

Solution 1

```
1 // Copyright © 2020 AlgoExpert, LLC. All rights reserved.
2
3 #include <vector>
4 using namespace std;
5
6 // O(n) time | O(n) space
7 int waterArea(vector<int> heights) {
8     vector<int> maxes(heights.size(), 0);
9     int leftMax = 0;
10    for (int i = 0; i < heights.size(); i++) {
11        int height = heights[i];
12        maxes[i] = leftMax;
13        leftMax = max(leftMax, height);
14    }
15    int rightMax = 0;
16    for (int i = heights.size() - 1; i >= 0; i--) {
17        int height = heights[i];
18        int minHeight = min(rightMax, maxes[i]);
19        if (height < minHeight) {
20            maxes[i] = minHeight - height;
21        } else {
22            maxes[i] = 0;
23        }
24        rightMax = max(rightMax, height);
25    }
26    int total = 0;
27    for (int i = 0; i < heights.size(); i++) {
28        total += maxes[i];
29    }
30    return total;
31 }
32
```