Aquatic Macrophytes and Local Factors Drive Bacterial Community Distribution and Interactions in a Riparian Zone of Lake Taihu

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Figure S1. The relative abundance of different phyla and subphyla in the four zones. Abbreviation: supralittoral zone with *P. australis* (RZa), eulittoral zone with *P. australis* (RZb), eulittoral zone without *P. australis* (NZc), infralittoral zone without *P. australis* (NZd).

Table S1. The properties of local factors in lake riparian. Abbreviation: supralittoral zone with *P. australis* (RZa), eulittoral zone with *P. australis* (RZb), eulittoral zone without *P. australis* (NZc), infralittoral zone without *P. australis* (NZd), ammonium nitrogen (NH$_4^+$), nitrate nitrogen (NO$_3^-$), sample water content (SWC), organic matter content (OM), total carbon (TC), total nitrogen (TN), dissolved organic carbon (DOC).

| Soil property | RZa (SD) | RZb (SD) | NZc (SD) | NZd (SD) |
|---------------|----------|----------|----------|----------|
| NH$_4^+$ (mg·kg$^{-1}$) | 5.85 (0.89)$^c$ | 5.89 (0.46)$^c$ | 63.36 (7.27)$^a$ | 21.87 (2.37)$^b$ |
| NO$_3^-$ (mg·kg$^{-1}$) | 1.89 (0.31)$^a$ | 1.71 (0.29)$^a$ | 1.31 (0.12)$^b$ | 1.17 (0.15)$^b$ |
| pH | 6.28 (0.46)$^b$ | 5.28 (0.30)$^c$ | 6.82 (0.18)$^a$ | 6.83 (0.16)$^a$ |
| TN (%) | 0.12 (0.02)$^b$ | 0.16 (0.06)$^{ab}$ | 0.21 (0.06)$^a$ | 0.13 (0.02)$^b$ |
| TC (%) | 1.22 (0.35)$^a$ | 1.58 (0.62)$^a$ | 1.83 (0.52)$^a$ | 1.17 (0.22)$^a$ |
| TC/TN | 10.08 (1.11)$^a$ | 9.99 (0.92)$^{ab}$ | 8.78 (0.40)$^b$ | 8.77 (0.17)$^c$ |
| OM (%) | 3.97 (0.56)$^b$ | 4.79 (1.35)$^{ab}$ | 5.47 (1.01)$^a$ | 4.41 (0.79)$^{ab}$ |
| SWC (%) | 32.51 (1.32)$^d$ | 38.52 (2.03)$^c$ | 60.05 (8.50)$^a$ | 51.36 (6.22)$^b$ |
| DOC (mg·kg$^{-1}$) | 189.58 (53.97)$^b$ | 198.01 (54.82)$^b$ | 318.17 (22.98)$^a$ | 283.75 (22.74)$^a$ |
| Clay (%) | 17.83 (0.75)$^c$ | 16.67 (0.75)$^d$ | 33.33 (1.03)$^a$ | 29.33 (1.03)$^b$ |
| Silt (%) | 72.00 (1.26)$^b$ | 65.50 (1.05)$^b$ | 57.00 (1.41)$^c$ | 54.67 (1.21)$^d$ |
| Sand (%) | 10.17 (1.47)$^c$ | 17.83 (1.17)$^a$ | 9.67 (1.51)$^c$ | 16.00 (0.89)$^b$ |

SD, standard deviation. Statistical significance was assessed by one-way ANOVA followed by Tukey’s HSD test, and significant differences were accepted when *p* < 0.05 between the two groups. Letters denote significant differences in pairwise comparisons (*p* < 0.05).

Table S2. Estimated OUT richness and alpha diversity indices of the four zones (no significant difference was found for each variable). Abbreviation: supralittoral zone with *P. australis* (RZa),
eulittoral zone with *P. australis* (RZb), eulittoral zone without *P. australis* (NZc), infralittoral zone without *P. australis* (NZd).

|               | RZa (SD) | RZb (SD) | NZc (SD) | NZd (SD) |
|---------------|----------|----------|----------|----------|
| Goods Coverage| 0.87 (0.01) | 0.87 (0.02) | 0.87 (0.01) | 0.88 (0.01) |
| Shannon        | 11.18 (0.38) | 11.34 (0.31) | 11.45 (0.05) | 10.87 (0.44) |
| PD            | 221.00 (19.60) | 228.55 (22.61) | 240.63 (4.29) | 226.00 (8.09) |
| Chao1         | 12025.98 (1180.62) | 12081.23 (1267.12) | 12094.39 (457.77) | 11169.66 (390.52) |
| Ace           | 12611.46 (1224.68) | 12965.79 (1617.77) | 12900.68 (513.29) | 11931.26 (579.43) |

SD, standard deviation.

Table S3. Permutational multivariate analysis of similarity (ANOSIM) and permutational multivariate analysis of variance (ADONIS) based on Bray-Curtis dissimilarity matrix (BC) and Weighted-Unifrac dissimilarity matrix (WU) in bacterial community composition among four sampling sites. Abbreviation: *P. australis* zone (RZ), non-*P. australis* zone (NZ), supralittoral zone with *P. australis* (RZa), eulittoral zone with *P. australis* (RZb), eulittoral zone without *P. australis* (NZc), infralittoral zone without *P. australis* (NZd).

| Group | Anosim | Adonis |
|-------|--------|--------|
|       | R      | P      | F      | P      |
|       | BC     | WU     | BC     | WU     |
| RZ&NZ | 0.7724 | 0.001  | 0.7209 | 0.001  |
| RZa & NZb | 0.4444 | 0.003 | **0.07407** | **0.22** |
| RZa & NZc | 1.004 | 0.9963 | 1.000 | 1.100 |
| RZa & NZd | 0.8611 | 0.004 | 0.8074 | 0.002 |
| RZb & NZc | 0.8389 | 0.003 | 0.7611 | 0.005 |
| RZb & NZd | 0.9037 | 0.002 | 0.6796 | 0.006 |
| NZc &NZd | 0.8093 | 0.005 | 0.5019 | 1.001 |

Non-significant differences at *p* > 0.05 are indicated in **bold**.

Table S4. Significance analysis of RDA by Monte Carlo permutation (permutation=999). Abbreviation: ammonium nitrogen (NH₄⁺), nitrate nitrogen (NO₃⁻), sample water content (SWC), organic matter content (OM), total carbon (TC), total nitrogen (TN), dissolved organic carbon (DOC).

| Group | r²   | p          |
|-------|------|------------|
| NH₄⁺  | 0.72 | 0.0001     |
| NO₃⁻  | 0.58 | 0.0002     |
| pH    | 0.49 | 0.001      |
| OM    | 0.35 | 0.0102     |
| SWC   | 0.82 | 0.0001     |
| DOC   | 0.54 | 0.0003     |
| Silt  | 0.73 | 0.0002     |

Significant differences were accepted when *p* < 0.05.

Table S5. Module hubs and connectors in *P. australis* zone and non-*P. australis* zone networks. Abbreviation: *P. australis* zone (RZ), non-*P. australis* zone (NZ). c, o, f, g represent class, order, family and genus, respectively.

| OUT ID | Ra (%) | No. of module | Zi | Pi | Phylum | Lowest taxonomic rank |
|--------|--------|---------------|----|----|--------|-----------------------|
Table S6. The mantel and partial mantel tests on connectivity of networks and local factors. Abbreviation: *P. australi* zone (RZ), non-*P. australis* zone (NZ), ammonium nitrogen (NH$_4^+$), nitrate nitrogen (NO$_3^-$), sample water content (SWC), organic matter content (OM), total carbon (TC), total nitrogen (TN), dissolved organic carbon (DOC).

| Factors | RZ r | RZ p | NZ r | NZ p |
|---------|------|------|------|------|
| All factors | 0.003 | 0.447 | **0.152** | **0.001** |
| NH$_4^+$ | −0.017 | 0.69 | **0.16** | 0.001 |
| NO$_3^-$ | −0.061 | 0.995 | −0.03 | 0.828 |
| pH | **0.086** | **0.01** | −0.049 | 0.95 |
| TN | −0.054 | 0.957 | −0.2 | 1 |
| TC | −0.033 | 0.872 | −0.2 | 1 |
| C:N | −0.041 | 0.892 | −0.059 | 0.979 |
| OM | −0.059 | 0.981 | −0.11 | 1 |
| SWC | 0.025 | 0.216 | −0.011 | 0.636 |
| DOC | −0.075 | 0.998 | **0.17** | **0.001** |
| Clay | 0.016 | 0.27 | −0.067 | 1 |
| Silt | **0.11** | **0.002** | **0.26** | **0.001** |
| Sand | **0.11** | **0.001** | **0.18** | **0.001** |

Significant differences at *p* < 0.05 are indicated in bold.
**Table S7.** Correlations between module eigengenes and local factors. Abbreviation: *P. australi* zone (RZ), non-*P. australis* zone (NZ), ammonium nitrogen (NH$_4^+$), nitrate nitrogen (NO$_3^-$), sample water content (SWC), organic matter content (OM), total carbon (TC), total nitrogen (TN), dissolved organic carbon (DOC).

| network | Module code | No of nodes | $\phi$ | NH$_4^+$ | NO$_3^-$ | pH | TN | TC | C:N | OM | SWC | DOC | Clay | Silt | Sand |
|--------|-------------|-------------|-------|--------|--------|----|----|----|-----|----|-----|-----|------|------|------|
| RZ     | 1           | 43          | 55%   | 0.0098 | -0.39  | -0.14 | 0.089 | -0.07 | 0.096 | 0.0071 | 0.62* | 0.086 | -0.13 | -0.35 | 0.33 |
|        | 2           | 36          | 61%   | 0.14   | 0.34   | -0.38 | 0.039 | 0.071 | 0.065 | -0.037 | 0.38  | -0.18 | 0.085 | -0.5  | 0.4  |
|        | 3           | 33          | 60%   | 0.16   | 0.56   | -0.22 | 0.1   | 0.057 | 0.067 | 0.041  | 0.12  | -0.2   | 0.28  | -0.31 | 0.2  |
|        | 4           | 43          | 54%   | 0.066  | -0.34  | -0.39 | 0.27  | 0.21  | -0.26 | 0.16   | 0.22  | 0.047  | -0.59 | -0.3  | 0.39 |
|        | 5           | 14          | 70%   | 0.21   | 0.0027 | 0.1   | -0.12 | 0.061 | 0.12   | -0.19  | -0.1  | -0.26  | -0.11 | 0.18  | -0.13 |
|        | 6           | 36          | 61%   | 0.14   | 0.34   | -0.38 | 0.039 | 0.071 | 0.065 | -0.037 | 0.38  | -0.18 | 0.085 | -0.5  | 0.4  |
|        | 7           | 33          | 60%   | 0.16   | 0.56   | -0.22 | 0.1   | 0.057 | 0.067 | 0.041  | 0.12  | -0.2   | 0.28  | -0.31 | 0.2  |
|        | 8           | 43          | 54%   | 0.066  | -0.34  | -0.39 | 0.27  | 0.21  | -0.26 | 0.16   | 0.22  | 0.047  | -0.59 | -0.3  | 0.39 |
|        | 9           | 14          | 70%   | 0.21   | 0.0027 | 0.1   | -0.12 | 0.061 | 0.12   | -0.19  | -0.1  | -0.26  | -0.11 | 0.18  | -0.13 |
|        | 10          | 61          | 63%   | 0.72** | 0.72** | 0.22  | 0.73** | 0.73** | 0.17   | 0.83*** | -0.76** | -0.6*  | -0.78** | -0.12 | 0.57 |
| NZ     | 2           | 64          | 63%   | -0.11  | 0.25   | -0.22 | 0.024 | 0.019 | -0.079 | -0.022 | -0.26  | 0.46   | -0.17 | -0.22 | 0.22 |
|        | 3           | 21          | 70%   | -0.65* | -0.12  | -0.28 | -0.47 | -0.48 | -0.063 | -0.41  | -0.59  | -0.15  | -0.7*  | -0.51 | 0.71** |
|        | 4           | 56          | 69%   | 0.79** | 0.5    | 0.14  | 0.79** | 0.77** | -0.36  | 0.85**  | 0.92*** | 0.45   | 0.87*** | 0.27  | -0.71* |
|        | 5           | 40          | 81%   | 0.79** | -0.5   | 0.018 | -0.54 | -0.56 | -0.04  | -0.27  | -0.2   | 0.73** | -0.68* | 0.72* | 0.81** |
|        | 6           | 7           | 69%   | -0.68* | -0.23  | 0.15  | -0.25 | -0.29 | -0.33  | 0.011  | 0.068  | -0.49  | -0.53  | -0.7*  | 0.7*  |
|        | 7           | 9           | 80%   | -0.077 | 0.073  | 0.069 | 0.18  | 0.17  | -0.12  | 0.47   | 0.5    | -0.37  | 0.1    | -0.28 | 0.072 |
|        | 8           | 7           | 83%   | -0.063 | 0.14   | 0.065 | 0.29  | 0.26  | -0.36  | 0.58   | 0.64*  | -0.17  | 0.12   | -0.49 | 0.17  |

The $\phi$ value was the percentage of the total variance explained by the eigengene of respective module. * 0.01 < $P$ < 0.05; ** 0.001 < $P$ < 0.01; *** $P$ < 0.001.
