**Appendix A.**

|  |  |
| --- | --- |
| The formula of is: | (1) |

Where, and are the landscape disturbance index and vulnerability index of the th landscape class, respectively. The formula of is:

|  |  |
| --- | --- |
|  | (2) |

Where, , , and are the landscape fragmentation index, isolation index, and fractal dimension index of the th class, respectively. Based on previous research, the values of a, b, and c were 0.5, 0.3, and 0.2, respectively.

The landscape fragmentation index measures the number of patches within an area and represents the fragmentation of the landscape. The landscape isolation index displays the degree of separation of patches. The landscape fractal dimension index shows the complexity of patch shape. All landscape indexes were calculated based on Fragstats 4.2.

The landscape vulnerability index measures the resistance of landscape types to external disturbances. The larger the landscape vulnerability index is, the weaker the resistance to external disturbances. According to previous studies, The values of landscape vulnerability of the farmland, forestland, grassland, wetland, and construction land are 4, 2, 3, 5, and 1, respectively. Each indicator was standardized using the MIN-MAX standardization method.