1.00c	4.04±1.26c	0.63±0.75a	0.00±0.00a	0.00±0.00a
<i>Chthoniobacter</i> of <i>Verrucomicrobia</i>	3.78±0.84a	0.02±0.01b	0.40±0.10b	0.03±0.02b	0.10±0.04b	0.23±0.06b	0.16±0.05b
<i>Crenothrix</i> of <i>Gammaproteobacteria</i>	2.96±0.38a	0.76±0.16b	0.77±0.13b	0.25±0.10bc	0.02±0.03c	0.00±0.00c	0.00±0.00c
<i>Flavobacterium</i> of <i>Bacteroidetes</i>	0.31±0.08a	0.19±0.02b	0.41±0.11a	0.10±0.08bc	0.11±0.09bc	0.03±0.02c	0.06±0.04c
<i>Comamonadaceae</i> of <i>Betaproriteobactea</i>	1.71±0.33a	3.95±0.13b	1.82±0.26a	0.84±0.17c	0.49±0.20cd	0.27±0.15d	0.20±0.09d
<i>Nitrosomonadaceae</i> of <i>Betaproteobacteria</i>	2.23±0.27a	0.45±0.08b	0.55±0.17b	1.31±0.36c	2.74±1.07a	0.50±0.08b	0.78±0.22bc
<i>Xanthomonadales</i> of <i>Gammaproteobacteria</i>	0.11±0.12a	0.17±0.06a	0.65±0.04b	1.84±0.57c	0.91±0.25b	0.15±0.07a	0.15±0.08a
Subgroup6 of <i>Acidobacteria</i>	2.05±0.20a	0.22±0.02b	0.8±0.25bc	1.83±0.24ac	6.58±1.81d	6.91±0.82d	9.77±1.06e

DA101_soil_group of							
<i>Verrucomicrobia</i>	0.00±0.01a	0.00±0.00a	0.02±0.01a	0.01±0.01a	0.12±0.14a	8.08±2.24b	5.29±1.53c
<i>Sphingomonas</i> of							
<i>Alphaproteobacteria</i>	0.02±0.01a	0.02±0.01a	0.13±0.08a	0.23±0.14a	2.28±1.11b	5.37±1.83c	5.31±0.40c
<i>Haliangium</i> of							
<i>Deltaproteobacteria</i>	0.50±0.14a	0.22±0.03b	0.26±0.17b	0.53±0.06a	0.57±0.25a	0.80±0.19c	0.71±0.11ac
<i>Gemmatimonadaceae</i> of							
<i>Gemmatimonadetes</i>	0.14±0.08a	0.20±0.00a	0.43±0.12b	0.16±0.08a	0.24±0.11a	0.50±0.14b	0.72±0.10c
<i>Mycobacterium</i> of							
<i>Actinobacteria</i>	0.09±0.02ab	0.03±0.02c	0.02±0.01c	0.03±0.02c	0.04±0.01ac	0.23±0.08d	0.13±0.04b
<i>Clostridium</i> of <i>Firmicutes</i>	0.00±0.04a	0.22±0.14b	0.25±0.14c	0.31±0.08d	0.06±0.04a	0.00±0.00a	0.00±0.00a
Gitt-GS-136 of <i>Chloroflexi</i>	0.04±0.02a	0.04±0.02a	0.03±0.02a	0.05±0.03a	0.54±0.34b	0.56±0.15c	0.65±0.16c
<i>Cyanobacteria</i>	0.00±0.00a	0.01±0.00b	0.00±0.00a	0.00±0.00ab	0.02±0.00c	0.02±0.01bc	0.01±0.00b
<i>Acetobacteraceae</i> of	0.00±0.00a	0.00±0.00a	0.00±0.00a	0.00±0.00a	0.00±0.00ab	0.03±0.02b	0.03±0.02b

Alphaproteobacteria

Arenimonas of

0.00±0.00a 0.06±0.02bc 0.03±0.01ab 0.00±0.00a 0.07±0.07c 0.03±0.02ad 0.05±0.05bcd

Gammaproteobacteria

Singulisphaera of

0.00±0.00a 0.00±0.00a 0.00±0.00a 0.00±0.00a 0.00±0.00a 0.07±0.04b 0.05±0.04b

Planctomycetes

Note: Same and different lowercase letters respectively indicated insignificant and significant differences of selective bacterial species among sampling zones (P<0.05) based on one-way analysis of variance (ANOVA).

Table S5.

	Silt	Clay	Sand	Moisture	pH	Salinity	TOC	TN	TP	Ammonia Nitrogen	Nitrate Nitrogen
Silt	-0.98**	1	0.86**	-0.69**	0.03	0.85**	0.73**	0.85**	0.91**	-0.26	0.84**
Clay	-0.94**	0.86**	1	-0.67**	-0.18	0.74**	0.66**	0.84**	0.80**	-0.22	0.80**
Sand	1	-0.98**	-0.94**	0.70**	0.04	-0.84**	-0.73**	-0.88**	-0.90**	0.26	-0.85**
Moisture	0.70**	-0.69**	-0.67**	1	0.59**	-0.36*	-0.14	-0.47**	-0.60**	0.52**	-0.67**

pH	0.04	0.03	-0.18	0.59**	1	0.38*	0.53**	0.23	0.18	0.36*	-0.08
Salinity	-0.84**	0.85**	0.74**	-0.36*	0.38*	1	0.90**	0.91**	0.92**	0.16	0.83**
TOC	-0.73**	0.73**	0.66**	-0.14	0.53**	0.90**	1	0.93**	0.86**	0.14	0.65**
TN	-0.88**	0.85**	0.84**	-0.47**	0.23	0.91**	0.93**	1	0.96**	-0.04	0.81**
TP	-0.90**	0.91**	0.80**	-0.60**	0.18	0.92**	0.86**	0.96**	1	-0.14	0.84**
Ammonia	0.26	-0.26	-0.22	0.52**	0.36*	0.16	0.14	-0.04	-0.14	1	0.08
Nitrogen											
Nitrate	-0.85**	0.84**	0.80**	-0.67**	-0.08	0.83**	0.65**	0.81**	0.84**	0.08	1
Nitrogen											

Note: * and ** represent correlation at the 0.05 and 0.01 level (2-tailed), respectively.