

## Supplementary Material

### Chemicals and reagents

Sulfamethoxazole (SMX), Trimethoprim (TMP) were from Dr Ehrenstorfer (Augsburg, Germany), with purity >99%. HPLC/MS/MS methanol and acetonitrile were from Merck (Darmstadt, Germany). Formic acid (FA), sodium azide ( $\text{NaN}_3$ ) was purchased from Fisher Scientific (Pittsburgh, PA, USA). Milli-Q water (18.2 M $\Omega$ ) was produced from a Millipore purification system (Millipore, USA). Deionized water was produced from Aquapro. Individual stock solutions of sulfonamide antibiotics were prepared by dissolving 0.05 mg of two compounds in 50mL of methanol and stored in dark at -20°C. Working solutions of 200, 150, 100, 50 and 20  $\mu\text{g/L}$  were prepared by dilution of stock solutions of with Milli-Q water prior to each experimental run. Ammonium chloride ( $\text{NH}_4\text{Cl}$ ), sodium Chloride ( $\text{NaCl}$ ), magnesium chloride hexahydrate ( $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ ), magnesium sulfate heptahydrate ( $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ ), calcium chloride dihydrate ( $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ ), potassium chloride ( $\text{KCl}$ ), sodium bicarbonate ( $\text{NaHCO}_3$ ), sodium bromide ( $\text{NaBr}$ ), calcium nitrate tetrahydrate ( $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ ), blue copperas ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ), green vitriol ( $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ ), heptahydrate ( $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ ), manganese sulfate tetrahydrate ( $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$ ), sodium molybdate dihydrate ( $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$ ), boric acid ( $\text{H}_3\text{BO}_3$ ) and sodium hydroxide ( $\text{NaOH}$ ) were purchased from Tianjin Guangfu technology development CO., LTD. Yeast powder, peptone and agar were purchased from Beijing Aoboxing Biological Technology CO., LTD.

### Artificial composite soil column set-up and operation

These artificial composite soil columns had conducted 60-d experiment of the artificial water solution as influent. Before this experiment, use 0.01 mol/L  $\text{CaCl}_2$  deionized solution to clean artificial composite soil columns for 10 d. The influent was put in 20 L bottles and pumped through these columns at a constant flow rate (0.5 mL/min). The influent was from reclaimed water treatment station in Tsinghua University and added SMX and TMP to adjust the initial concentration about 20-30  $\mu\text{g/L}$ . These artificial composite soil artificial composite soil columns were designed four parts, that is, the supporting layer (15 cm), the sorption layer (25 cm), the biodegradation layer (15 cm) and overflow layer (10 cm) from the bottom up. In the supporting layer, 2-5 cm graded cobblestones were filled and a filter screen for preventing clay ceramics leaking down was added on the upper of the supporting layer. Then the sorption layer was made of

clay ceramsites. Also, there is a filter screen on the upper of the sorption layer.

### The TMP removal

**Table S1** The total nitrogen,  $\text{NH}_4^+$ -N,  $\text{NO}_2^-$ -N and  $\text{NO}_3^-$ -N concentration test result

Index	$\text{NH}_4^+$ -N (mg/L)	$\text{NO}_2^-$ -N (mg/L)	$\text{NO}_3^-$ -N (mg/L)	Total nitrogen (mg/L)
Sample 1	0.44	2.86	0.80	4.25
Sample 2	0.51	3.05	0.90	4.51

### Analytical methods

**Table S2** The gradient elution program

Time (min)	The mobile phase (A)	The mobile phase (B)
0	10%	90%
4	90%	10%
5	90%	10%
5.5	10%	90%
7	10%	90%

A represents Milli-Q water added 0.1% formic acid. B represents acetonitrile.

### Extraction and identification of Strains



**Fig. S1** The colony type in elevation and surface on agar