# Effect of wastewater treatment plant effluent on fates of antibiotic resistance genes in receiving rivers: a large-scale and metagenomics analysis

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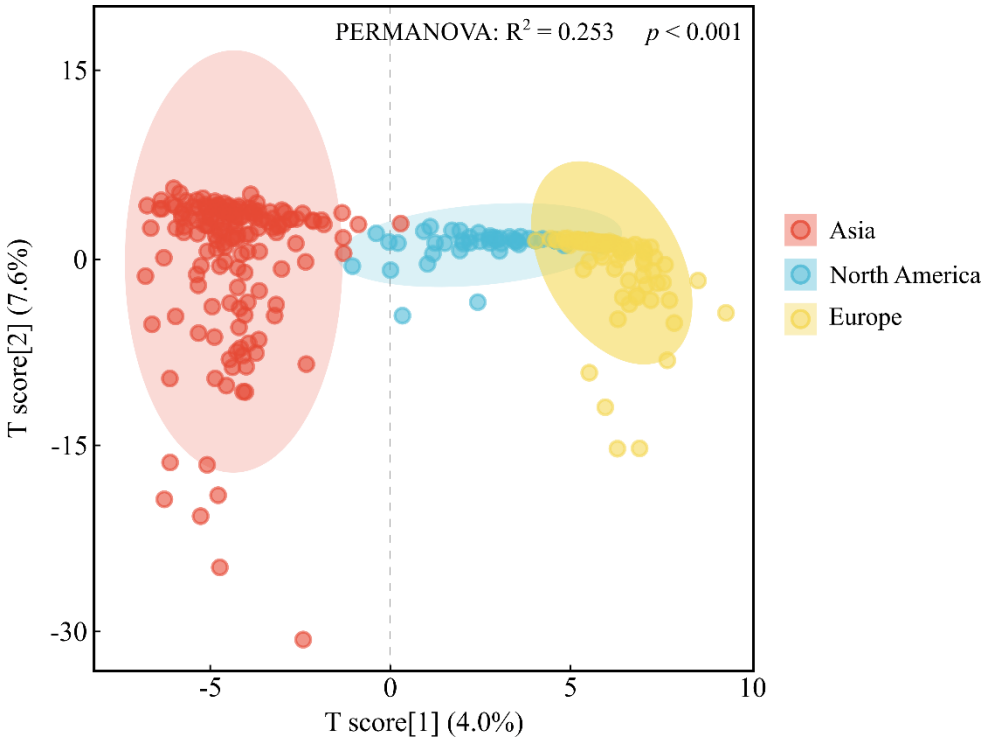


**Fig. S1.** PLS-DA plot of ARGs composition across Asian, North American, and European regions.

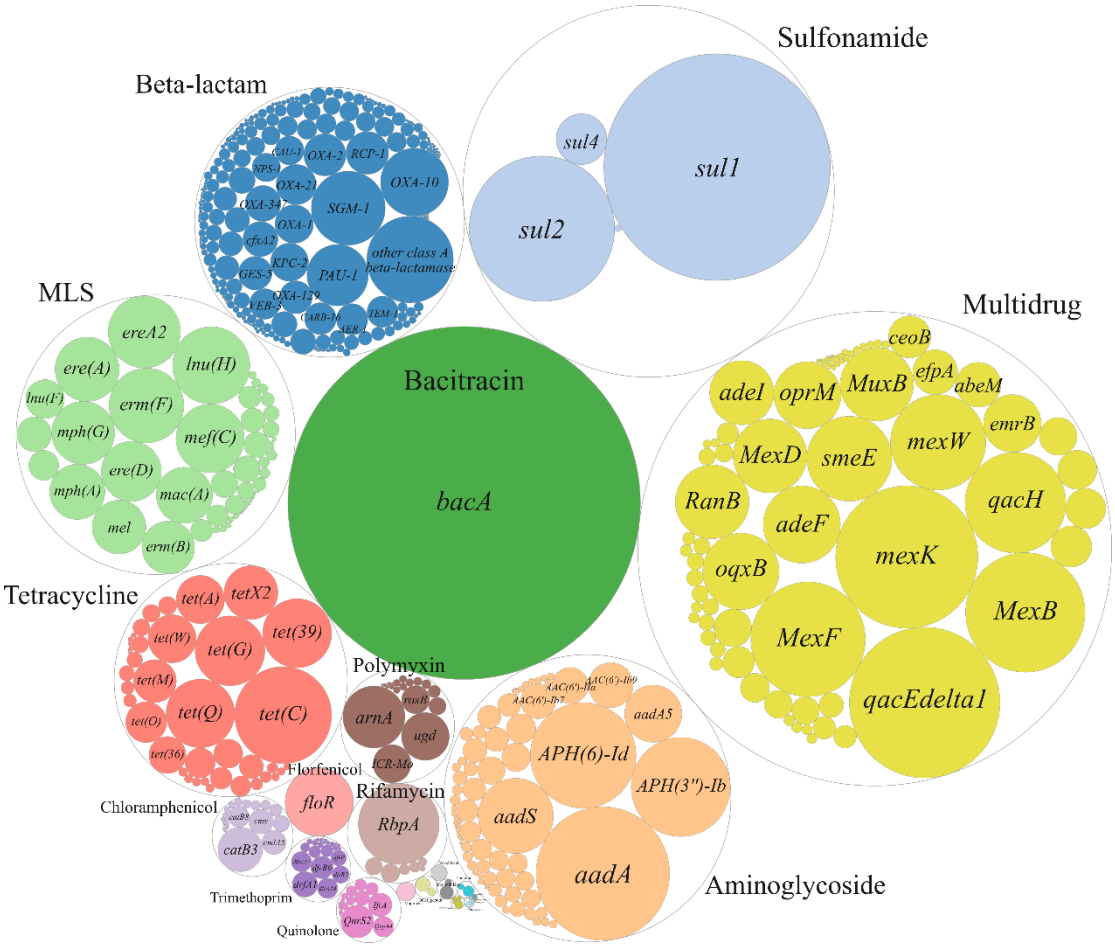


**Fig. S2.** Overall profile of ARGs. Outer and inner circles represent ARG types and subtypes, respectively. Circle size is proportional to the mean abundance of ARGs.

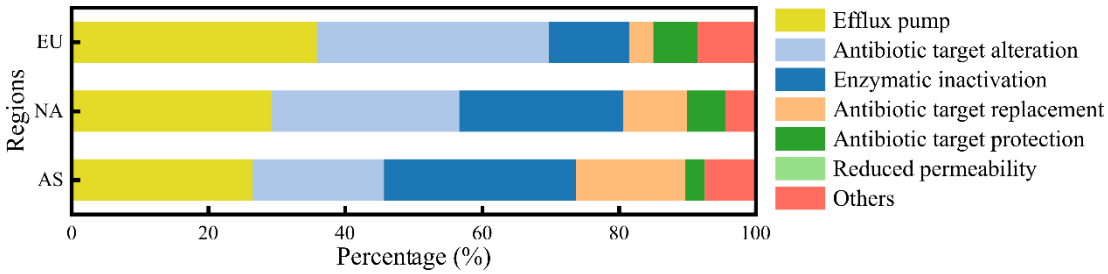


**Fig. S3.** Composition of resistance mechanisms across regions.

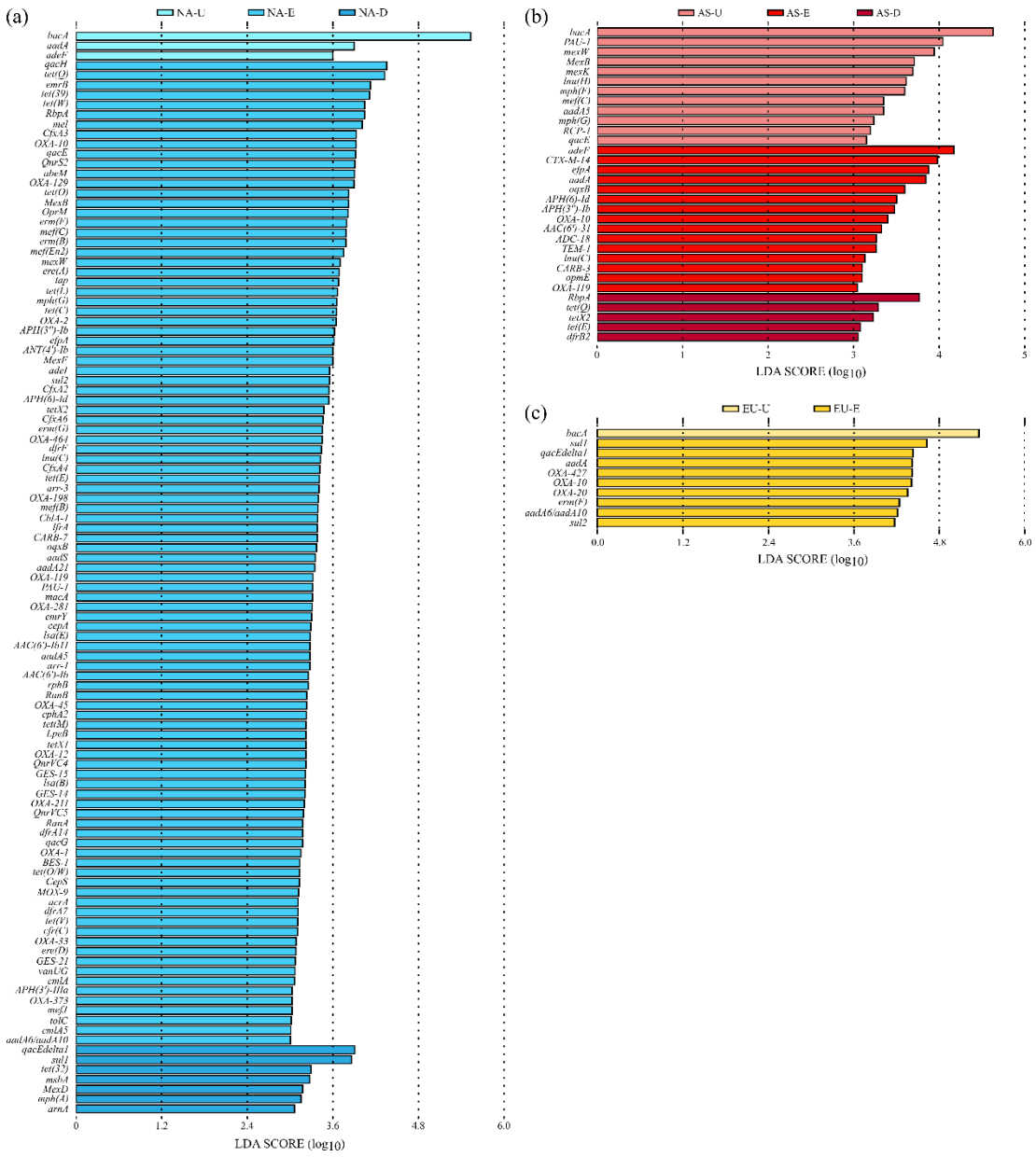


**Fig. S4.** Identification of the significant enriched ARGs across different positions in North American (a), Asian (b), and European (c) regions.

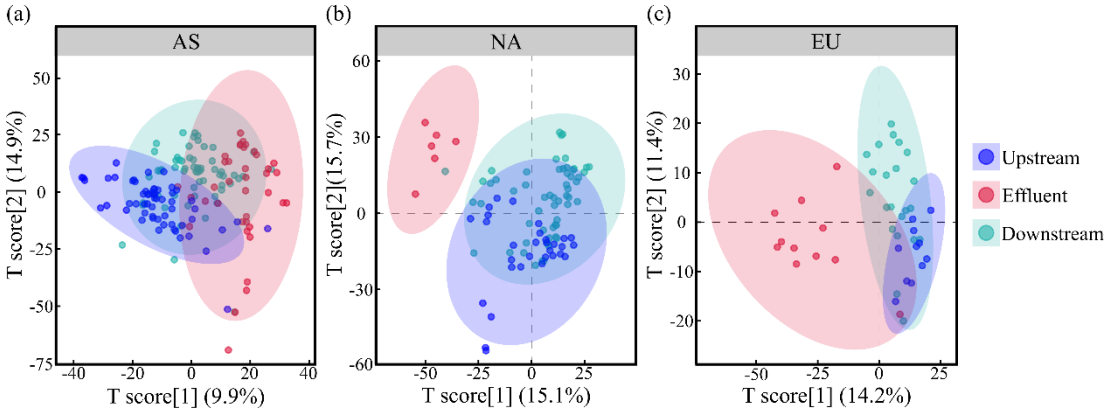


**Fig. S5.** PLS-DA plot of bacterial community across positions in Asian (a), North American (b), and European (c) regions.

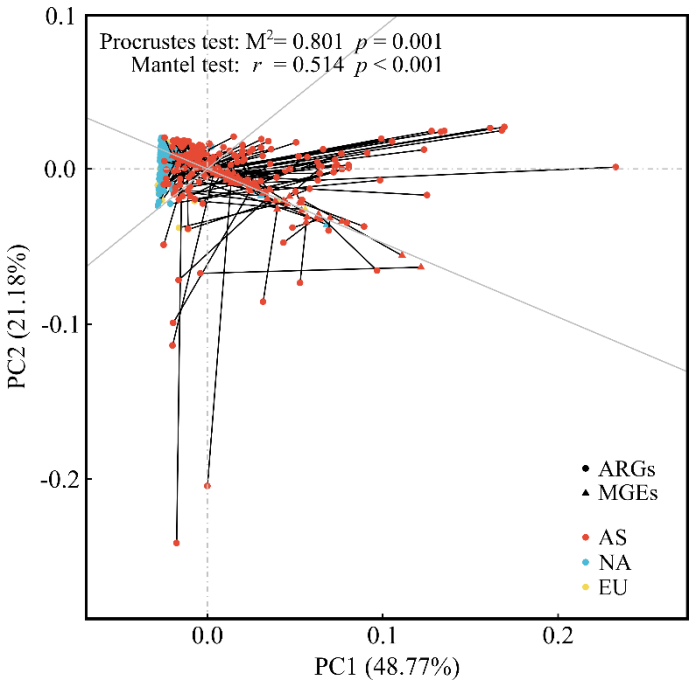


**Fig. S6.** Procrustes analysis and Mantel test between MGEs and ARG profiles.

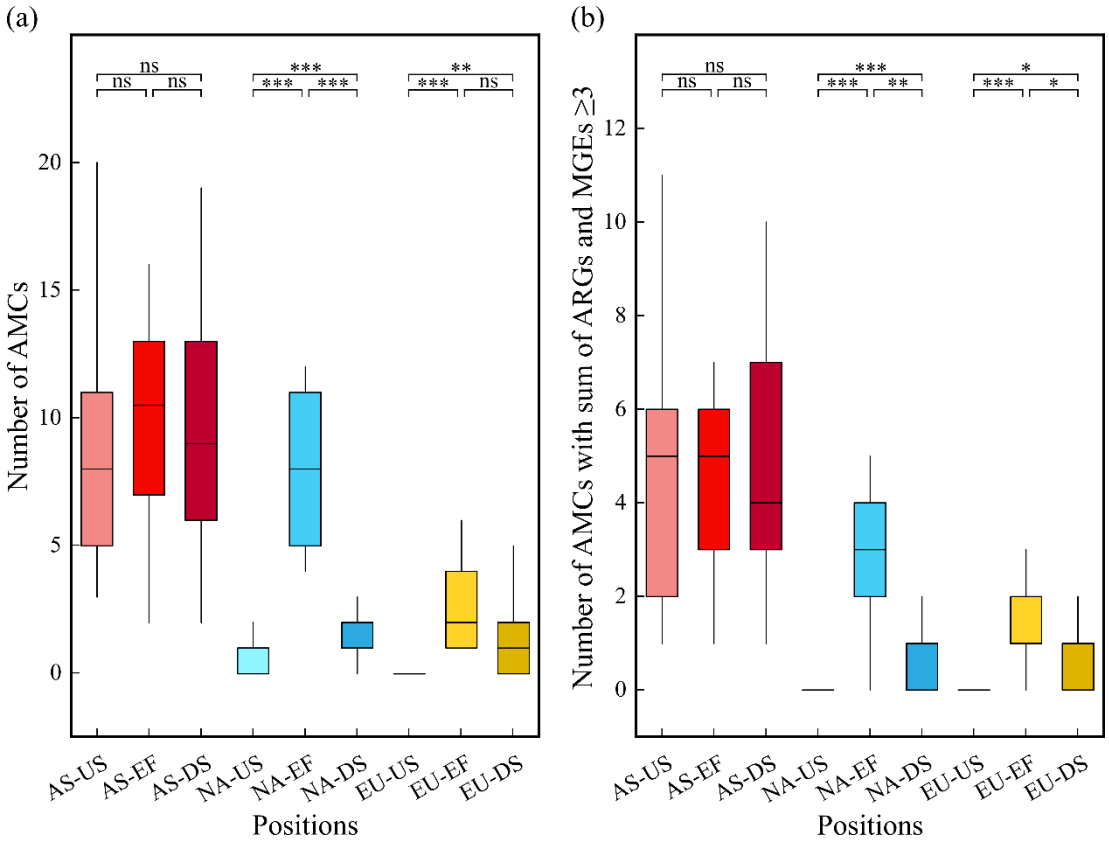


**Fig. S7.** Comparison of characters of AMCs across positions: number of AMCs (a); numbers of AMCs with sum of ARGs and MGEs ≥ 3 (b). (*, **, and *** mean significant differences at $p <$ 0.05, 0.01, and 0.001, respectively, Wilcoxon test)

**Table S1**

Sample information

| Database | Accession | Byte (GB) | Continent | Country | Position | Media | Latitude | Longitude | Year | Month | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GSA [a] | CRR070843 | 3.34 | Asia | China | Downstream | Sediment | 40.3N | 116.8E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070844 | 4.02 | Asia | China | Downstream | Sediment | 40.3N | 116.8E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070845 | 3.45 | Asia | China | Downstream | Sediment | 40.2N | 116.7E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070846 | 3.62 | Asia | China | Downstream | Sediment | 40.1N | 116.7E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070847 | 3.78 | Asia | China | Downstream | Sediment | 40.1N | 116.7E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070848 | 3.49 | Asia | China | Downstream | Sediment | 40.1N | 116.7E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070849 | 3.7 | Asia | China | Downstream | Sediment | 40.0N | 116.8E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070850 | 4.14 | Asia | China | Downstream | Sediment | 39.9N | 116.8E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070851 | 3.77 | Asia | China | Upstream | Sediment | 39.9N | 116.9E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070852 | 3.57 | Asia | China | Upstream | Sediment | 39.8N | 116.9E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070853 | 3.28 | Asia | China | Upstream | Sediment | 39.8N | 117.0E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070868 | 4.26 | Asia | China | Effluent | Water | 40.4N | 116.8E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070869 | 3.76 | Asia | China | Effluent | Water | 40.3N | 116.6E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070870 | 3.6 | Asia | China | Effluent | Water | 40.0N | 116.7E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070871 | 3.96 | Asia | China | Effluent | Water | 40.1N | 116.6E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070872 | 3.58 | Asia | China | Effluent | Water | 39.9N | 116.8E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070873 | 4.34 | Asia | China | Effluent | Water | 39.9N | 116.8E | 2018 | 11 | (Chen et al., 2019) |
| GSA | CRR070874 | 3.68 | Asia | China | Effluent | Water | 40.0N | 117.0E | 2018 | 11 | (Chen et al., 2019) |
| DDBJ [b] | DRR424543 | 6.5 | Asia | Japan | Downstream | Water | - | - | 2021 | 3 | (Sabar et al., 2023) |
| DDBJ | DRR424545 | 6.3 | Asia | Japan | Downstream | Water | - | - | 2021 | 3 | (Sabar et al., 2023) |
| DDBJ | DRR424546 | 6.9 | Asia | Japan | Downstream | Water | - | - | 2021 | 3 | (Sabar et al., 2023) |
| DDBJ | DRR424549 | 6.8 | Asia | Japan | Effluent | Water | - | - | 2020 | 10 | (Sabar et al., 2023) |
| DDBJ | DRR424551 | 6.2 | Asia | Japan | Effluent | Water | - | - | 2020 | 10 | (Sabar et al., 2023) |
| NCBI [c] | SRR10036018 | 24.74 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036019 | 18.64 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036020 | 25.1 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |

| Database | Accession | Byte (GB) | Continent | Country | Position | Media | Latitude | Longitude | Year | Month | Reference |
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| NCBI | SRR10036021 | 19.3 | North America | America | Downstream | Water | 39.1N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036022 | 12.74 | North America | America | Downstream | Water | 39.1N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036023 | 21.78 | North America | America | Downstream | Water | 39.1N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036024 | 18.1 | North America | America | Downstream | Water | 39.1N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036025 | 19.62 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036026 | 18.92 | North America | America | Downstream | Water | 39.1N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036027 | 19.98 | North America | America | Downstream | Water | 39.1N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036028 | 17.22 | North America | America | Downstream | Water | 39.1N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036029 | 17.42 | North America | America | Downstream | Water | 39.1N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036030 | 26.34 | North America | America | Downstream | Water | 39.1N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036031 | 15.2 | North America | America | Downstream | Water | 39.0N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036032 | 21.06 | North America | America | Downstream | Water | 39.0N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036033 | 14.06 | North America | America | Downstream | Water | 39.0N | 94.5W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036034 | 19.9 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036035 | 11.08 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036036 | 23.44 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036037 | 22.54 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036038 | 17.6 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036039 | 17.22 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036040 | 17.12 | North America | America | Upstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036041 | 13.16 | North America | America | Upstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036042 | 18.18 | North America | America | Upstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036043 | 14.66 | North America | America | Upstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036044 | 15.66 | North America | America | Upstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036045 | 16.36 | North America | America | Upstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036046 | 16.14 | North America | America | Downstream | Water | 39.0N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036047 | 12.9 | North America | America | Upstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036048 | 19.46 | North America | America | Upstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |

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| NCBI | SRR10036049 | 17.22 | North America | America | Upstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036050 | 14.24 | North America | America | Upstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036051 | 19.52 | North America | America | Upstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036052 | 13.44 | North America | America | Upstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036053 | 11.64 | North America | America | Upstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036054 | 19.16 | North America | America | Upstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036055 | 17.88 | North America | America | Upstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036056 | 18.02 | North America | America | Downstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036057 | 17.1 | North America | America | Downstream | Water | 39.0N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036058 | 15.04 | North America | America | Downstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036059 | 19.56 | North America | America | Downstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036060 | 18.94 | North America | America | Downstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036061 | 20.08 | North America | America | Downstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036062 | 23.06 | North America | America | Downstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036063 | 16 | North America | America | Downstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036064 | 22 | North America | America | Downstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036065 | 21.7 | North America | America | Downstream | Water | 38.9N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036066 | 17.46 | North America | America | Upstream | Water | 38.9N | 94.8W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036067 | 18.96 | North America | America | Upstream | Water | 38.9N | 94.8W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036068 | 20.58 | North America | America | Downstream | Water | 39.0N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036069 | 17.24 | North America | America | Upstream | Water | 38.9N | 94.8W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036070 | 11.2 | North America | America | Downstream | Water | 38.8N | 94.8W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036071 | 21.68 | North America | America | Downstream | Water | 38.8N | 94.8W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036072 | 20.12 | North America | America | Downstream | Water | 38.8N | 94.8W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036073 | 23.36 | North America | America | Upstream | Water | 38.8N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036074 | 16.8 | North America | America | Upstream | Water | 38.8N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036075 | 11.72 | North America | America | Upstream | Water | 38.8N | 94.7W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036076 | 15.86 | North America | America | Upstream | Water | 38.8N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |

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| NCBI | SRR10036077 | 13.68 | North America | America | Upstream | Water | 38.8N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036078 | 21.54 | North America | America | Upstream | Water | 38.8N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036079 | 18.32 | North America | America | Downstream | Water | 39.0N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036080 | 15.12 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036081 | 19.28 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036082 | 22.36 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036083 | 21.46 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036084 | 16.78 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036085 | 11.26 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036086 | 19.2 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036087 | 11.36 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036088 | 15.08 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036089 | 18.76 | North America | America | Downstream | Water | 38.9N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036090 | 21.4 | North America | America | Downstream | Water | 39.0N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10036091 | 26.58 | North America | America | Downstream | Water | 39.0N | 94.6W | 2017 | 8 | (Thornton et al., 2020) |
| NCBI | SRR10132616 | 4.22 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132617 | 4.32 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132618 | 4.34 | Asia | China | Upstream | Water | 40.0N | 116.3E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132619 | 4.46 | Asia | China | Effluent | Water | 40.0N | 116.4E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132620 | 4.6 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132621 | 4.26 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132623 | 4.24 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132624 | 4.52 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132625 | 4.14 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132626 | 4.28 | Asia | China | Upstream | Water | 40.0N | 116.3E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132627 | 4.32 | Asia | China | Effluent | Water | 40.0N | 116.4E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132628 | 4.18 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132629 | 4.28 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2018 | 12 | (Wang et al., 2020) |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR10132630 | 4.38 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132631 | 4.18 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132632 | 4.48 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132635 | 4.36 | Asia | China | Upstream | Water | 40.0N | 116.3E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132636 | 4.44 | Asia | China | Effluent | Water | 40.0N | 116.4E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132637 | 4.34 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132638 | 4.38 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132639 | 4.32 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132640 | 5.04 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132641 | 4.58 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132642 | 4.96 | Asia | China | Upstream | Water | 40.0N | 116.3E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132643 | 4.56 | Asia | China | Effluent | Water | 40.0N | 116.4E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132644 | 4.9 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132646 | 4.6 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132647 | 4.36 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132648 | 4.66 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132649 | 4.88 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132650 | 4.9 | Asia | China | Effluent | Water | 40.0N | 116.4E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132651 | 4.06 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132652 | 5 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132653 | 4.68 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2015 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132654 | 5.08 | Asia | China | Upstream | Water | 40.0N | 116.4E | 2015 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132655 | 4.48 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2015 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132657 | 4.96 | Asia | China | Downstream | Water | 40.0N | 116.4E | 2015 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132658 | 4.32 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132659 | 3.84 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132660 | 4.32 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132661 | 4.3 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2019 | 3 | (Wang et al., 2020) |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR10132662 | 4.04 | Asia | China | Downstream | Water | 39.9N | 116.6E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132663 | 4.44 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132664 | 4.42 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2019 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132665 | 4.38 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132666 | 4.28 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132668 | 4.34 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132669 | 4.28 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132670 | 4.32 | Asia | China | Downstream | Water | 39.9N | 116.6E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132671 | 3.36 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132672 | 4.24 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132673 | 4.36 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132674 | 4.12 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132675 | 4.52 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132676 | 4.22 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132677 | 4.34 | Asia | China | Downstream | Water | 39.9N | 116.6E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132679 | 4.48 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132680 | 4.34 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132681 | 4.32 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132682 | 4.62 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132683 | 4.9 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132684 | 4.62 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132685 | 4.48 | Asia | China | Downstream | Water | 39.9N | 116.6E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132686 | 4.92 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132687 | 4.9 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 9 | (Wang et al., 2020) |
| NCBI | SRR10132688 | 4.28 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132690 | 4.3 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132691 | 4.38 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132692 | 4.72 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2016 | 3 | (Wang et al., 2020) |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR10132693 | 4.64 | Asia | China | Downstream | Water | 39.9N | 116.6E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132694 | 4.28 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132695 | 4.86 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 3 | (Wang et al., 2020) |
| NCBI | SRR10132696 | 4.94 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2015 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132697 | 4.6 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2015 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132698 | 4.94 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2015 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132699 | 4.82 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2015 | 12 | (Wang et al., 2020) |
| NCBI | SRR10132701 | 4.92 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2015 | 12 | (Wang et al., 2020) |
| NCBI | SRR10761721 | 16.2 | Asia | South Korea | Downstream | Water | 37.6N | 127.1E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR10761722 | 17.84 | Asia | South Korea | Upstream | Water | 37.6N | 127.1E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR10761723 | 19.66 | Asia | South Korea | Effluent | Water | 37.6N | 127.1E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR11536955 | 17.44 | Asia | South Korea | Downstream | Water | 35.1N | 126.8E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR11536956 | 16.56 | Asia | South Korea | Upstream | Water | 35.1N | 126.8E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR11536957 | 16.36 | Asia | South Korea | Effluent | Water | 35.1N | 126.8E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR11567519 | 8.5 | North America | Puerto Rico | Downstream | Sediment | 18.0N | 66.0W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567520 | 7.44 | North America | Puerto Rico | Downstream | Water | 18.0N | 66.0W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567521 | 9.06 | North America | Puerto Rico | Upstream | Sediment | 18.0N | 66.0W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567522 | 5.28 | North America | Puerto Rico | Upstream | Water | 18.0N | 66.0W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567525 | 8.1 | North America | Puerto Rico | Upstream | Water | 18.3N | 66.1W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567526 | 8.34 | North America | Puerto Rico | Upstream | Sediment | 18.3N | 66.1W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567530 | 9.74 | North America | Puerto Rico | Downstream | Sediment | 18.3N | 66.1W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567537 | 7.54 | North America | Puerto Rico | Upstream | Sediment | 18.3N | 66.0W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567538 | 5.24 | North America | Puerto Rico | Upstream | Water | 18.3N | 66.0W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567539 | 8.4 | North America | Puerto Rico | Downstream | Sediment | 18.3N | 66.0W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567540 | 6.42 | North America | Puerto Rico | Downstream | Water | 18.3N | 66.0W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR11567542 | 7.06 | North America | Puerto Rico | Downstream | Water | 18.3N | 66.1W | 2018 | 2 | (Davis et al., 2020) |
| NCBI | SRR12404947 | 13.24 | Asia | South Korea | Effluent | Water | 35.9N | 128.9E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404948 | 13.88 | Asia | South Korea | Downstream | Water | 35.9N | 128.9E | 2025 | 5 | (Raza et al., 2021) |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR12404949 | 16.96 | Asia | South Korea | Upstream | Water | 35.9N | 128.9E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404950 | 14.04 | Asia | South Korea | Effluent | Water | 35.9N | 128.9E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404951 | 18.1 | Asia | South Korea | Downstream | Water | 35.0N | 127.0E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404952 | 18.12 | Asia | South Korea | Upstream | Water | 35.1N | 127.0E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404953 | 18.94 | Asia | South Korea | Effluent | Water | 35.0N | 127.0E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404954 | 12.94 | Asia | South Korea | Downstream | Water | 34.8N | 126.4E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404955 | 11.46 | Asia | South Korea | Downstream | Water | 36.1N | 128.4E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404956 | 11.74 | Asia | South Korea | Upstream | Water | 36.1N | 128.4E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404957 | 11.88 | Asia | South Korea | Effluent | Water | 36.1N | 128.4E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404958 | 19.76 | Asia | South Korea | Downstream | Water | 35.3N | 126.8E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404959 | 15.4 | Asia | South Korea | Upstream | Water | 35.3N | 126.8E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404960 | 18.36 | Asia | South Korea | Effluent | Water | 35.3N | 126.8E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404961 | 14.5 | Asia | South Korea | Downstream | Water | 35.9N | 128.9E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404962 | 13.24 | Asia | South Korea | Upstream | Water | 35.9N | 128.9E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404963 | 14.44 | Asia | South Korea | Upstream | Water | 34.8N | 126.4E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR12404964 | 17.82 | Asia | South Korea | Effluent | Water | 34.8N | 126.4E | 2025 | 5 | (Raza et al., 2021) |
| NCBI | SRR13287409 | 5.92 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2025 | 5 | (Tian et al., 2024) |
| NCBI | SRR13287410 | 5.3 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2025 | 5 | (Tian et al., 2024) |
| NCBI | SRR13287411 | 5.34 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2025 | 5 | (Tian et al., 2024) |
| NCBI | SRR13287412 | 6.14 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2025 | 5 | (Tian et al., 2024) |
| NCBI | SRR13287413 | 6.54 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2025 | 5 | (Tian et al., 2024) |
| NCBI | SRR13287414 | 6.16 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2025 | 5 | (Tian et al., 2024) |
| NCBI | SRR13287415 | 6.72 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287416 | 6.2 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287417 | 5.1 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287418 | 6.86 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2016 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287419 | 7.3 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2016 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287420 | 5.74 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2016 | 3 | (Tian et al., 2024) |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR13287421 | 5.2 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2016 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287422 | 6.22 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287423 | 6 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287424 | 4.78 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287425 | 7.24 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287426 | 5.1 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287427 | 5.48 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287428 | 6.58 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287429 | 4.9 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287430 | 4.88 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287431 | 6.62 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287432 | 7.74 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287433 | 5.18 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287434 | 7.58 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287435 | 5.52 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287436 | 4.24 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287437 | 4.36 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287438 | 5.7 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287439 | 7.04 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287440 | 5.18 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287441 | 4.46 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287442 | 5.32 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287443 | 6.06 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287444 | 7.92 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287445 | 5.96 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287446 | 5.1 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287447 | 7.56 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287448 | 5.12 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2016 | 3 | (Tian et al., 2024) |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR13287449 | 3.98 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287450 | 8.7 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287451 | 4.72 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287452 | 7.14 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2018 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287453 | 6.1 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2016 | 6 | (Tian et al., 2024) |
| NCBI | SRR13287454 | 5.58 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287455 | 5.18 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287456 | 6.84 | Asia | China | Downstream | Water | 39.9N | 116.5E | 2016 | 3 | (Tian et al., 2024) |
| NCBI | SRR13287457 | 7.06 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287458 | 4.54 | Asia | China | Upstream | Water | 39.9N | 116.5E | 2018 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287459 | 4.86 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287460 | 8.24 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287461 | 5.96 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2018 | 9 | (Tian et al., 2024) |
| NCBI | SRR13287462 | 4.94 | Asia | China | Effluent | Water | 39.9N | 116.5E | 2016 | 3 | (Tian et al., 2024) |
| NCBI | SRR14120361 | 6.14 | North America | America | Upstream | Water | 40.4N | 82.5W | 2020 | 4 | (Murphy et al., 2021) |
| NCBI | SRR14120362 | 4.78 | North America | America | Downstream | Water | 40.4N | 82.4W | 2019 | 12 | (Murphy et al., 2021) |
| NCBI | SRR14120363 | 5.74 | North America | America | Effluent | Water | 40.4N | 82.5W | 2019 | 12 | (Murphy et al., 2021) |
| NCBI | SRR14120364 | 5.9 | North America | America | Upstream | Water | 40.4N | 82.5W | 2019 | 12 | (Murphy et al., 2021) |
| NCBI | SRR14120365 | 5.58 | North America | America | Downstream | Water | 40.4N | 82.4W | 2019 | 11 | (Murphy et al., 2021) |
| NCBI | SRR14120366 | 5.22 | North America | America | Effluent | Water | 40.4N | 82.5W | 2019 | 11 | (Murphy et al., 2021) |
| NCBI | SRR14120367 | 5.36 | North America | America | Upstream | Water | 40.4N | 82.5W | 2019 | 11 | (Murphy et al., 2021) |
| NCBI | SRR14120368 | 5.54 | North America | America | Downstream | Water | 40.4N | 82.4W | 2019 | 10 | (Murphy et al., 2021) |
| NCBI | SRR14120369 | 5.84 | North America | America | Downstream | Water | 40.4N | 82.4W | 2020 | 6 | (Murphy et al., 2021) |
| NCBI | SRR14120370 | 7.44 | North America | America | Effluent | Water | 40.4N | 82.5W | 2020 | 6 | (Murphy et al., 2021) |
| NCBI | SRR14120371 | 6.16 | North America | America | Upstream | Water | 40.4N | 82.5W | 2020 | 6 | (Murphy et al., 2021) |
| NCBI | SRR14120372 | 6.72 | North America | America | Downstream | Water | 40.4N | 82.4W | 2020 | 5 | (Murphy et al., 2021) |
| NCBI | SRR14120373 | 6.76 | North America | America | Effluent | Water | 40.4N | 82.5W | 2020 | 5 | (Murphy et al., 2021) |
| NCBI | SRR14120374 | 8.48 | North America | America | Upstream | Water | 40.4N | 82.5W | 2020 | 5 | (Murphy et al., 2021) |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR14120375 | 6.5 | North America | America | Downstream | Water | 40.4N | 82.4W | 2020 | 4 | (Murphy et al., 2021) |
| NCBI | SRR14120376 | 6.68 | North America | America | Effluent | Water | 40.4N | 82.5W | 2020 | 4 | (Murphy et al., 2021) |
| NCBI | SRR14120377 | 4.96 | North America | America | Effluent | Water | 40.4N | 82.5W | 2019 | 10 | (Murphy et al., 2021) |
| NCBI | SRR14120378 | 5.22 | North America | America | Upstream | Water | 40.4N | 82.5W | 2019 | 10 | (Murphy et al., 2021) |
| NCBI | SRR20074297 | 6.36 | Asia | China | Downstream | Water | 30.3N | 120.2E | 2020 | 5 | (Zhang et al., 2022) |
| NCBI | SRR20074299 | 6.16 | Asia | China | Upstream | Water | 30.3N | 120.2E | 2020 | 5 | (Zhang et al., 2022) |
| NCBI | SRR20074300 | 6.3 | Asia | China | Effluent | Water | 30.3N | 120.2E | 2020 | 5 | (Zhang et al., 2022) |
| NCBI | SRR25018254 | 8.32 | Europe | Switzerland | Upstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018255 | 9.34 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018256 | 9.3 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018257 | 8.48 | Europe | Switzerland | Upstream | Sediment | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018258 | 9.58 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018259 | 8.6 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018261 | 8 | Europe | Switzerland | Upstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018262 | 6.3 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018263 | 8.48 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018264 | 6.64 | Europe | Switzerland | Upstream | Sediment | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018265 | 7.88 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018266 | 7.66 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018267 | 6.98 | Europe | Switzerland | Upstream | Sediment | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018268 | 6.78 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018269 | 6.8 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 7 | (Lee et al., 2023) |
| NCBI | SRR25018270 | 7.76 | Europe | Switzerland | Upstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018272 | 6.76 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018273 | 6.56 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018274 | 7.4 | Europe | Switzerland | Upstream | Sediment | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018275 | 7.1 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018276 | 6.8 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |

| Database | Accession | Byte (GB) | Continent | Country | Position | Media | Latitude | Longitude | Year | Month | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR25018277 | 6.88 | Europe | Switzerland | Upstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018278 | 6.78 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018279 | 7.16 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018280 | 6.78 | Europe | Switzerland | Upstream | Sediment | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018281 | 7.3 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 7 | (Lee et al., 2023) |
| NCBI | SRR25018283 | 10.48 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018284 | 6.32 | Europe | Switzerland | Upstream | Sediment | 46.8N | 8.2E | 2017 | 7 | (Lee et al., 2023) |
| NCBI | SRR25018285 | 7 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018286 | 7.02 | Europe | Switzerland | Downstream | Sediment | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018317 | 6.06 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018318 | 6.7 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018319 | 6.12 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018320 | 6.62 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018321 | 6.5 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 7 | (Lee et al., 2023) |
| NCBI | SRR25018322 | 9.1 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018323 | 7.54 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018324 | 8.52 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018325 | 7.16 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018326 | 6.9 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018327 | 7.84 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018328 | 6.56 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018329 | 7.8 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018330 | 7.46 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018331 | 7.5 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018332 | 7.9 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 7 | (Lee et al., 2023) |
| NCBI | SRR25018333 | 8.02 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018334 | 8.1 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018335 | 7.34 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |

| Database | Accession | Byte (GB) | Continent | Country | Position | Media | Latitude | Longitude | Year | Month | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR25018336 | 6.7 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018337 | 7.2 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 7 | (Lee et al., 2023) |
| NCBI | SRR25018338 | 7.8 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018339 | 8.52 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018340 | 7.48 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018341 | 6.8 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018342 | 6.8 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018343 | 6.7 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018344 | 6.86 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018345 | 8.14 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 10 | (Lee et al., 2023) |
| NCBI | SRR25018346 | 7.24 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018347 | 6.9 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 7 | (Lee et al., 2023) |
| NCBI | SRR25018348 | 6.72 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018349 | 6.98 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018350 | 6.88 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018351 | 6.92 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018352 | 7.82 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018353 | 6.66 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018354 | 7.42 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018355 | 7.06 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018356 | 6.3 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018357 | 7.3 | Europe | Switzerland | Upstream | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018358 | 5.98 | Europe | Switzerland | Effluent | Water | 46.8N | 8.2E | 2017 | 9 | (Lee et al., 2023) |
| NCBI | SRR25018359 | 7.12 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR25018360 | 6.38 | Europe | Switzerland | Downstream | Water | 46.8N | 8.2E | 2017 | 8 | (Lee et al., 2023) |
| NCBI | SRR24037931 | 10.58 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037930 | 13.26 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037929 | 10.96 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |

| Database | Accession | Byte (GB) | Continent | Country | Position | Media | Latitude | Longitude | Year | Month | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR24037906 | 10.92 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037933 | 12.1 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037932 | 11.48 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037935 | 11.34 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037934 | 10.74 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037923 | 10.8 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037909 | 14.3 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037908 | 11.92 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037907 | 11.38 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 7 | (Wang et al., 2024) |
| NCBI | SRR24037928 | 9.14 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR24037927 | 9.44 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR24037926 | 8.92 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR24037921 | 10.1 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR24037920 | 10.46 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR24037919 | 9.28 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR35804659 | 9.86 | Asia | China | Downstream | Sediment | 34.7N | 109.3E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR35804658 | 10.06 | Asia | China | Downstream | Sediment | 34.7N | 109.3E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR35804657 | 10.08 | Asia | China | Downstream | Sediment | 34.7N | 109.3E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR35804656 | 9.04 | Asia | China | Downstream | Sediment | 34.7N | 109.3E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR35804655 | 9.36 | Asia | China | Downstream | Sediment | 34.7N | 109.3E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR35804654 | 10.42 | Asia | China | Downstream | Sediment | 34.7N | 109.3E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR35804653 | 8.82 | Asia | China | Downstream | Sediment | 34.7N | 109.3E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR35804652 | 9.42 | Asia | China | Downstream | Sediment | 34.7N | 109.3E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR24037915 | 12.72 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR24037914 | 11.38 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR24037913 | 9.5 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR24037918 | 10.72 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |
| NCBI | SRR24037917 | 12.66 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |

| Database | Accession | Byte (GB) | Continent | Country | Position | Media | Latitude | Longitude | Year | Month | Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NCBI | SRR24037916 | 12.68 | Asia | China | Downstream | Sediment | 34.4N | 109.2E | 2022 | 2 | (Wang et al., 2024) |

[a] Genome Sequence Archive

[b] DNA Data Bank of Japan

[c] National Center for Biotechnology Information

**Table S2**

Water properties

| Accession | WT (℃) | pH | DO (mg/L) | EC (μS/cm) | TDS (mg/L) | ORP (mV) | TSS (mg/L) | $NO_3^-$ (mg/L) | $PO_4^{3-}$ (mg/L) | $NH_4^+$ (mg/L) | TN (mg/L) | TP (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SRR10036018 | 29.8 | 8.22 | 4.77 | 681 | 442 | 139.7 | - | - | - | - | - | - |
| SRR10036019 | - | 8.92 | - | 667 | 435.5 | 52.2 | - | - | - | - | - | - |
| SRR10036020 | - | 8.92 | - | 667 | 435.5 | 52.2 | - | - | - | - | - | - |
| SRR10036021 | 28.2 | 8.35 | 4.23 | 661 | 429 | 130.1 | - | - | - | - | - | - |
| SRR10036022 | 28.2 | 8.35 | 4.23 | 661 | 429 | 130.1 | - | - | - | - | - | - |
| SRR10036023 | 28.2 | 8.35 | 4.23 | 661 | 429 | 130.1 | - | - | - | - | - | - |
| SRR10036024 | 25.9 | 8.45 | 4.83 | 633 | 409.5 | 131.3 | - | - | - | - | - | - |
| SRR10036025 | - | 8.62 | - | 690 | 448.5 | 67.9 | - | - | - | - | - | - |
| SRR10036026 | 25.9 | 8.45 | 4.83 | 633 | 409.5 | 131.3 | - | - | - | - | - | - |
| SRR10036027 | 25.9 | 8.45 | 4.83 | 633 | 409.5 | 131.3 | - | - | - | - | - | - |
| SRR10036028 | 29.2 | 8.42 | 5.30 | 634 | 409.5 | 108.4 | - | - | - | - | - | - |
| SRR10036029 | 29.2 | 8.42 | 5.30 | 634 | 409.5 | 108.4 | - | - | - | - | - | - |
| SRR10036030 | 29.2 | 8.42 | 5.30 | 634 | 409.5 | 108.4 | - | - | - | - | - | - |
| SRR10036031 | 33.4 | 8.18 | 4.22 | 505 | 331.5 | 124.3 | - | - | - | - | - | - |
| SRR10036032 | 33.4 | 8.18 | 4.22 | 505 | 331.5 | 124.3 | - | - | - | - | - | - |
| SRR10036033 | 33.4 | 8.18 | 4.22 | 505 | 331.5 | 124.3 | - | - | - | - | - | - |
| SRR10036034 | 29.8 | 8.22 | 4.77 | 681 | 442 | 139.7 | - | - | - | - | - | - |
| SRR10036035 | 29.8 | 8.22 | 4.77 | 681 | 442 | 139.7 | - | - | - | - | - | - |
| SRR10036036 | - | 8.62 | - | 690 | 448.5 | 67.9 | - | - | - | - | - | - |
| SRR10036037 | 27.7 | 8.27 | 5.28 | 395.5 | 256.1 | 150.4 | - | - | - | - | - | - |
| SRR10036038 | 27.7 | 8.27 | 5.28 | 395.5 | 256.1 | 150.4 | - | - | - | - | - | - |
| SRR10036039 | 27.7 | 8.27 | 5.28 | 395.5 | 256.1 | 150.4 | - | - | - | - | - | - |
| SRR10036040 | 25 | 8.36 | 5.12 | 653 | 422.5 | 154.5 | - | - | - | - | - | - |
| SRR10036041 | 25 | 8.36 | 5.12 | 653 | 422.5 | 154.5 | - | - | - | - | - | - |

| Accession | WT (℃) | pH | DO (mg/L) | EC (μS/cm) | TDS (mg/L) | ORP (mV) | TSS (mg/L) | $NO_3^-$ (mg/L) | $PO_4^{3-}$ (mg/L) | $NH_4^+$ (mg/L) | TN (mg/L) | TP (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SRR10036042 | 25 | 8.36 | 5.12 | 653 | 422.5 | 154.5 | - | - | - | - | - | - |
| SRR10036043 | 24.8 | 8.44 | 5.71 | 565 | 364 | 150 | - | - | - | - | - | - |
| SRR10036044 | 24.8 | 8.44 | 5.71 | 565 | 364 | 150 | - | - | - | - | - | - |
| SRR10036045 | 24.8 | 8.44 | 5.71 | 565 | 364 | 150 | - | - | - | - | - | - |
| SRR10036046 | - | 8.57 | - | 869 | 565.5 | 124.3 | - | - | - | - | - | - |
| SRR10036047 | 23.3 | 8.54 | 4.88 | 661 | 429 | 136.4 | - | - | - | - | - | - |
| SRR10036048 | 23.3 | 8.54 | 4.88 | 661 | 429 | 136.4 | - | - | - | - | - | - |
| SRR10036049 | 23.3 | 8.54 | 4.88 | 661 | 429 | 136.4 | - | - | - | - | - | - |
| SRR10036050 | 24.1 | 8.43 | 5.40 | 531 | 344.5 | 113.7 | - | - | - | - | - | - |
| SRR10036051 | 24.1 | 8.43 | 5.40 | 531 | 344.5 | 113.7 | - | - | - | - | - | - |
| SRR10036052 | 24.1 | 8.43 | 5.40 | 531 | 344.5 | 113.7 | - | - | - | - | - | - |
| SRR10036053 | 25.9 | 8.34 | 5.54 | 439.6 | 286 | 97.7 | - | - | - | - | - | - |
| SRR10036054 | 25.9 | 8.34 | 5.54 | 439.6 | 286 | 97.7 | - | - | - | - | - | - |
| SRR10036055 | 25.9 | 8.34 | 5.54 | 439.6 | 286 | 97.7 | - | - | - | - | - | - |
| SRR10036056 | 27.7 | 8.34 | 5.48 | 698 | 455 | 95.2 | - | - | - | - | - | - |
| SRR10036057 | - | 8.57 | - | 869 | 565.5 | 124.3 | - | - | - | - | - | - |
| SRR10036058 | 27.7 | 8.34 | 5.48 | 698 | 455 | 95.2 | - | - | - | - | - | - |
| SRR10036059 | 27.7 | 8.34 | 5.48 | 698 | 455 | 95.2 | - | - | - | - | - | - |
| SRR10036060 | 30.7 | 8.32 | 4.88 | 436.6 | 280 | 68.5 | - | - | - | - | - | - |
| SRR10036061 | 30.7 | 8.32 | 4.88 | 436.6 | 280 | 68.5 | - | - | - | - | - | - |
| SRR10036062 | 30.7 | 8.32 | 4.88 | 436.6 | 280 | 68.5 | - | - | - | - | - | - |
| SRR10036063 | 26.5 | 8.33 | 5.20 | 715 | 468 | 154.1 | - | - | - | - | - | - |
| SRR10036064 | 26.5 | 8.33 | 5.20 | 715 | 468 | 154.1 | - | - | - | - | - | - |
| SRR10036065 | 26.5 | 8.33 | 5.20 | 715 | 468 | 154.1 | - | - | - | - | - | - |
| SRR10036066 | 28.6 | 8.91 | 5.06 | 291.5 | 189.8 | 126.4 | - | - | - | - | - | - |
| SRR10036067 | 28.6 | 8.91 | 5.06 | 291.5 | 189.8 | 126.4 | - | - | - | - | - | - |
| SRR10036068 | - | 8.57 | - | 869 | 565.5 | 124.3 | - | - | - | - | - | - |

| Accession | WT (℃) | pH | DO (mg/L) | EC (μS/cm) | TDS (mg/L) | ORP (mV) | TSS (mg/L) | $NO_3^-$ (mg/L) | $PO_4^{3-}$ (mg/L) | $NH_4^+$ (mg/L) | TN (mg/L) | TP (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SRR10036069 | 28.6 | 8.91 | 5.06 | 291.5 | 189.8 | 126.4 | - | - | - | - | - | - |
| SRR10036070 | 22.8 | 8.26 | 4.90 | 404.6 | 263.25 | 146.4 | - | - | - | - | - | - |
| SRR10036071 | 22.8 | 8.26 | 4.90 | 404.6 | 263.25 | 146.4 | - | - | - | - | - | - |
| SRR10036072 | 22.8 | 8.26 | 4.90 | 404.6 | 263.25 | 146.4 | - | - | - | - | - | - |
| SRR10036073 | 26.8 | 8.65 | 4.75 | 520 | 338 | 121.3 | - | - | - | - | - | - |
| SRR10036074 | 26.8 | 8.65 | 4.75 | 520 | 338 | 121.3 | - | - | - | - | - | - |
| SRR10036075 | 26.8 | 8.65 | 4.75 | 520 | 338 | 121.3 | - | - | - | - | - | - |
| SRR10036076 | 27.4 | 8.36 | 5.47 | 600 | 390 | 96.6 | - | - | - | - | - | - |
| SRR10036077 | 27.4 | 8.36 | 5.47 | 600 | 390 | 96.6 | - | - | - | - | - | - |
| SRR10036078 | 27.4 | 8.36 | 5.47 | 600 | 390 | 96.6 | - | - | - | - | - | - |
| SRR10036079 | - | 8.52 | - | 1063 | 689 | 126.1 | - | - | - | - | - | - |
| SRR10036080 | 25.9 | 8.07 | 4.93 | 504 | 325 | 143.9 | - | - | - | - | - | - |
| SRR10036081 | 25.9 | 8.07 | 4.93 | 504 | 325 | 143.9 | - | - | - | - | - | - |
| SRR10036082 | 25.9 | 8.07 | 4.93 | 504 | 325 | 143.9 | - | - | - | - | - | - |
| SRR10036083 | 28.4 | 8.77 | 5.38 | 648 | 422.5 | 130.8 | - | - | - | - | - | - |
| SRR10036084 | 28.4 | 8.77 | 5.38 | 648 | 422.5 | 130.8 | - | - | - | - | - | - |
| SRR10036085 | 28.4 | 8.77 | 5.38 | 648 | 422.5 | 130.8 | - | - | - | - | - | - |
| SRR10036086 | - | 8.62 | - | 690 | 448.5 | 67.9 | - | - | - | - | - | - |
| SRR10036087 | - | 8.62 | - | 690 | 448.5 | 67.9 | - | - | - | - | - | - |
| SRR10036088 | - | 8.62 | - | 690 | 448.5 | 67.9 | - | - | - | - | - | - |
| SRR10036089 | - | 8.92 | - | 667 | 435.5 | 52.2 | - | - | - | - | - | - |
| SRR10036090 | - | 8.52 | - | 1063 | 689 | 126.1 | - | - | - | - | - | - |
| SRR10036091 | - | 8.52 | - | 1063 | 689 | 126.1 | - | - | - | - | - | - |
| SRR10761721 | 20 | 7.7 | - | - | - | - | 12.4 | - | - | - | 11.667 | 0.191 |
| SRR10761722 | 20 | 7.9 | - | - | - | - | 13.8 | - | - | - | 5.739 | 0.103 |
| SRR10761723 | 22 | 6.2 | - | - | - | - | 1.8 | - | - | - | 16.951 | 0.101 |
| SRR11536955 | 27.6 | 7.5 | - | - | - | - | 14.1 | - | - | - | 4.371 | 0.516 |

| Accession | WT (℃) | pH | DO (mg/L) | EC (μS/cm) | TDS (mg/L) | ORP (mV) | TSS (mg/L) | $NO_3^-$ (mg/L) | $PO_4^{3-}$ (mg/L) | $NH_4^+$ (mg/L) | TN (mg/L) | TP (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SRR11536956 | 27.48 | 7.24 | - | - | - | - | 13.5 | - | - | - | 5.742 | 0.175 |
| SRR11536957 | 26 | 7.2 | - | - | - | - | 1.2 | - | - | - | 9.462 | 0.039 |
| SRR12404947 | 25 | 6.8 | - | - | - | - | 1.4 | - | - | - | 5.39 | 0.11 |
| SRR12404948 | 31.7 | 7.3 | - | - | - | - | 10.4 | - | - | - | 6.33 | 0.05 |
| SRR12404949 | 31.7 | 8.2 | - | - | - | - | 7.8 | - | - | - | 10.46 | 0.12 |
| SRR12404950 | 26.3 | 6.9 | - | - | - | - | 2.1 | - | - | - | 7.55 | 0.05 |
| SRR12404955 | 22 | 7.4 | - | - | - | - | 9.2 | - | - | - | 7.2 | 0.079 |
| SRR12404956 | 21 | 7.41 | - | - | - | - | 10 | - | - | - | 6.2 | 0.076 |
| SRR12404957 | 21 | 6.8 | - | - | - | - | 1 | - | - | - | 12 | 0.039 |
| SRR12404958 | 27.05 | 7.13 | - | - | - | - | 12.2 | - | - | - | 2.964 | 0.165 |
| SRR12404959 | 27.32 | 8.17 | - | - | - | - | 25.2 | - | - | - | 2.698 | 0.254 |
| SRR12404960 | 25.3 | 6.8 | - | - | - | - | 0.4 | - | - | - | 1.436 | 0.053 |
| SRR12404961 | 30.7 | 8.2 | - | - | - | - | 4.6 | - | - | - | 3.21 | 0.06 |
| SRR12404962 | 32.5 | 8.3 | - | - | - | - | 4 | - | - | - | 11.95 | 0.11 |
| SRR14120361 | 9.3 | 8.15 | 12.04 | 522 | - | - | - | 0.33 | 0.14 | 0.02 | - | - |
| SRR14120362 | 8.2 | 8 | 12.23 | 740 | - | - | - | 2.7 | 0 | 0 | - | - |
| SRR14120363 | 9 | 8.55 | 8.35 | 892 | - | - | - | 5.3 | 1.89 | 2.25 | - | - |
| SRR14120364 | 4.7 | 8.55 | 11.98 | 683 | - | - | - | 0.4 | 0 | 0 | - | - |
| SRR14120365 | 8.8 | 7.19 | 12.47 | 608 | - | - | - | 0.55 | 0.71 | 0.06 | - | - |
| SRR14120366 | 13.8 | 7.2 | 8.71 | 794 | - | - | - | 6.56 | 4.75 | 0.36 | - | - |
| SRR14120367 | 14.3 | 7.26 | 12.6 | 597 | - | - | - | 0.7 | 0.13 | 0.07 | - | - |
| SRR14120368 | 15.6 | 8.4 | 10.14 | 536 | - | - | - | 0.31 | 0.57 | 0.34 | - | - |
| SRR14120369 | 18.7 | 7.87 | 8.51 | 588 | - | - | - | 2.1 | 0.25 | 0 | - | - |
| SRR14120370 | 17.8 | 7.47 | 9.01 | 744 | - | - | - | 4.51 | 2.36 | 0.09 | - | - |
| SRR14120371 | 18.6 | 8.1 | 9.68 | 512 | - | - | - | 0.41 | 0.19 | 0.05 | - | - |
| SRR14120372 | 19.3 | 7.56 | 8.22 | 513 | - | - | - | 0.49 | 0.54 | 0.05 | - | - |
| SRR14120373 | 18.4 | 7.26 | 8.59 | 597 | - | - | - | 5.65 | 1.19 | 0.18 | - | - |

| Accession | WT (℃) | pH | DO (mg/L) | EC (µS/cm) | TDS (mg/L) | ORP (mV) | TSS (mg/L) | $NO_3^-$ (mg/L) | $PO_4^{3-}$ (mg/L) | $NH_4^+$ (mg/L) | TN (mg/L) | TP (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SRR14120374 | 19.2 | 7.43 | 8.62 | 515 | - | - | - | 0.69 | 0.35 | 0.07 | - | - |
| SRR14120375 | 9.1 | 8.48 | 12.6 | 509 | - | - | - | 0.31 | 0.22 | 0.02 | - | - |
| SRR14120376 | 10.1 | 8.26 | 11.93 | 612 | - | - | - | 3.2 | 1.54 | 0.13 | - | - |
| SRR14120377 | 13.8 | 8.27 | 11.21 | 658 | - | - | - | 2.2 | 3.46 | 0.36 | - | - |
| SRR14120378 | 14.3 | 8.39 | 10.09 | 665 | - | - | - | 0.33 | 0.08 | 0.06 | - | - |

**Table S3**

Overall profile of ARGs.

| ARG types | Number of ARG subtypes | Detected count | Detection frequency | Average abundance (tpm) |
|---|---|---|---|---|
| Multidrug | 91 | 3815 | 98.98% | 31.82 |
| Bacitracin | 1 | 385 | 98.47% | 24.58 |
| Sulfonamide | 4 | 719 | 84.65% | 14.81 |
| Aminoglycoside | 82 | 2337 | 74.94% | 12.74 |
| Beta-lactam | 268 | 3100 | 78.52% | 11.69 |
| Macrolide-lincosamide-streptogramin | 55 | 2288 | 71.87% | 10.95 |
| Tetracycline | 43 | 2025 | 73.40% | 8.42 |
| Polymyxin | 25 | 374 | 53.20% | 1.85 |
| Rifamycin | 7 | 194 | 40.15% | 1.49 |
| Florfenicol | 1 | 178 | 45.52% | 0.92 |
| Chloramphenicol | 23 | 454 | 41.94% | 0.90 |
| Trimethoprim | 2 | 360 | 43.48% | 0.62 |
| Quinolone | 20 | 146 | 25.58% | 0.58 |
| Mupirocin | 1 | 36 | 9.21% | 0.07 |
| Other_peptide | 2 | 20 | 4.35% | 0.05 |
| Novobiocin | 1 | 8 | 2.05% | 0.05 |
| Streptothricin | 27 | 22 | 5.63% | 0.05 |
| Tiamulin | 2 | 14 | 3.58% | 0.03 |
| Fosfomycin | 4 | 14 | 2.30% | 0.02 |
| Vancomycin | 7 | 11 | 1.53% | 0.01 |

| ARG types | Number of ARG subtypes | Detected count | Detection frequency | Average abundance (tpm) |
|---|---|---|---|---|
| Defensin | 1 | 1 | 0.26% | 0.01 |
| Bleomycin | 1 | 1 | 0.26% | 0.00 |
| Bicyclomycin | 1 | 2 | 0.51% | 0.00 |

**Table S4**

Shared ARG subtypes across three regions.

| Aminoglycoside | Beta-lactam | Beta-lactam | MLS | Multidrug | Multidrug | Tetracycline | Polymyxin | Rifamycin |
|---|---|---|---|---|---|---|---|---|
| *AAC(6')-IIa* | *AER-1* | *OXA-34* | *ere(D)* | *abeM* | *mexW* | *tet(32)* | *arnA* | *arr-1* |
| *aadA* | *CblA-1* | *OXA-373* | *erm(B)* | *acrF* | *MuxB* | *tet(39)* | *mcr-3.8* | *RbpA* |
| *aadA10* | *CfxA* | *OXA-4* | *erm(F)* | *adeF* | *MuxC* | *tet(40)* | *rosA* | *rphB* |
| *aadA11* | *CfxA2* | *OXA-427* | *erm(G)* | *adeI* | *OpmH* | *tet(44)* | *rosB* | |
| *aadA27* | *CfxA6* | *OXA-464* | *linG* | *amrB* | *OprM* | *tet(A)* | *ugd* | **Quinolone** |
| *aadA5* | *IMP-37* | *OXA-5* | *lnu(C)* | *bpeF* | *OprN* | *tet(C)* | | *QepA4* |
| *aadA6* | *MOX-9* | *OXA-58* | *lnu(H)* | *ceoB* | *oqxB* | *tet(M)* | **Trimethoprim** | *QnrS2* |
| *aadA6/aadA10* | *NPS-1* | *OXA-9* | *lsa(E)* | *efpA* | *patA* | *tet(O)* | *dfrA1* | |
| *ANT(6)-Ia* | *OXA-10* | *PAU-1* | *macA* | *emrB* | *qacE* | *tet(Q)* | *dfrA14* | **Bacitracin** |
| *APH(3'')-Ib* | *OXA-119* | *Other class A* | *macB* | *emrD* | *qacEdelta1* | *tet(S)* | *DfrA36* | *bacA* |
| *APH(3')-IIIa* | *OXA-12* | *beta-lactamase* | *mef(C)* | *mdsB* | *qacH* | *tet(W)* | *dfrF* | |
| *APH(6)-Id* | *OXA-129* | | *mef(En2)* | *mdtF* | *RanA* | *tet(X)* | | **Novobiocin** |
| | *OXA-2* | | *mel* | *mdtK* | *RanB* | *tetA(48)* | **Sulfonamide** | *novA* |
| | *OXA-205* | | *mph(A)* | *MexB* | *sdeY* | *tetA(P)* | *sul1* | |
| | *OXA-209* | | *mph(G)* | *MexD* | *smeE* | *tetB(P)* | *sul2* | **Chloramphenicol** |
| | *OXA-211* | | | *MexE* | *tap* | *tetX2* | *sul3* | *capO* |
| | *OXA-296* | | | *MexF* | *tolC* | | *sul4* | |
| | *OXA-33* | | | *mexK* | *ileS* | | | |

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