



## **How a Water Market Might Work**

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## How a water market might work.

Notes by Mason Gaffney, July 27, 1977

On July 14, at a Hearing of the Governor's Commission on Water Rights Law Reform, I offered a suggestion that the State of California, as the underlying owner of water, set a price on withdrawals. This raises the question of how such price might be determined and administered.

There are many possibilities, and varying circumstances to adapt to. Almost any reasonable pricing arrangement would improve on the present practise, so I do not insist on one particular scheme. I present here one plan which works like the coffee market has this year: when the supply fails the price rises, screening out marginal consumption; as supply recovers the price drops. It works like the markets in which most farmers sell their products: prices rise and fall constantly from week to week to balance changing supply and demand.

This will not be a perfect market. There will be only one seller, and the buyers will surely form a user's association. But this should not deter us. No human institution is perfect, except some that are perfectly awful. The present water market is one of these, and the point is to make it less awful. Maximum feasible improvement is the goal. To achieve this, continous monitoring of both buyers and sellers by a sophisticated regulatory agency may be needed, although the proposed market is inherently self-regulating in the absence of malice and blundering. It is also simple, clean, and unambiguous in philosophy, so the needed oversight does not entail framing a regulatory concept, or even implementing one, but simply the double negative of preventing anyone from preventing the system from regulating itself.

I assume the most difficult case, a stream without storage, with unpredictable varying flows. The model is easily modified to accommodate storage. Among its benefits, however, we find that price flexibility substitutes for some storage and reduces the need for it by eliminating waste in dry times and encouraging more use in wet times.

I assume a watermaster in charge both of distributing water and collecting money, like any merchant, but subject to guidelines provided by legislation. These guidelines essentially instruct him to follow precepts to be found in hundreds of elementary economics textbooks. He is to maximize net revenues from water sales subject to the competitive constraint that he not withhold supply deliberately to raise price.

If he gets into capital outlays and water storage he should maximize DCF (discounted cash flow). I assume my readers are or can become conversant with the social welfare rationale behind such guidelines.

The main unusual feature of this market is the water-master's urgency for information about demand, in the face of unpredictable variable unstorable supply. He requires a distribution schedule before water runs to waste. The solution is advance bidding. Each bidder submits a demand schedule for the range of probable prices. The watermaster cumulates these. This gives him a basis for striking a market-clearing price at any rate of flow, and a set of orders at that price.

Table 1 shows how a distribution schedule works today. Table 2 shows how it works using this advance bidding system. Row 2 of Table 2, "Cumulative Demand," having once been determined, now becomes Row 1 of a revised Table 1, i.e. Flow of Princess R. For every flow there is a price and a set of orders for delivery.

That is a basic framework. There are bugs to work out of the system. I believe they are minor next to its benefits. I would be glad to go into this further if desired by the Commission: both the bugs and the benefits.



Table 2

The Way It Can Be Done

Jointly Determining Price of Water and Allocation.

Users submit demand schedules indicating desired flow at each price. Watermaster cumulates these. For every rate of flow there is now a price and an allocation schedule (by interpolation if need be).

Price of Water	260	240	220	200	180	160	140	120	100	80	60	40	20	10
Cum. Demand (sf)	5	8	13	15	17	19	21	25	31	36	50	70	98	140
Pioneer Ditch											1	2	2	3
Highline Canal							1	1	2	2	3	3	4	5
People's Ditch										1	1	5	10	12
Onion Slough W.C.	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Monona I.D.	$\frac{1}{2}$	1	2	3	4	4	4	5	5	6	10	11	12	13
Porcupine Cut										2	4	4	4	5
Valley Mutual					1	1	1	2	2	3	9	12	12	12
Amalgamated I.D.									1	1	1	3	8	8
Fresno Scraper Canal									1	1	1	1	3	3
Sierra MWC										1	1	1	1	1
Barcelona W.S.D.									1	1	1	1	4	20
Dynamic Ditch	$\frac{1}{2}$	1	1	1	1	1	1	2	2	2	2	2	2	2
Poverty I.D.	2	2	3	3	3	3	4	4	4	4	4	8	10	10
Dryland Development		1	1	1	1	2	2	3	3	3	3	3	6	6
Inovating MWC			1	1	1	2	2	2	2	2	2	2	8	8
Enterprise I.D.			1	1	1	1	1	1	1	1	1	6	6	16
Late-blooming Farmers' Canal Co. }	1	2	3	4	4	4	4	4	5	5	5	5	5	15