As a non-governmental organization (NGO) with a budget of RM25,000 for flood relief, you face the challenge of allocating aid to 15 affected areas. Each area has varying degrees of damage severity, a different proportion of high-risk residents to the total population and different required budget.

|  |  |  |  |
| --- | --- | --- | --- |
| Area | Damage Severity | Ratio of high risk resident | Budget estimated (RM) |
| A | 3 | 1:5 | 3,000 |
| B | 1 | 1:4 | 3,000 |
| C | 3 | 1:5 | 2,500 |
| D | 3 | 1:2 | 4,600 |
| E | 3 | 1:5 | 3,200 |
| F | 1 | 1:8 | 5,430 |
| G | 3 | 1:8 | 4,300 |
| H | 2 | 1:10 | 4,100 |
| I | 2 | 1:5 | 3,300 |
| J | 3 | 1:4 | 3,200 |
| K | 2 | 1:8 | 2,000 |
| L | 3 | 1:5 | 3,200 |
| M | 1 | 1:8 | 2,400 |
| N | 3 | 1:4 | 2,470 |
| O | 2 | 1:8 | 3,300 |
| Total Budget | | | 50,000 |

|  |  |
| --- | --- |
| Damage Severity Level | Description |
| 1 | Low |
| 2 | Moderate |
| 3 | High |

Chromosome representation

Gene - Areas

Allele - Area that will get the budget (Boolean)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chromosome 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| Chromosome 2 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Chromosome 3 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

Fitness as

+ +

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
| Damage | 3 | 0 | 3 | 3 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 3 | 0 | 0 | 2 |
| Ration | 0.2 | 0 | 0.2 | 0.5 | 0 | 0.125 | 0 | 0 | 0.2 | 0 | 0 | 0.2 | 0 | 0 | 0.125 |
| Budget | 3000 |  | 2500 | 4600 | 0 | 5430 | 0 | 0 | 3300 | 0 | 0 | 3200 | 0 | 0 | 3300 |
| Chromosome | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |

a’ = 3 + 3 + 3 + 1 + 2 + 3 + 2

= 17

a = 35

b’ = 0.2 + 0.2 + 0.5 + 0.125 + 0.2 + 0.2 + 0.125

= 1.55

b = 2.975

c’ = 3000 + 2500 + 4600 +5430 +3300 + 3200 + 3300

= 25,330

c = 50,000

+ +