Water trading in England

- One mechanism to decrease the economic costs of scarcity events

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Contents

- Conceptual and English context
- Observed trades 2003-08 in England and proposed improvements
- Barriers to trading
- Tools for Cost-benefit analysis & policy simulation
- Conclusions and recommendations

Conceptual Context

- Drought is a hydrological; water scarcity is a human (economic) concept
- Scarcity exists when at zero price, quantity demanded is greater than quantity supplied
- Under traditional supply-based water development paradigm, policy responses are:
  - develop resources / build infrastructure to increase supply during non-droughts
  - rationing during droughts (priorisation)
- Increased recognition that these can be ecologically and economically inefficient (rationing may not be solution with lowest societal cost)

Demand-side management

- Under existing or upcoming scarcity, it becomes useful to also include demand-side measures
- Policy measures include:
  - Demand management (communication campaign, drought pricing)
  - Long-term and short term trading (e.g. option contracts) of water licences

Joint supply/demand perspective

- Continuum between water scarcity (long-term) and drought (short-term)
- Not all droughts require a management response (e.g. Norway), but all scarcity events do

From a policy & management perspective, should we speak of water scarcity events rather than droughts?

National Context: England & Wales Water

- Environment Agency manages national water abstraction licensing system (1963)
- All water abstractions regulated to preserve environmental quality
- Droughts: 1976, 1996, 2006
- EA emits no more new abstraction licences in several areas
- EA encourages licence trading since 2003 but few trades occur; water companies not trading
- 2009 govt. commissioned independent reviews

Independent Review of Competition and Innovation in Water Markets:
Final report

This talk focuses on

Professor Martin Cave
April 2009

Chapter 3	Abstraction and discharge
Chapter 4	Upstream
Chapter 5	Retail
Chapter 6	Industry structure
Chapter 7	Innovative capacity

Water Trades
in England & Wales 2003-2008
& Proposed Improvements

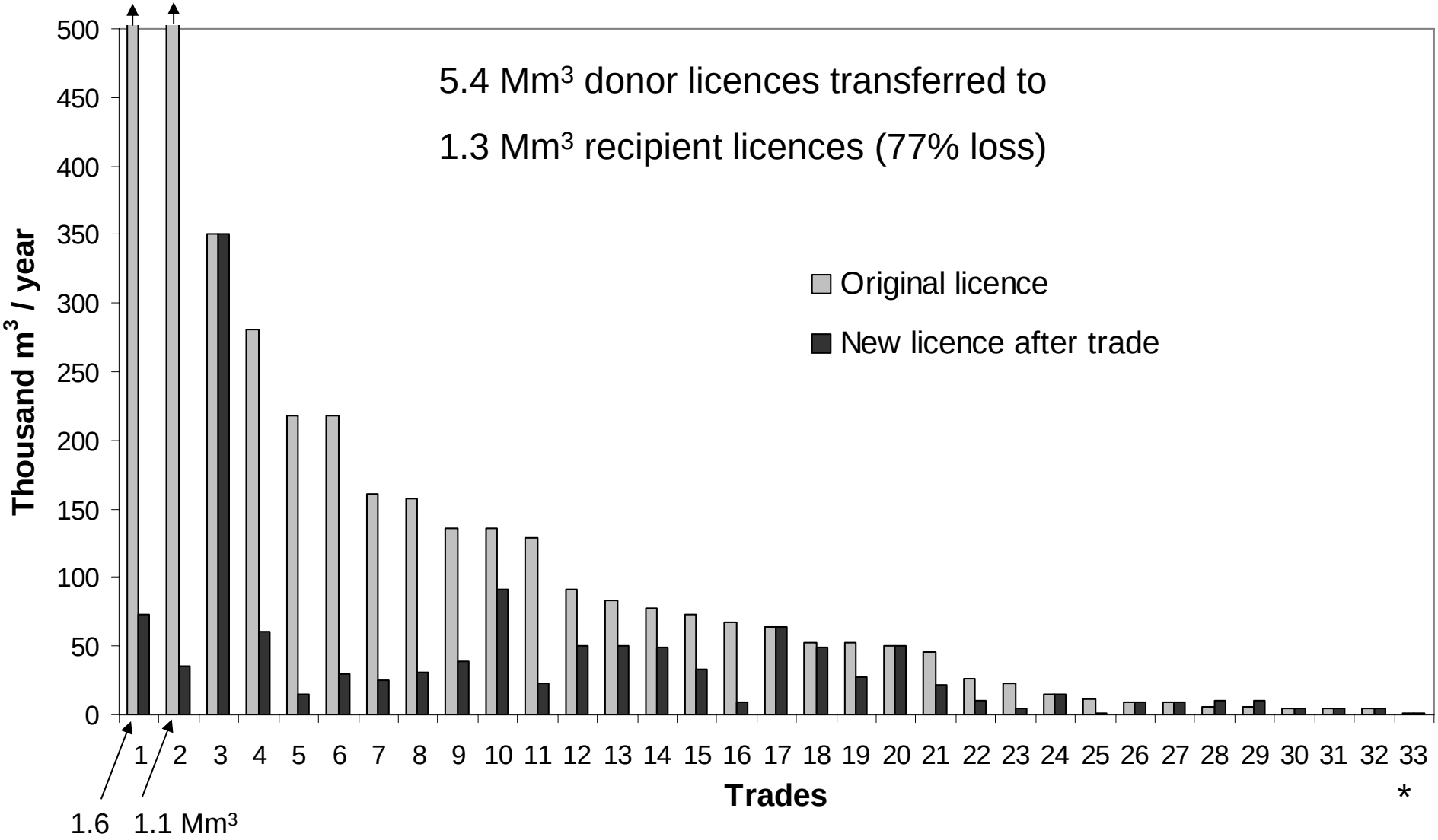
Water Trading in England & Wales

1. Intra-basin trading of abstraction licences (50 trades 2003-08)
2. Intra-basin or inter-basin trading between water companies (infrequent)

Intra-basin Abstraction Licence Trades

- 2003 Water Act encouraged (intra-basin) trading of abstraction licenses
- EA must approve trade and can change licence conditions, but does not act as broker
- 48 licence trades between 2003 – 2008
- Traded licences (after trade): 1.9 Mm^3 (0.002% of total annual abstractions)

Reductions in Traded Licenses



* N.B. Original licensed volume missing for 15 trades

Temporary vs. Permanent

	Number of Trades	% by Number	Volume (m^3/yr)	% by Volume
Temporary	23	48%	992,518	53%
Permanent	15	31%	456,995	24%
Unknown	10	21%	431,163	23%

Who's Giving Up Water?

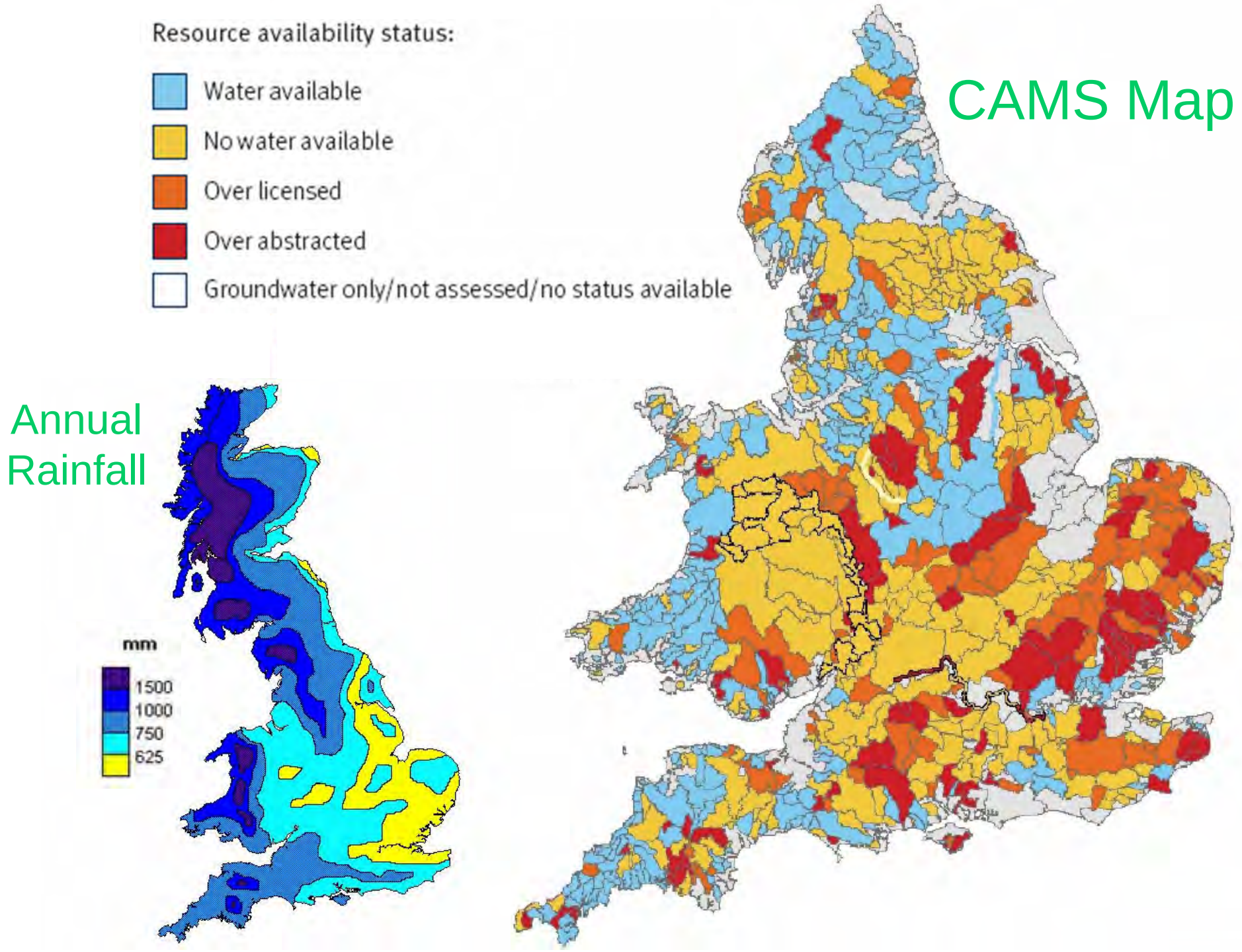
Donor's Licence Purpose	Number of Trades	% by Number	Volume (m^3/yr)	% by Volume
Spray irrigation	34	71%	992,280	53%
unknown	5	10%	51,000	3%
Water supply	2	4%	95,000	5%
General Farming	2	4%	24,000	1%
Mineral washing	2	4%	410,496	22%
Industrial	2	4%	272,500	14%
Heating - cooling	1	2%	35,400	2%

Who's Buying Water?

Recipients Licence	Number of Trades	% by Number	Volume (m^3/yr)	% by Volume
Spray irrigation	34	71%	953,280	51%
Water supply	5	10%	168,500	9%
General Farming	4	8%	123,000	7%
Industrial	2	4%	85,400	5%
Mineral washing	1	2%	350,496	19%
Heating - cooling	1	2%	200,000	11%

Trade Locations

	Number of Trades	% by Number	Volume (m^3/yr)	% by Volume
Anglian	31	65%	1,003,964	53%
Thames	5	10%	428,947	23%
Midlands	4	8%	295,465	16%
Southern	3	6%	73,000	4%
South West	2	4%	24,000	1%
North East	2	4%	25,000	1%
Wales	1	2%	30,300	2%


Resource availability status:
Water available
No water available
Over licensed
Over abstracted
Groundwater only/not assessed/no status available
CAMS Map
Annual Rainfall
mm
1500
1000
750
625

Trade Across Sectors

Donor to Recipient	Number of Trades	% by Number	Volume (m^3/yr)	% by Volume
Agriculture and farming to same use	35	73%	980,880	52%
Water supply to same use	4	8%	96,000	5%
Other	9	19%	803,796	43%

Summary Intra-basin Trading 2003-2008

- Few trades
- Most trades are small
- Most trades stay within agricultural sector in East and South England

Proposed Measures – Environment Agency

- Achieve sustainable abstractions, a pre-requisite for sustainable trading
- Provide market with more information (e.g. online trading centre)
- Improve licencing admin. processes
- Improve information on licence conditions and how they could change under trade

Proposed Measures – Cave Review

- Legislation should allow revenues from abstraction charges to rise above that required for cost recovery – these **scarcity charges** are an incentive to return unused or unvalued licenses
- **Reverse auctions** could be held where the EA buys back licenses (funded by scarcity charges)
- **Negotiated agreements** on voluntarily reductions between EA and collective abstractors could avoid the above

Trading between Water Companies

- Water companies are not trading amongst themselves or with other licence holders
- Potentially large economic and ecological efficiency gains exist:
  - decrease system wide costs
  - differ costly and potentially ecologically disruptive new supply infrastructure

Trading between Water Companies

Not currently incentivised by:

- **Regulation**: water companies are regulated monopolies allowed return to capital.
  → Companies maximise capital (ie. New infrastructure) and minimise operating costs (e.g. trading)
- **Pricing**: average cost pricing means prices don't reflect incremental ('marginal') cost of new resources (often high in water scarce areas)

Some Proposed Measures

- Entry/exit charge fixed pricing scheme
  - Like natural gas industry
  - Water companies able to predict cost of a trade given predictable pricing formula
  - Low exit costs where marginal costs are high
- Change regulations determining allowable industry returns to incentivise trading

Barriers

Hydrological Challenges to Trading

- In normal years, not enough scarcity in many areas (“Sleeper licences”: less than 50% of licensed water abstracted in normal years)
- Drought needed to kick-start market
- Accounting of traded water (seepage, evap., riparian use)

Environmental Challenges to Trading

- EA agrees to downstream trades but dislikes upstream (greater environmental impacts of abstraction upcatchment)
- Pumping from groundwater connected to rivers can effect river levels
- Sleeper licences could be ‘awoken’ by market leading to over-abstraction

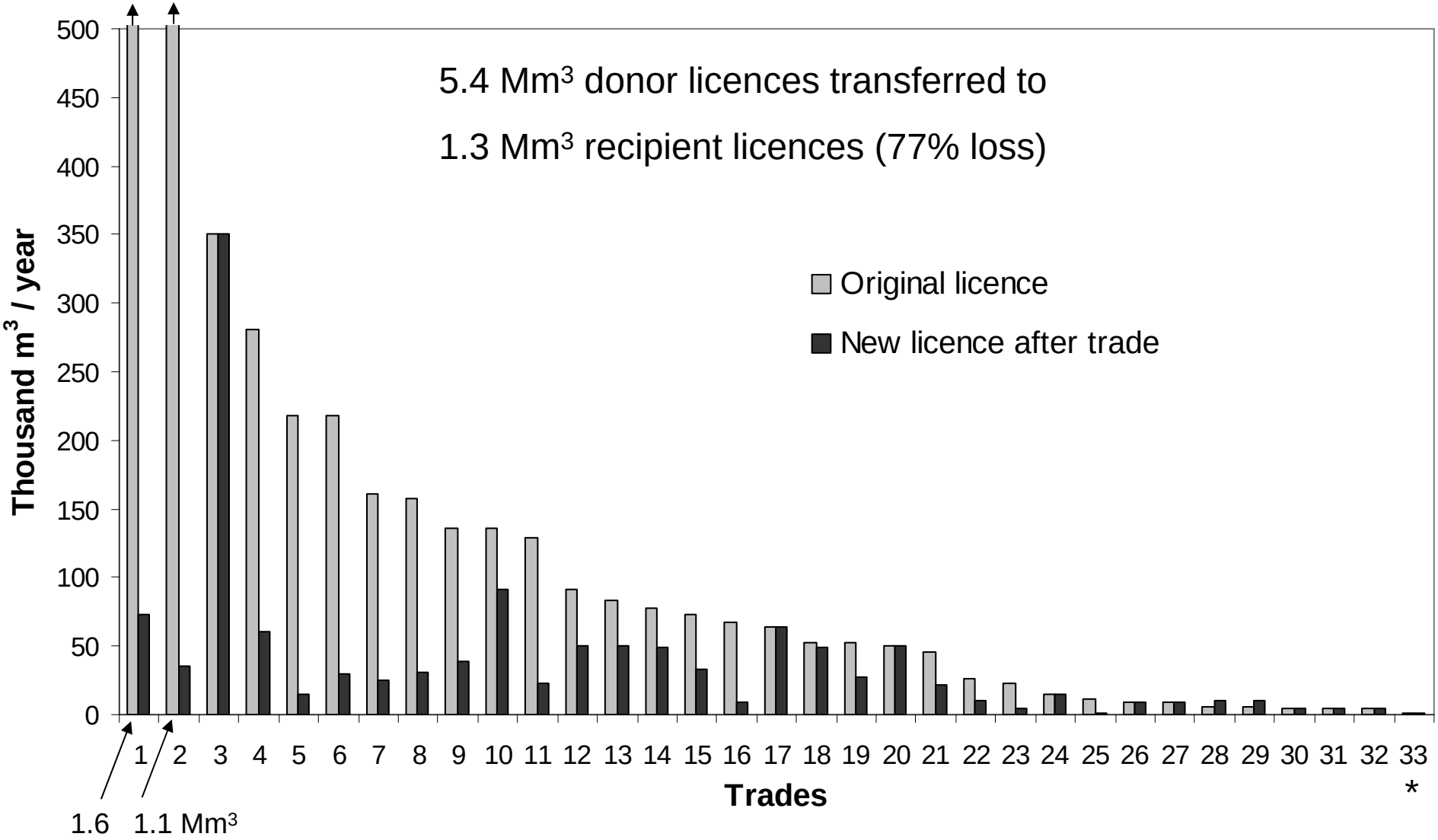
Economic Challenges to Trading

- Market Failure
  - Little low-value water use; majority of water use is already used for high value economic activity (water supply, energy, industry)
  - Only consumptive uses can meaningfully trade (water supply, industry, agriculture) – ‘thin’ market with few participants
- Prices
  - Licence value linked to changing CAMS status assessments, licence conditions and duration
  - Given diversity and uniqueness of licences & absence of price data, it’s hard to establish licence value
  - Prices could vary as in other water markets

Institutional Challenges to Trading

- Uncertainty about traded licence modifications discourages trading
- If user trades water, when time-limited licence is due for renewal, can they claim ‘reasonable need’?
- **Transaction costs** from
  - uncertainty about licence value
  - licence modification during trade

Reductions in Traded Licenses



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Poor Incentives for Water Companies

- Legal, regulatory frameworks encourage companies to be self-sufficient
- E.g. must supply own region 1st, regs. encourage capex over opex
- Issues to resolve: pricing, common carriage, treated water quality & access to networks

Political, Social Challenges

- People unaware market is active
- Fear of hoarding of licences, e.g. by water companies
- Distrust of ‘market’
- Resistance to change, commodification

Cost-Benefit and Policy simulation Tools

Hydro-economic models

- Complexity of integrated ecological / economic / regulatory / hydrological / engineering problem may overwhelm current Cost-Benefit methods
- Hydro-economic models may be a viable alternative and or complement
- They allow estimating benefits and costs of trades; and policy simulation in general

Hydro-economic models

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Review

Hydro-economic models: Concepts, design, applications, and future prospects

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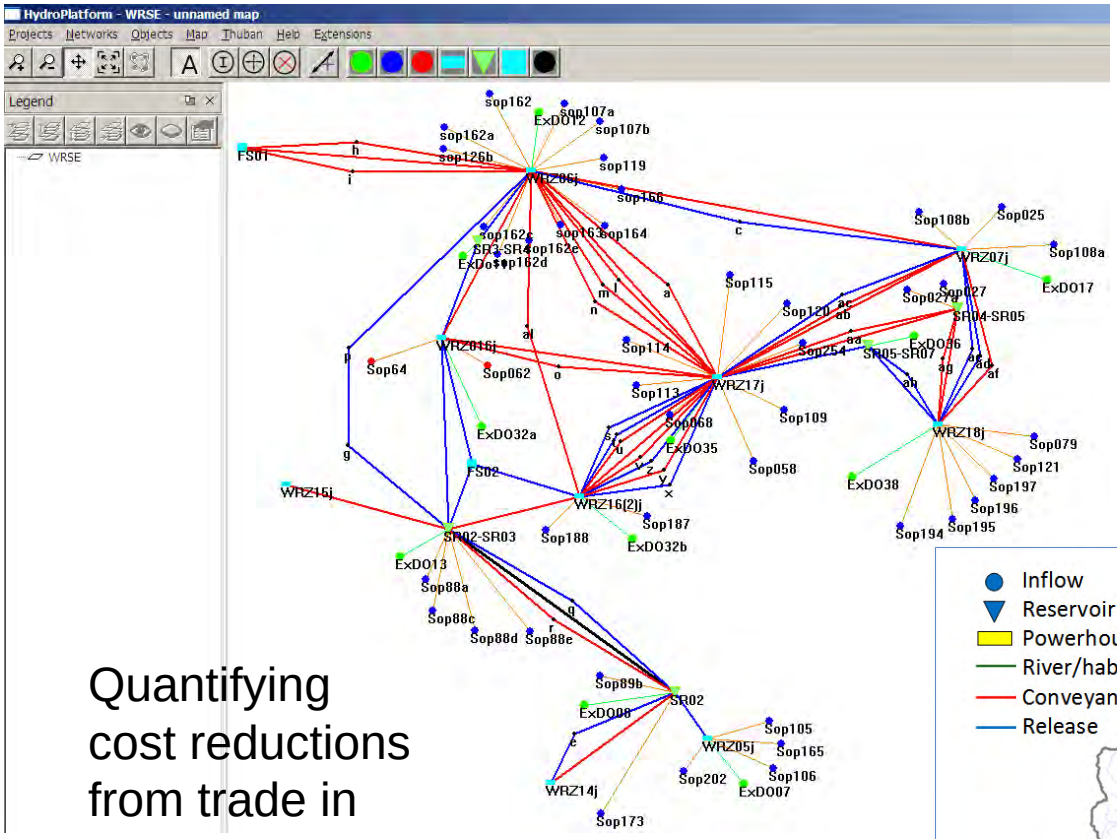
SUMMARY

Future water management will shift from building new water supply systems to better operating existing ones. The variation of water values in time and space will increasingly motivate efforts to address water scarcity and reduce water conflicts. Hydro-economic models represent spatially distributed water resource systems, infrastructure, management options and economic values in an integrated manner. In these tools water allocations and management are either driven by the economic value of water or economically evaluated to provide policy insights and reveal opportunities for better management. A central concept is that water demands are not fixed requirements but rather functions where quantities of water use at different times have varying total and marginal economic values. This paper reviews techniques to characterize the economic value of water use and include such values in mathematical models. We identify the key steps in model design and diverse problems, formulations, levels of integration, spatial and temporal scales, and solution techniques addressed and used by over 80 hydro-economic modeling efforts dating back 45-years from 23 countries. We list current limitations of the approach, suggest directions for future work, and recommend ways to improve policy relevance.

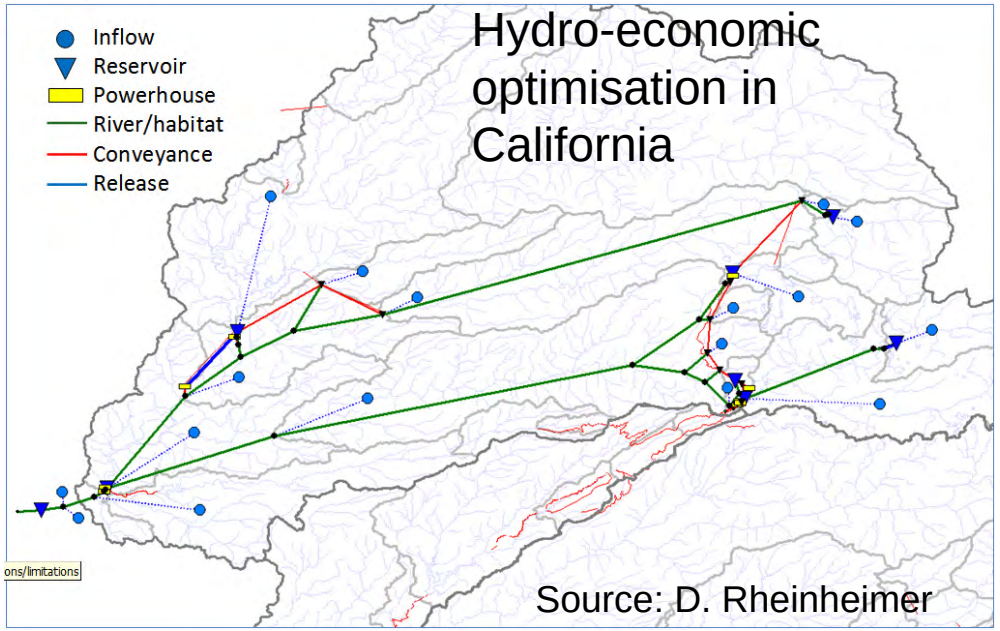
www.hydroplatform.org



Quantifying cost reductions from trade in England

Hydro-economic models can be data-intensive.

HydroPlatform is an open-source user-interface and data management software platform for water management models.



Conclusions

Conclusions

- Water scarcity will increasingly exist over a wider range of hydrological conditions
- Under scarcity, demand-management policies (e.g. trading) will apply during drought and non-drought periods
- Trading can reduce economic and ecological harm of ‘scarcity events’

- Currently little licence trading in England and almost no water company trading
- Regulators seek to encourage trading, but barriers remain