Data processing

According to the Penman-Monteith recommended by FAO, the reference crop evapotranspiration (ET_0) is calculated as fellow. Then corrected ET_0 with the crop coefficient.

$$ET_0 = \frac{0.408\Delta(R_n - G) + r\frac{900}{T+273}u_2(e_s - e_a)}{\Delta + r(1 + 0.34u_2)} \tag{1}$$

$$ET_c = K_c ET_0 \tag{2}$$

where R_n is the net radiation on the surface of crops; G is the soil heat flux; T is the wind speed at 2m height; e_s is saturated water vapor pressure; e_a is the actual water vapor pressure; Δ is the slope of saturated water vapor pressure curve; r is the hygrometer constant. K_c is the corresponding crop coefficient; ET_c is the evapotranspiration of corresponding crops.

The formula for water demand per unit area of a crop is CWR:

$$CWR = 10\sum_{i=1}^{n} ET_c = 10K_c\sum_{i=1}^{n} ET_0 \tag{3}$$

where n is the total number of days during the crop growth period. Finally calculate the unit virtual water content VWC:

$$VWC = \frac{CWR}{CY} \tag{4}$$

The correlation degree

k_{nn_i} identifies all nodes in the neighborhood of i, and then sums their respective node degrees, and finally normalizes the node degree of node i. k_{nn} is divided into four categories including $k_{nn}^{in,in}$, $k_{nn}^{out,in}$, $k_{nn}^{in,out}$, and $k_{nn}^{out,out}$. The first element in the superscript determines the neighbors of the node i, whereas the second element labels the characteristic of the neighbors For example, the relationship between nodes shown in Figure S1. B and C are the input areas of A; D and E are the output areas of B; F, G and H are the output areas of C. Thus, calculated $k_{nn_i}^{in,\text{out}}$ of A according to the formula (5) is 2.5.

$$k_{nn_i} = \frac{1}{k_i}\sum_{j\in V(i)} k_j \tag{5}$$

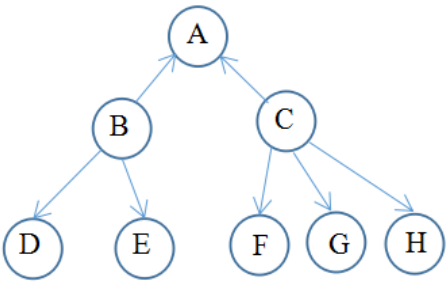

Figure S1. The relationship between nodes.