Fairness Measure & Its Justification

Our fairness measure was contingent upon 2 of the specified conditions

1) No one is left out
2) Not all water goes to 1 farmer

Our 2 water sources are 1) Ground Water Reservoir
2) Irrigation by Central Planner

Our Central Planner uses the moisture levels $M_1(t)$, $M_2(t)$, $M_3(t)$, $M_4(t)$ and compares them to calculate which soil has the least amount of moisture. The Central Planner then sends water to that farm and flags the farm too. On the next iteration, the Central Planner does the same comparison and awards water to the lowest moisture level unflagged farm. And the cycle continues till all farms are flagged. At that point, all flags are erased and the cycle begins anew

Key to note here is that farms will use their reservoirs to attain max. moisture level to keep their farms moist till the next irrigation point

We feel that this system is justified because no farmer recieves water twice in a month. This maintains social equitability. Each farm will recieve water proportionate to its farm size & storage (reservoir) capacity so ~~their~~ there would be sufficient water to maintain moisture levels in the range 0.15 - 0.8 during the downtime of irrigation.

Some drawbacks of this model:

→ Farms with higher moisture decay rate would bear immense internal costs because of water pumping from reservoir which requires a lot of energy & $$

* Solution: Prioritize bigger farms using ELO permutation

→ There is no backup system. Because the central planner is solely based on $M_1(t)$, $M_2(t)$, $M_3(t)$, $M_4(t)$ readings, a system failure would make it impossible to identify the correct farm to irrigate.

* Solution: Set up a feedback loop with the reservoir to maintain water levels & have backup storage for sensor data