CHAP. 2 – KEY ELEMENTS

Supply natural→retail	Efficiency four initial types
Demand people & firms	MNBs for retail water

1

DEMAND THEORY

People

- People derive satisfaction from their use of water.
- Yes, they sustain "life" with water too, but life is not typically relevant "at the margin" where efficient allocation is determined.
  - except, maybe, in undeveloped-country situations

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DEMAND THEORY

- Self-interested, utility-maximizing behavior leads people to
  - apply limited water to their most valued uses
  - cut back on their less-valued uses as water price increases

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DEMAND THEORY

- Meaning that: behavior can be mapped via a demand curve or function

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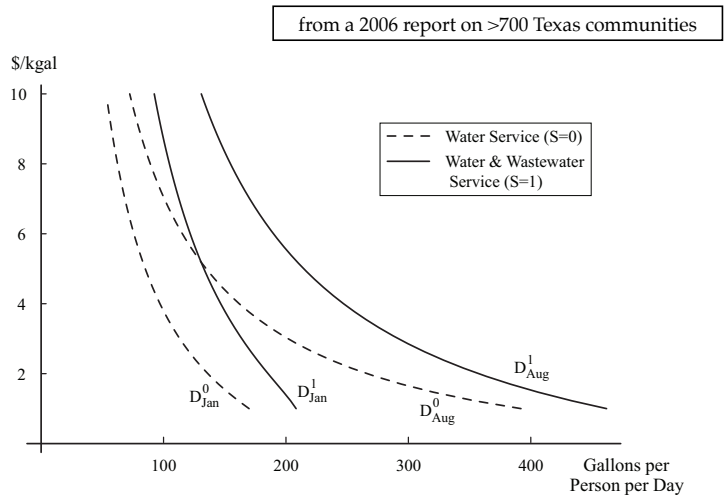

Figure 4.1 Texas Community Water Demand Functions

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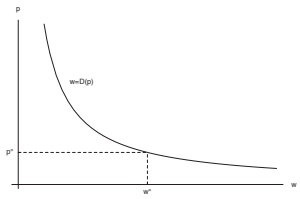
DEMAND (FROM BOTH SOURCES)

So, "Demand"



- results from self-interest
- isn't a single number
- takes the form: $w = D(p; \text{other things})$
- is invertible to $MB = D^{-1}(w; \text{other things})$

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POINT EXPANSION

	Linear		Log-Linear	
Known p & w	3	35000	3	35000
Adopted ε	-0.5		-0.5	
dw/dp	-5833.33			
Form	w=-5833p+b		$w = kp^{-0.5}$	
substitute:	35000=-5833•3+b		$35000=k•3^{-0.5}$	
therefore,	b=52500		k=60622	
Result	w=-5833p+52500		$w = 60622p^{-0.5}$	

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WORKING WITH DEMAND

- Demands can be added, when water type is the same.
- Sometimes use w=..., sometimes mb=...
- Now that the important aspects of supply (mc) and demand (mb) are established, they can be brought together.

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MNBS

applying aggregate efficiency

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Working with MNBs

- Combine mb with mc:
  - mnb(w) = mb(w) - mc(w)
- Saying D=S is similar but less useful in water work as it implies markets and isn't adept for water's other idiosyncrasies, like return flow.

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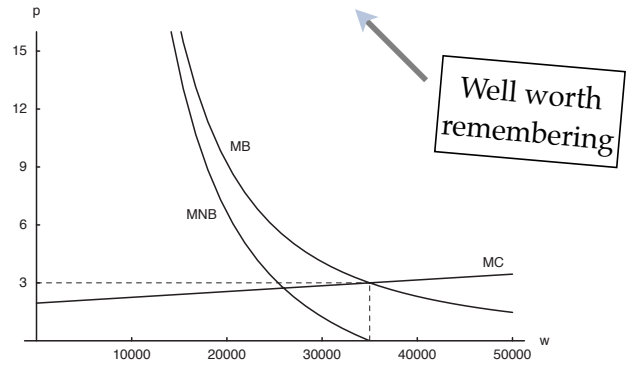
Working with MNBs

mnb of retail water is the mb of natural water!



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Working with MNBs

- For simple hydro-econ settings, aggregate efficiency implies equal MNBs for all involved agents.
  - Math is in text.
  - sufficient to make MNBs a prime concept

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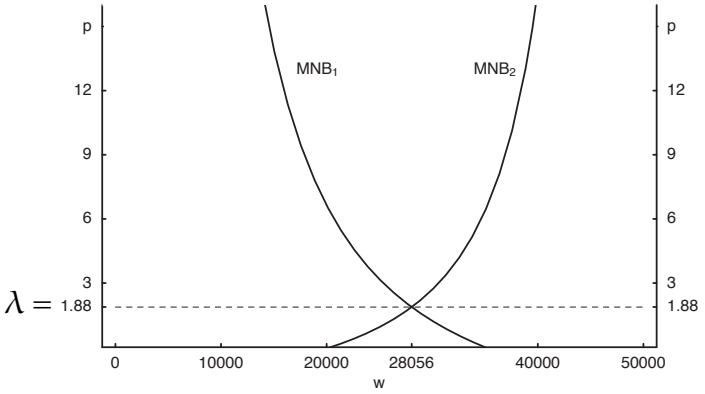
WORKING WITH MNBS



What happens when planning is based on $\lambda = 0$?
What happens when mb↑ ?

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WORKING WITH MNBS

- This sort of analysis is possible only when we've used mc to adjust mb to an equivalent type/location of natural water.

Natural Water	differential processing →	Retail Water

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POLISHING

What if reuse is practical?

What if uses are nonrival?

What if fairness is important?

What if conservation is important?

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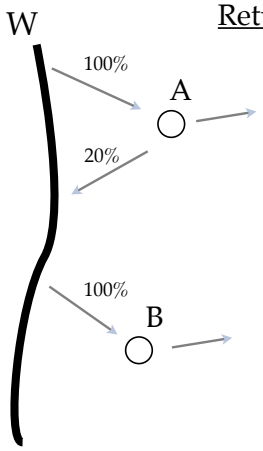
REUSE ACROSS USERS



Return flow example

Social Problem

$$\text{Max } [NB_A(w_A) + NB_B(w_B)]$$

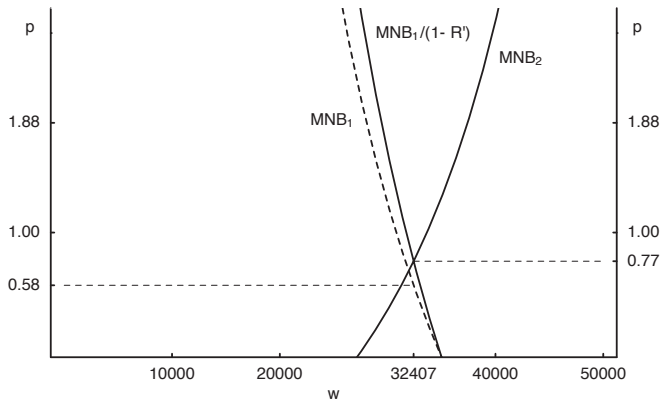
$$\text{s.t. } W - w_A + 0.2w_A \geq w_B$$

or

$$\text{Max } [NB_A(w_A) + NB_B(W-0.8w_A)]$$

$$\Rightarrow MNB_A + MNB_B \bullet (-0.8)=0$$

REUSE ACROSS USERS

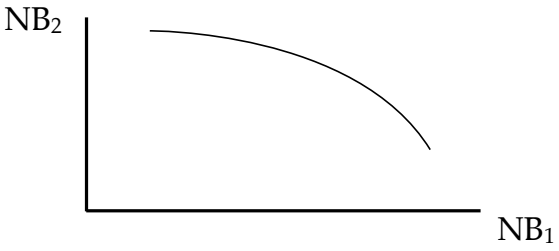


NONRIVAL USERS

- If water is truly scarce, nonrival users don't limit or harm each other's use, but as a group their use is rival to other uses. Examples?
- Because nonrival uses don't detract from one another, their MBs are additive.
  - If rival, demand sum is $w_A + w_B$.
  - If nonrival, demand sum is $MB_A + MB_B$.

WHEN FAIRNESS IS A ISSUE

- Maximizing sum of rivaling NBs is suspect when society is concerned about separate NBs.
- So it's appropriate to explore tradeoffs as in:



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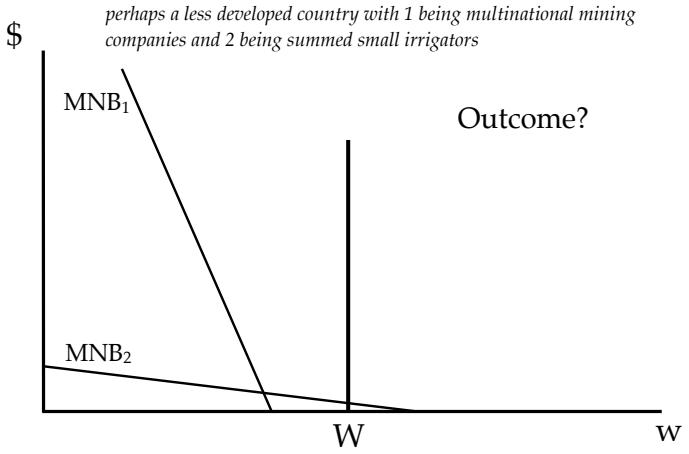
WHEN FAIRNESS IS A ISSUE



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CONSERVATION?

- Does economics care about conservation?
  - Yes, that's the intent of all of this static theory.
  - But we're trying to conserve both water and nonwater resources, so as to achieve a socially desirable balance.
- After all, efforts to save water involve other sacrifices which have value too.

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