**Table S1** The network topological properties used in this study.

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| **Features** | **Formula** | **Explanation** | **Note** | |
| **Part I: topological properties for individual nodes** | | | |
| Degree |  | is the connection strength between nodes i and j. | The number of direct association interactions for a specific OTU. | |
| Clustering coefficient |  | *li*is the number of links between neighbors of node *i* and *ki’* is the number of neighbors of node *i.* | It represents how well a node is connected with its neighbors. | |
| Betweenness |  | is the total number of shortest paths between j and k. | It is used to describe the ratio of paths that pass through the ith node. | |
| **Part II: The overall network topological properties** | | | |
| Average connectivity |  | *ki* is degree of node *i* and *n* is the number of nodes. | Higher *avgK* means a more complex network. | |
| Harmonic geodesic distance |  | *dij* is the shortest path between node *i* and *j*. | A smaller *GD* means that all the nodes in the network are closer. | |
| Average clustering coefficient |  | *CCi* is the clustering coefficient of node *i* | It is used to measure the extent of hierarchical structure present in a network. | |
| Centralization of betweenness |  | max(*B*) is the maximal value of all betweenness values and *Bi* represents the betweenness  of ith node. Finally this  value is normalized by the theoretical maximum centralization score. | It is close to 0 for a network in which each node has the same betweenness, and the bigger the more difference among all betweenness values. | |
| Modularity |  | *l* is the sum of total links; is 1 if node *i* and *j* are connected and 0 otherwise; *ki* is the degree of *i*; *mi* is the module that *i* belong to;  is 1 if *mi*=*mj* and 0 otherwise. | It demonstrates how well a network could be naturally divided into modules. | |