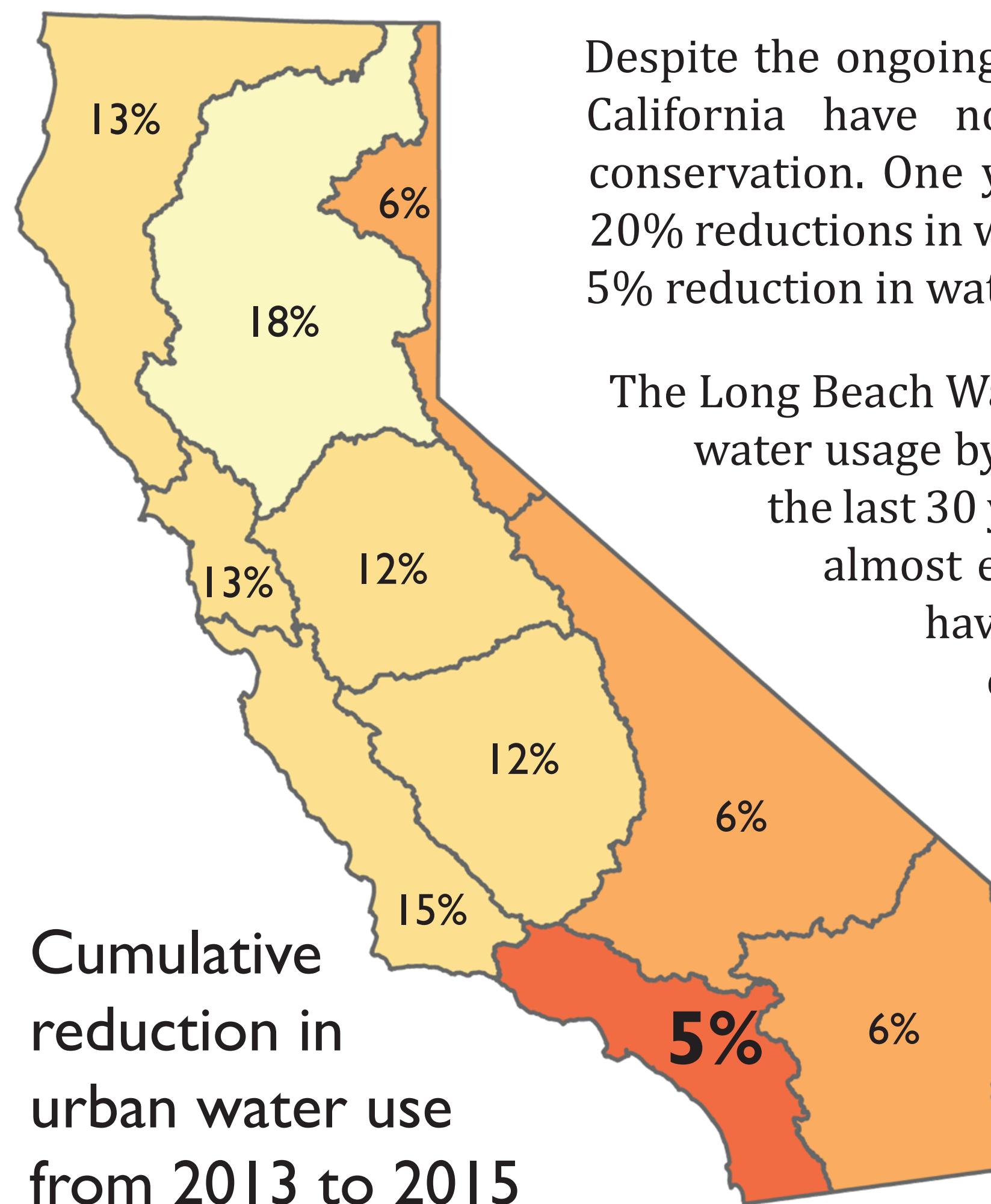


Urban water conservation in Southern California

Encouraging conservation through tradable allocations and market mechanisms

Why didn't water agencies in Southern California conserve more in response to the drought?



Despite the ongoing 2012-15 drought, urban water agencies in Southern California have not responded aggressively to statewide calls for conservation. One year after Governor Jerry Brown called for voluntary 20% reductions in water usage, the South Coast region had achieved only a 5% reduction in water use, the smallest reduction in the state.

The Long Beach Water Department has been an exception, reducing their water usage by 34% through aggressive conservation measures over the last 30 years. Long Beach now uses less water per-person than almost every other urban agency in Southern California. Why have other agencies not undertaken similar conservation efforts?

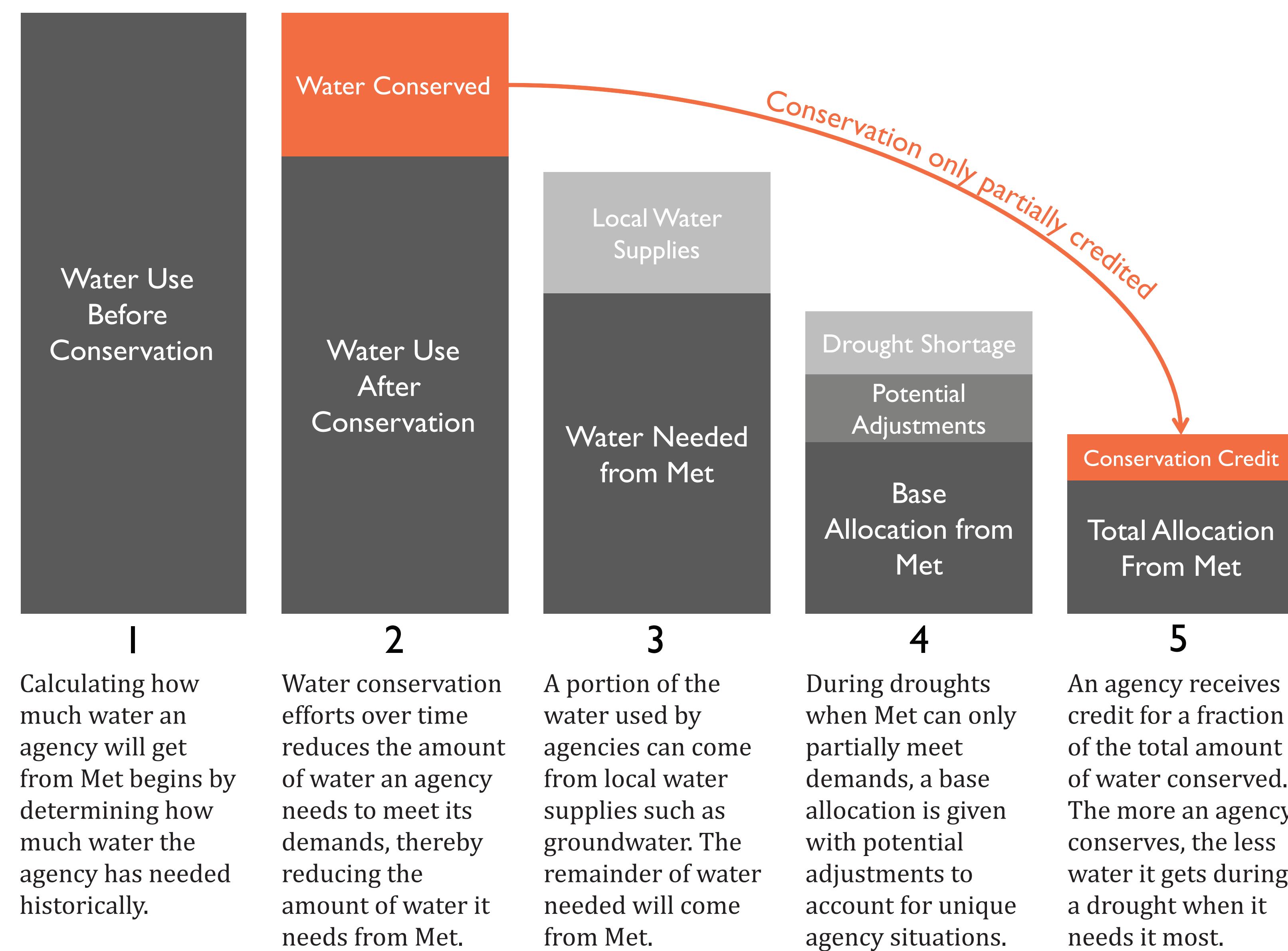
Research questions

- How does the existing water allocation system encourage conservation?
- Can we design an alternative system that better incentivizes conservation?

1 The existing system of water allocation

We begin by analyzing the existing system of water allocation in Southern California. Metropolitan Water District of Southern California (Met) provides water to the majority of cities and water agencies in the region. Therefore, we examine how Met allocates water to its member agencies during times of water shortage such as the current drought.

How the existing system allocates water



The existing system discourages conservation in two ways:

1. Use it or lose it

Agencies which reduce their use through conservation lose access to the conserved water, and this water is redistributed to other agencies during times of drought.



2. Conservation is soon forgotten

How much water an agency receives during a drought is mostly based on their most recent water use. Long term conservation efforts are not rewarded and essentially forgotten.

2 Our alternative system of water allocation

Designing an alternative system to encourage conservation

1. Secure right

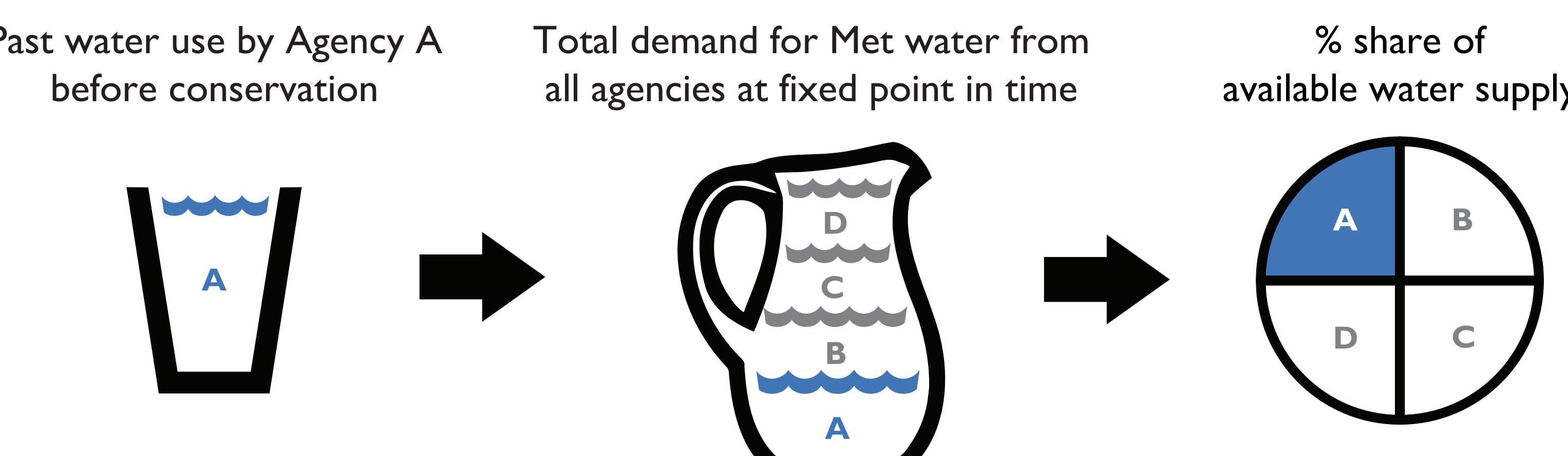
 Agencies which reduce their use through conservation are able to keep the conserved water as a buffer supply during drought. Agencies can also trade this conserved water, further incentivizing conservation.

2. Fixed point in time

 Because the allocation is based on a fixed point in time rather than an agency's most recent use, agencies are not penalized for reductions in water use achieved over time.

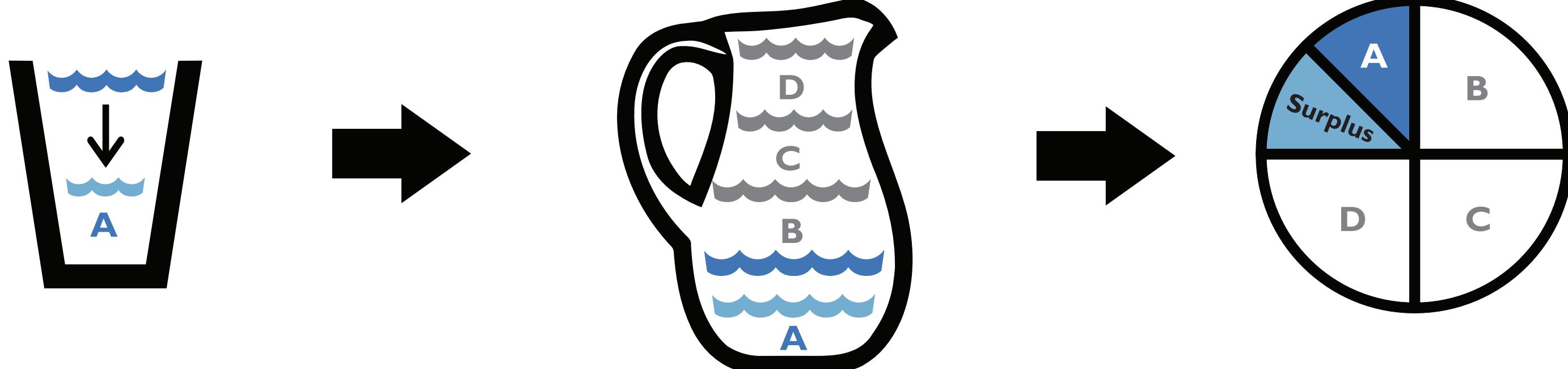
How our alternative system allocates water

An agency's water allocation is based on their water use at a fixed point in time in the past. Adding the total past water use of all agencies determines what the total demand for Met water would be if agencies did not undertake any conservation. A percentage share of the total available Met water supply is then assigned to each agency.



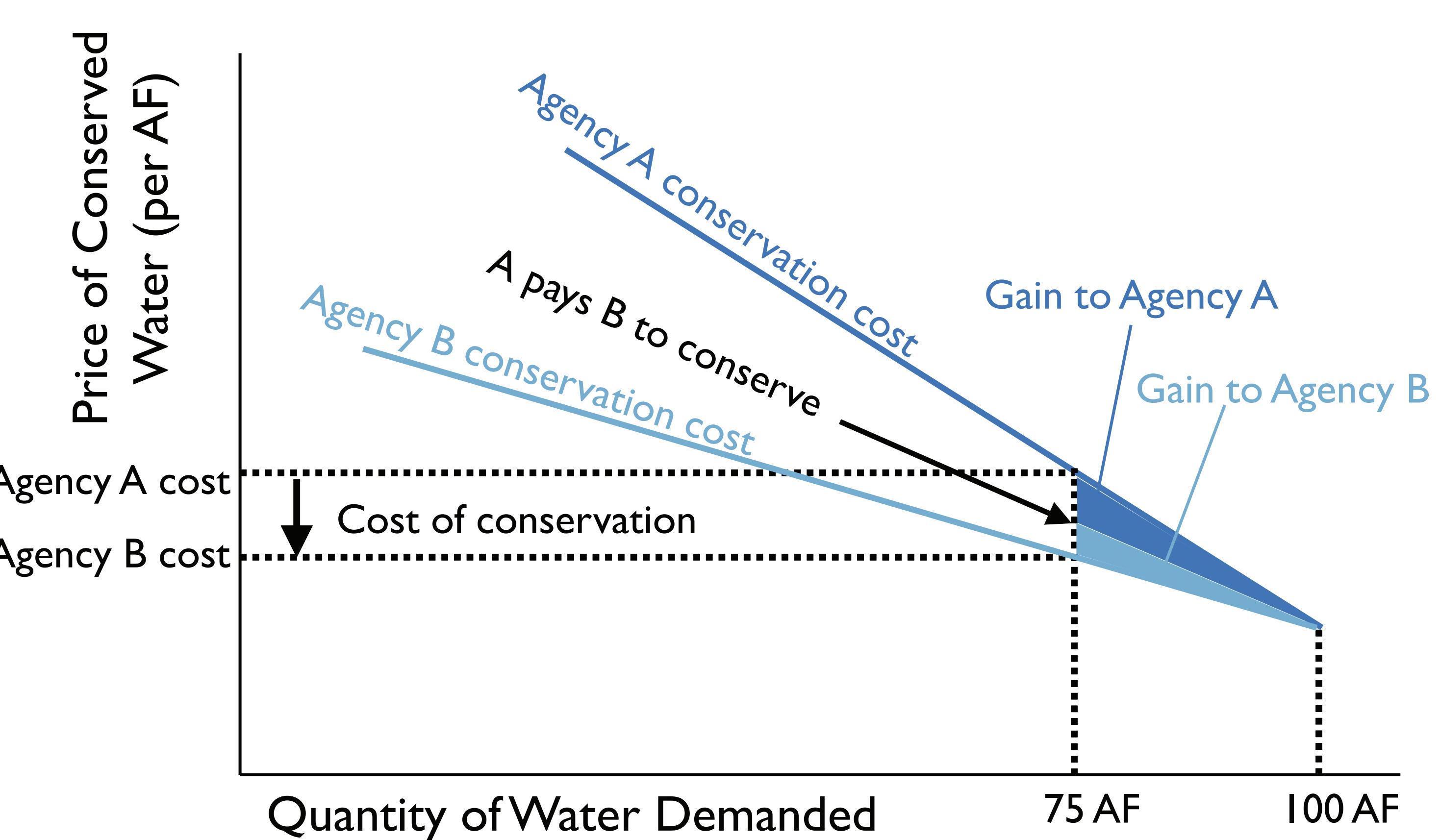
Under the alternative system, when an agency conserves, their allocation will not be reduced. The amount of water an agency receives will now be greater than their needs, resulting in a surplus.

Current water use by Agency A is reduced by conservation → Total demand for Met water is fixed based on past use → % share is fixed, so reduction in use creates surplus



Benefits of trading conserved water

Under the alternative system, when the cost of conservation for Agency A is higher than for Agency B, Agency A can pay Agency B to conserve. Agency A benefits by acquiring water or meeting conservation goals at a lower cost than if they had conserved on their own. Agency B benefits by receiving payment in excess of what it costs them to conserve.



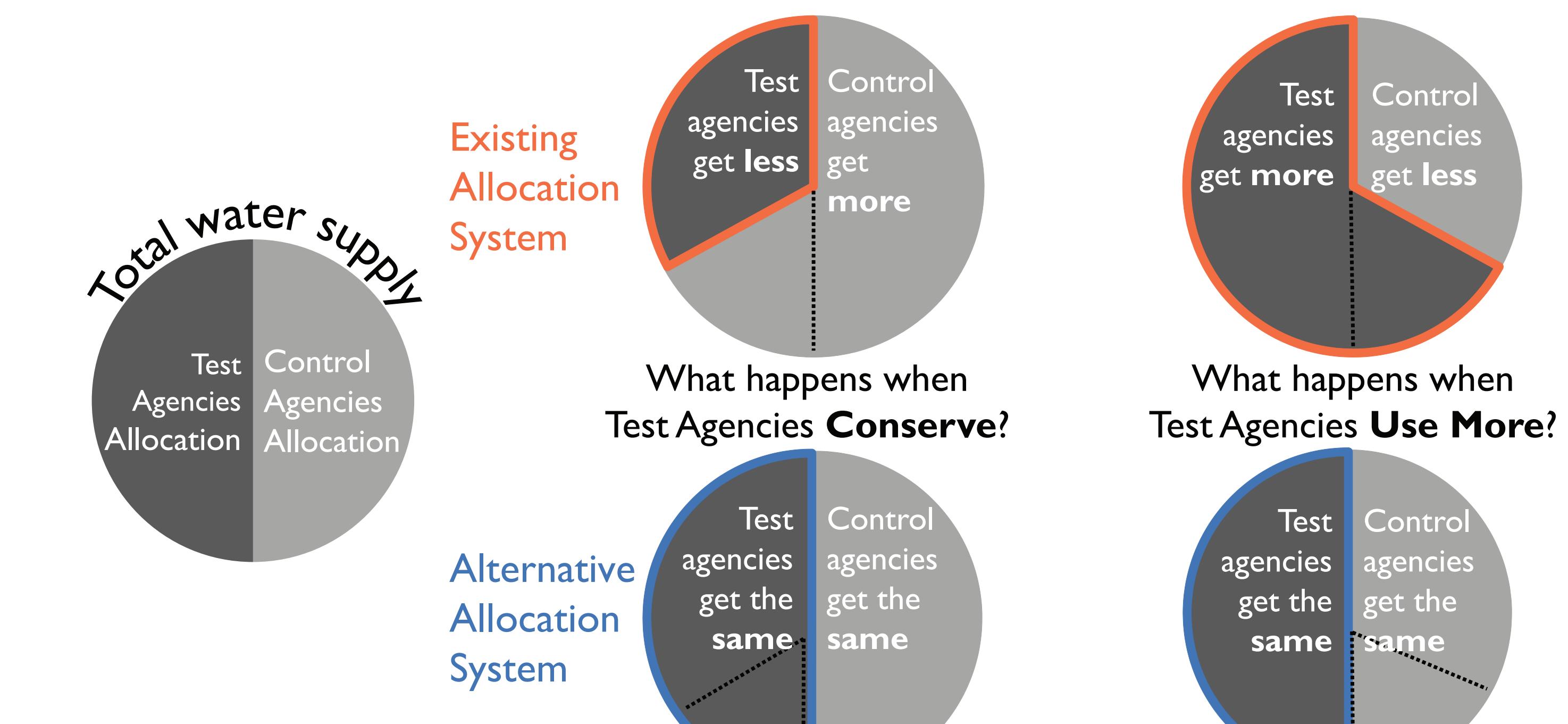
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Comparing the existing and alternative systems

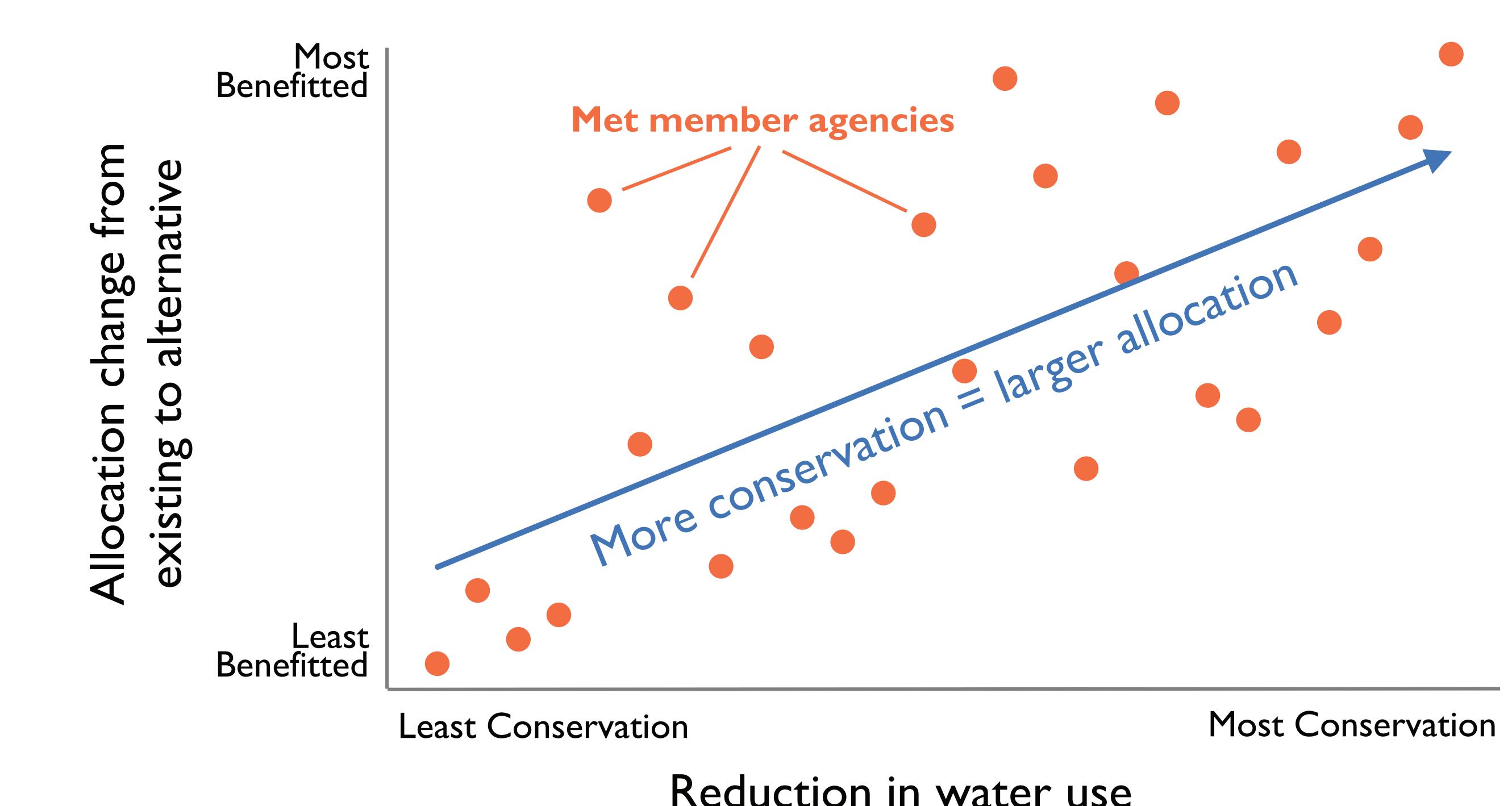
Under the existing system, the water made available by conserving agencies is redistributed to other agencies. Conserving agencies are not compensated for the water they provide to the system. When agencies use more they get more, leaving less water remaining for the other agencies.



Under the alternative system, agencies receive the same allocation regardless of recent water use. When agencies use more, their demand will exceed their allocation, resulting in a deficit. When agencies conserve, their allocation will exceed their demand, resulting in a surplus.

Alternative system rewards conservation

The agencies that have conserved the most in recent years also benefit the most under the alternative system, earning larger allocations of water compared to the existing system.



Conclusion

The challenge for California over the next century is to live within our current water supplies even as our population and economy grow. To do so, we must better manage our demand by identifying methods to incentivize conservation.

Drawbacks of existing system

Costly additional supplies: When Met cannot supply enough water to meet demand it must seek costly additional supplies from groundwater, desalination, or irrigation districts.

No conservation incentive: Agencies are better off increasing their water demand before a drought in order to secure a larger share of the supply when a water shortage occurs.

Acknowledgments

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