


Responsible Use of Rivers

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29th April 2021

Is there such a thing as responsible use of rivers?

- ▶ Or is any use to be actively discouraged, minimised and ultimately phased out.
- ▶  if 'no such thing'

- | | | |
|---|---|--|
| ▶ Public Water Supply <ul style="list-style-type: none">▶ Routing and storage | ▶ Drainage <ul style="list-style-type: none">▶ Flood management | ▶ Recreation <ul style="list-style-type: none">▶ Angling▶ Walking margins▶ In stream (kayaking, swimming, boating ...) |
| ▶ Wastewater <ul style="list-style-type: none">▶ Conveyor▶ 'self-purification' | ▶ Agri/Food <ul style="list-style-type: none">▶ Irrigation | ▶ Commercial Fishing |
| ▶ Navigation <ul style="list-style-type: none">▶ Human transport▶ Trading | ▶ Industry <ul style="list-style-type: none">▶ Hydropower▶ Process water▶ Cooling | |

Case Study :

Upland Interests, Lowland Interests & Perceived Change in Flood Risk 1878-9



Scope

- ▶ Aspects of Responsible Use of Rivers
 - ▶ Legal Framework Development
 - ▶ The current water resource challenge in England
 - ▶ Strategic decision making with some major implications
 - ▶ Flavour of trade-offs in current water resource planning
 - ▶ Discussion
 - ▶ Case Study - Upland Interests v Lowland Interests : Flooding Risk
-
- ❑ Main presentation - Neil Edwards (AquaInform)
 - ❑ Active chat - Ben Williams (RWE Generation UK)
 - ❑ Chat Themes - Ben will collate as necessary
 - ❑ Discussion / Case Study - free for all + chat

Responsible Use of Rivers

Responsible

- Having obligation, authority control, duty of care
 - (to) being answerable to an authority
- Primary cause, carrying blame or getting credit for something
 - Morally accountable for behaviour
 - Having good judgement and the ability to act correctly
- (of a job) Having importance, independence or control
 - Capable of being trusted

Use

- Abstraction
- Discharge
- Drainage
- Navigation
- Fishing
- In stream recreation
- Margin Recreation
- Structures/Buildings

Rivers

- Water
- Banks & Bed
- Margins
- Flood plain
- Catchment

- ▶ 'Responsible' involves 'value' judgment (morality, correctness) beyond mere 'legal compliance'
- ▶ View points on 'values' include ...
 - ▶ User
 - ▶ Other users
 - ▶ Regulators
 - ▶ User's customers

- ▶ Affected non-user parties
- ▶ Local interests
- ▶ Non-local interests
- ▶ Investors

Does Responsible Use of Rivers Need Controlling or Can Users ‘Sort it Out for Themselves’?

- ▶ Water Wars/Range Wars - ‘derogation’ of ‘existing water rights’
- ▶ Protection of environment
 - ▶ It can’t compete for itself
 - ▶ Agent(s) acting for environment (eg Environment Agency, Natural England, Rivers Trusts, Wildlife Groups...)
- ▶ Social mechanisms tend develop to resolve dispute once dependence on rivers evolves eg
 - ▶ Risk of unavailability of water resource
 - ▶ Intrinsically uncertain subject to natural seasonal and weather related statistical distribution
 - ▶ Risk of Flood
 - ▶ Risk of adverse water quality
 - ▶ Intrinsically uncertain subject to natural seasonal and weather related statistical distribution
- ▶ Need a future-facing system to deliver sufficient confidence for would be users to commit to invest in new activity/infrastructure & provide a degree of protection (but not fossilise) existing users eg
 - ▶ against new (excessive) upstream consumptive use, or diversion or excess
 - ▶ against new upstream (excessive) impairment of quality
- ▶ ie Planning
 - ▶ Anticipating problems and avoiding them
 - ▶ Towards ‘best’ use?



Illustration:
Water Resource
Management in England
- Focus on Abstraction
from Rivers

England - Water Resource Regulation Development

<1878 2000-3000 individual 'local' Acts of Parliament (Local Sanitary Authorities, Statutory Water Undertakers, Conservancies)

1878 River Conservancy Bill - advocated integrated water management at river basin scale

1930 (Land Drainage Act)

- 47 of 100 identified Catchment Boards created

1945 (national policy on proper use of water resources)

1948 River Boards Act

- 17 River Boards
- Expanded to 32
- Subsumed Fisheries Boards

1951 Rivers (Pollution Prevention) Act

- discharge licences

1963 Water Resources Act

- 27 River Authorities
- Abstraction licensing (first come first served)

1973 Water Act

- 10 regional Water Authorities

1989 Water Act

- 10 Water Companies (PWS) + 1 National Rivers Authority (Aq Env Regulation)

1995 Environment Act

- 1 Environment Agency integrates 1 National Rivers Authority with Her Majesty's Inspectorate of Pollution and multiple Waste Authorities

2000-date Water Framework Directive River Basin Management Planning

- 11 River Basin Districts (Eng & Wales)

1999-2013 various changes to water resource management planning and abstraction licensing including all new licences to be time limited to 12-24 years

- 14 Catchment Abstraction Management Strategy 'areas'
- Each with several (3-10) Catchments

2017 Abstraction Plan replaces 2013-2017 Reform Initiative to fix abstraction licensing regime perceived no longer fit for purpose

- Unsustainable abstraction to be remedied
- Catchment Based Approach (100+)

2019 5 Regional Water Resource Planning Groups (England) introduced

Key Regulatory Theme - Much Simplified

- ▶ Institutional arrangements
- ▶ 1879-1973 - towards functional integration at river basin scale :
 - ▶ Increasing geographic scale to whole watersheds controlled by a single institution
 - ▶ Across sufficient range of interrelated issues and services including PWS
 - ▶ = Integrated river basin management
 - ▶ Knowledge
 - ▶ Power/Authority
 - ▶ Funding
- ▶ Culminating in the Water Authorities of 1973 as public bodies
- ▶ 1973-date - 'oscillation on scale' and more emphasis on 'economics' principles :
 - ▶ Water Authorities dismantled in privatisation of 1989 (economics principles applied in many settings not just 'water')
 - ▶ Separation of regulation & 'activity'
- ▶ New integration requirement via Water Framework Directive (2000)
 - ▶ Integrated Management Planning at River Basin District scale with Environment Agency as Competent Authority
 - ▶ Requires public participation
 - ▶ Balance of costs and benefits in setting targets
 - ▶ 2000-2015 RBDLP Liaison Panels (acting as critical friend to EA)
 - ▶ Dismantled in 2016 to focus at catchment scale
- ▶ New National and Regional Water Resource Planning initiatives
 - ▶ Water Company and Environment Agency dominated
 - ▶ Consideration of non-Public Water Supply interest

Primary features of an abstraction licence (England) & factors influencing determination

▶ Features

- ▶ Abstraction position / (area)
- ▶ Abstraction volume flows permitted for purpose(s)
 - ▶ Instantaneous, hourly, daily, [weekly], Annual
 - ▶ Possibly linked to river flow/level
 - ▶ Hands Off Flows (HOF)
 - ▶ Hands Off Levels (HOL)
- ▶ Reporting requirements
 - ▶ Compliance
 - ▶ Information
- ▶ {Biota Protection Provisions eg behavioural deterrents, fish recovery and return arrangements}
- ▶ [formerly included specification of land on which use takes place]

▶ Factors

- ▶ Aquatic environmental protection (Water Resources)
 - ▶ Environmental Flow Indices (EFI)

▶ Protected Area requirements

▶ Biota Protection

- ▶ Entrainment/impingement/ modification of flows ...

▶ User protection

- ▶ Against derogation (of existing licence right)

▶ Reasonable need and efficient use test

- ▶ For the purpose
- ▶ Does not consider the 'worth of the purpose'

▶ System does not always result in economic efficiency of use of scarce water resource

▶ Is First Come First Served (FCFS)

▶ But not all non-trivial abstractions require an abstraction licence!

- ▶ Coastal waters out of scope of abstraction licensing

Does compliance with a licence constitute responsible use of water?

- ▶ With a reputable licensing system, what can possibly go wrong...?
- ▶ ... change eg
 - ▶ Technology/techniques evolve to be more water efficient
 - ▶ What was reasonable need when granted may no longer be reasonable for the purpose
 - ▶ Production/demand tails off but leaks/losses/inefficiencies develop
 - ▶ May not be cost efficient for user to fix leaks if cost of fixing > cost of water eg long period until leak fix project payback
 - ▶ Views on environment needs change
 - ▶ Higher allocation to environment now thought desirable or become legally required
 - ▶ More licencing might have been issued than is now thought consistent with desired environment protection
 - ▶ Could imply occurrence of environmental damage (in fully licenced scenario) if nothing is done on licensing/restricting actual use
 - ▶ Growth in demand from existing users
 - ▶ PWS- Population growth and change in affluence leads to demand outstripping improvements in household water use efficiency
- ▶ Agri/food - market develops to favour more water intensive products
- ▶ Would be users with higher economic value purposes appear
 - ▶ if all available rights have been issued then barrier to their market entry
 - ▶ role for markets/trading to supplement or replace existing water resource allocation?
- ▶ Climate
 - ▶ Timing, frequency, duration and intensity of rainfall events changing differently in different areas affecting water supply and storage
 - ▶ Changing snow occurrence and snow melt timing
- ▶ What was once appropriate allocation of water resource (and implied use of rivers) may not continue to be as things change

‘Jaws of Death’ Speech 2019

▶ James Bevan (EA Chief Exec, March 2019)

- ▶ Action is needed to avoid demand for water exceeding supply in the next few decades as a result of ...
 - ▶ Climate change
 - ▶ Population growth
 - ▶ Environmental ambition

▶ EA National Framework for Water Resources (March 2020)

- ▶ Defines Regional Planning including ‘alignment’ between regions
- ▶ EA assess there is enough water for each sector within current allocations but not necessarily in the right place or time

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Escaping the jaws of death: ensuring enough water in 2050

Speech by Sir James Bevan, Chief Executive of the Environment Agency Waterwise Conference, 19 March 2019

Published 19 March 2019

From: [Environment Agency](#) and [Sir James Bevan](#)

- ▶ Assumptions for power/energy based on DECC 2011 (pre net zero/hydrogen ...!)
- ▶ ‘Abstractors should not assume they can always meet future growth using volumes of water held on their licences but historically unused’
 - ▶ Context indicates because of EA view of environmental pressures & WFD no deterioration interpretation
 - ▶ Not all required reductions are currently quantified
- ▶ Acknowledges uncertainty in projecting non-PWS future water demand
 - ▶ Creating challenges and opportunity in regional planning
 - ▶ *?What is a ‘valid’ future need, demand, aspiration?*

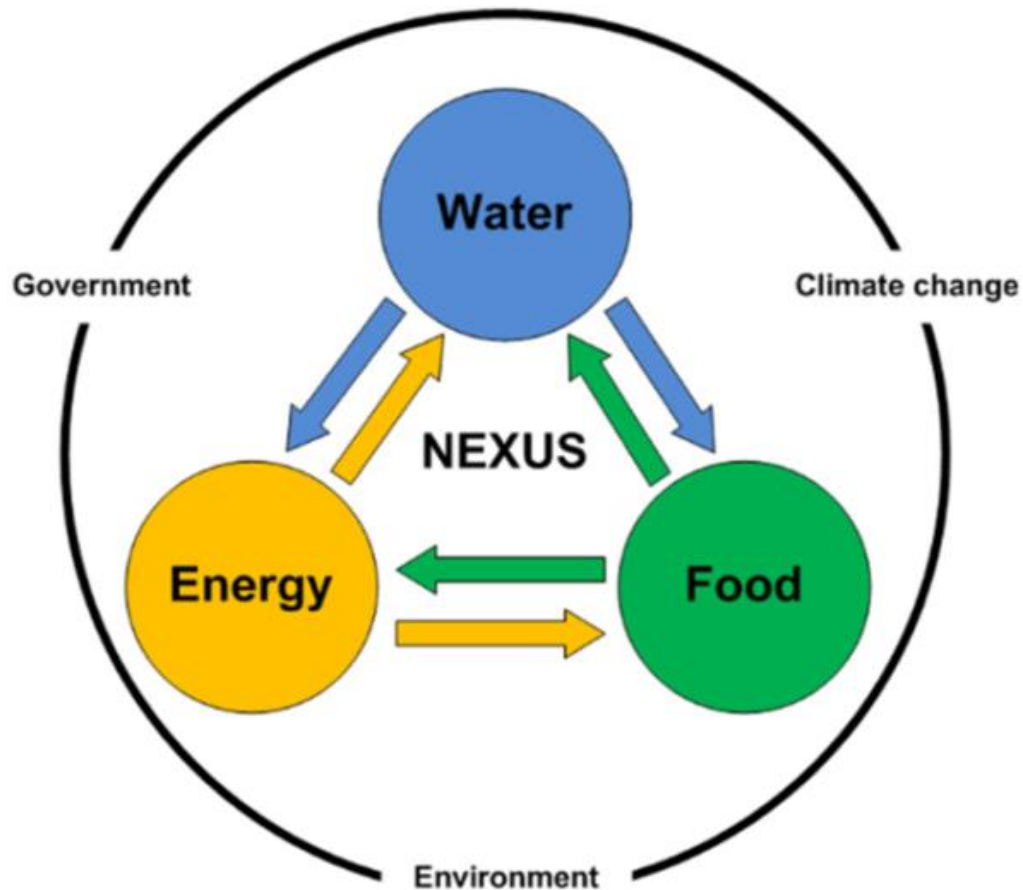


Traditional Trilemma Representation of Energy-Food-Water nexus

Water, energy, and food nexus: review of global implementation and simulation model development

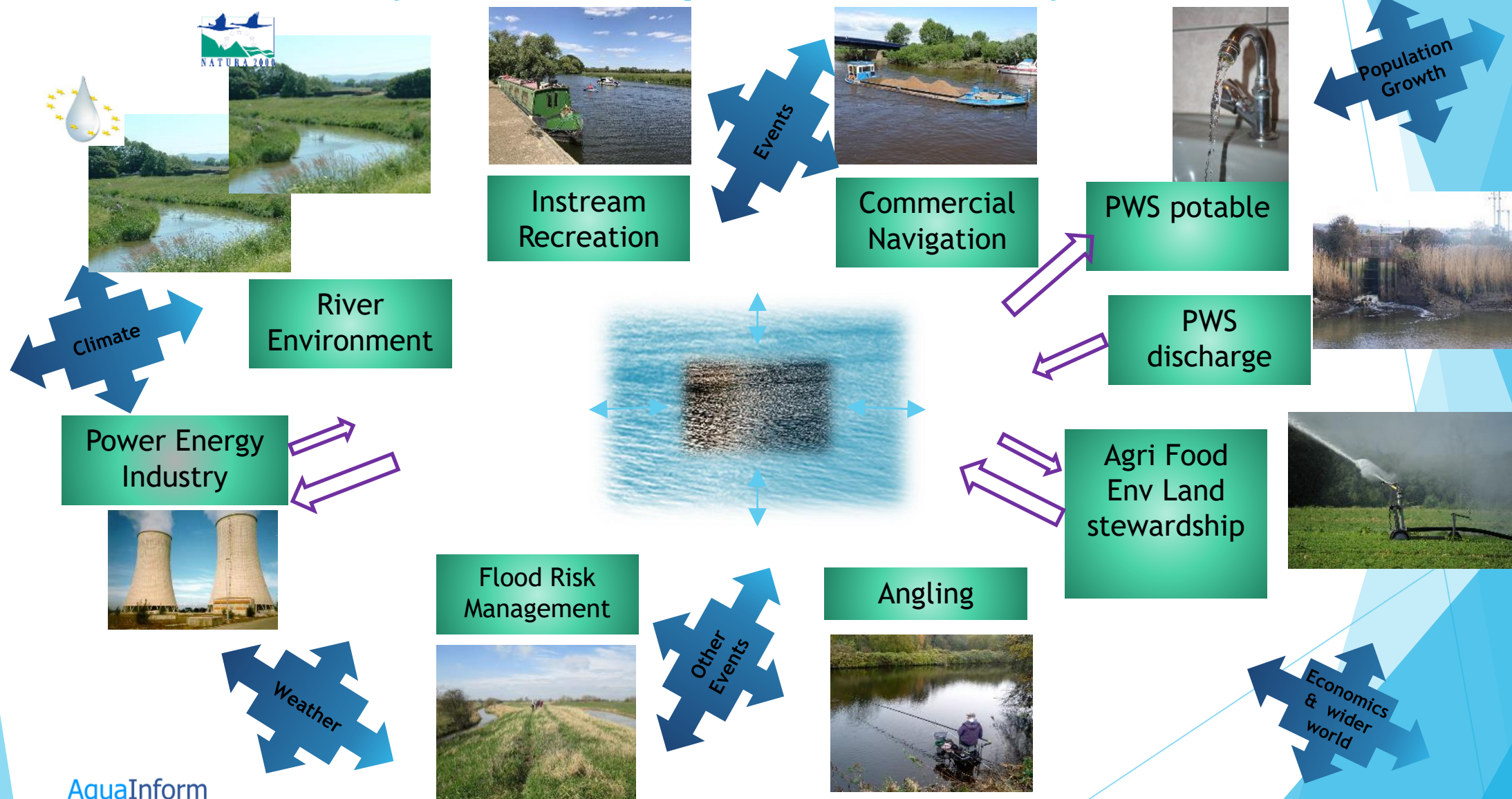
Albert Wicaksono, Gimoon Jeong, Doosun Kang

Published June 2017, 19 (3) 440-462; DOI: **10.2166/wp.2017.214**



- ▶ Energy, Water, Food can be interpreted differently eg as
 - ▶ industries
 - ▶ ecosystem services
- ▶ Government, climate change, environment eg as
 - ▶ external drivers
 - ▶ constraints

Multilemma - multi-activity, multi-party, with variability and deep uncertainty



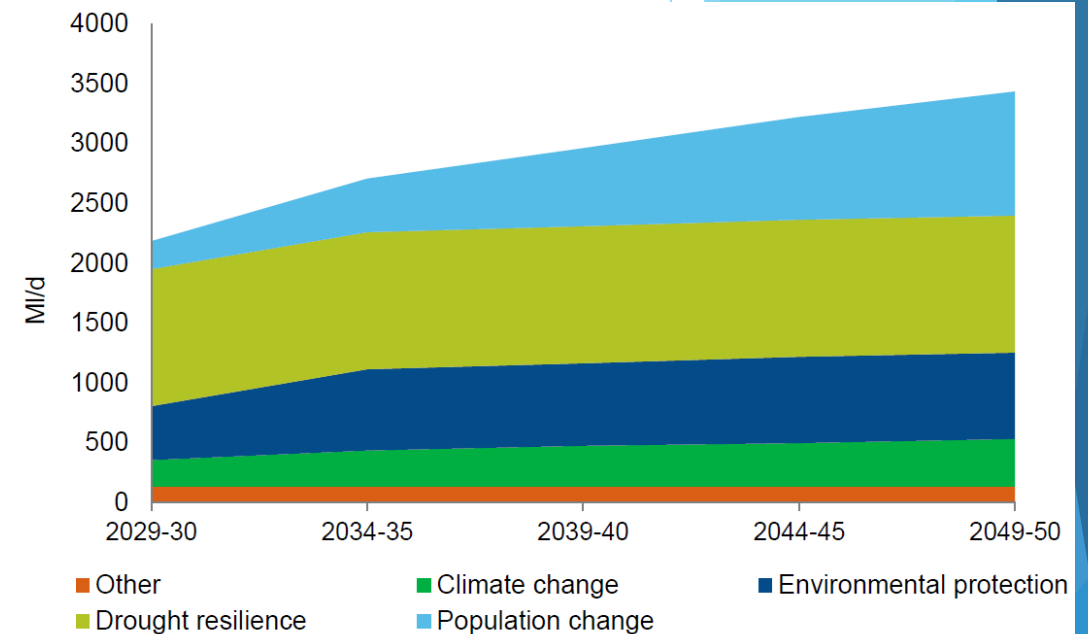
Possible actions to address multilemma

- ▶ Promote changes in water use within current licenced quantities
 - ▶ Incentivising or forcing leak-fixing
 - ▶ Eg more stringent reasonable need/efficient use testing on licence review
 - ▶ Increase price of abstraction licence and/or charging for actual use of water
 - ▶ Difference in economic role of water right and physical water
 - ▶ Use tactics linked to reputation to nudge abstractor/user behaviour
 - ▶ 'Name and shame' on water use/product metric if peer group data are published
 - ▶ Could result in direct stakeholder action (eg customer boycott, demonstrations ...)
- ▶ Set up a stakeholder process to tackle the nexus - may revise licenced quantities ie water resource allocation
 - ▶ eg Integrated National/Regional and Catchment Water Resource Planning
 - ▶ Siting within an already busy arena
 - ▶ River Basin Management Planning
 - ▶ 25 year Environment Plan ...
- ▶ Does an action drive towards 'responsible use of rivers' if it ...
 - ▶ increases cost of product/service
 - ▶ Could lead to closure of activity if cost cannot be 'passed through' impacting on market position
 - ▶ Implications for customers if passed on
 - ▶ Leads to other environmental impacts eg
 - ▶ Increased use of chemicals,
 - ▶ More chemical discharge to manage more complex system chemistry
 - ▶ Increase emissions to air
 - ▶ Leads to worsening of production performance in other measures eg
 - ▶ Energy/product
 - ▶ air cooling rather than water cooling
 - ▶ Fuel or feedstock / product
- ▶ Need to consider the wider picture - not just about the river?

EA National Framework Water Resources

March 2020

- ▶ PWS 1:500 year resilience
- ▶ Outline Definition of Regional Planning
 - ▶ Strategic PWS issues
 - ▶ Define regional environmental destination
 - ▶ Encouragement to be environmentally ambitious
 - ▶ abstraction reductions principally on WatCo where excessive abstraction could compromise attainment of 'ambition' for environmental destination
 - ▶ No checks/balances
- ▶ Consider needs of non-PWS
 - ▶ Traditional silo-sector approach
 - ▶ Sectors to establish their own needs
 - ▶ No appreciation of different sector institutional arrangements
 - ▶ Eg there is no body which can make legal agreements on behalf of the power sector or agriculture
- ▶ WatCo to lead regional processes
 - ▶ Tight integration with WatCo Water Resource Management Plans (and Drainage & Waste Water Management Plans)



English 'additional water need', ML/d,
'do nothing' scenario

Source: NFWR, 2020, Fig 3

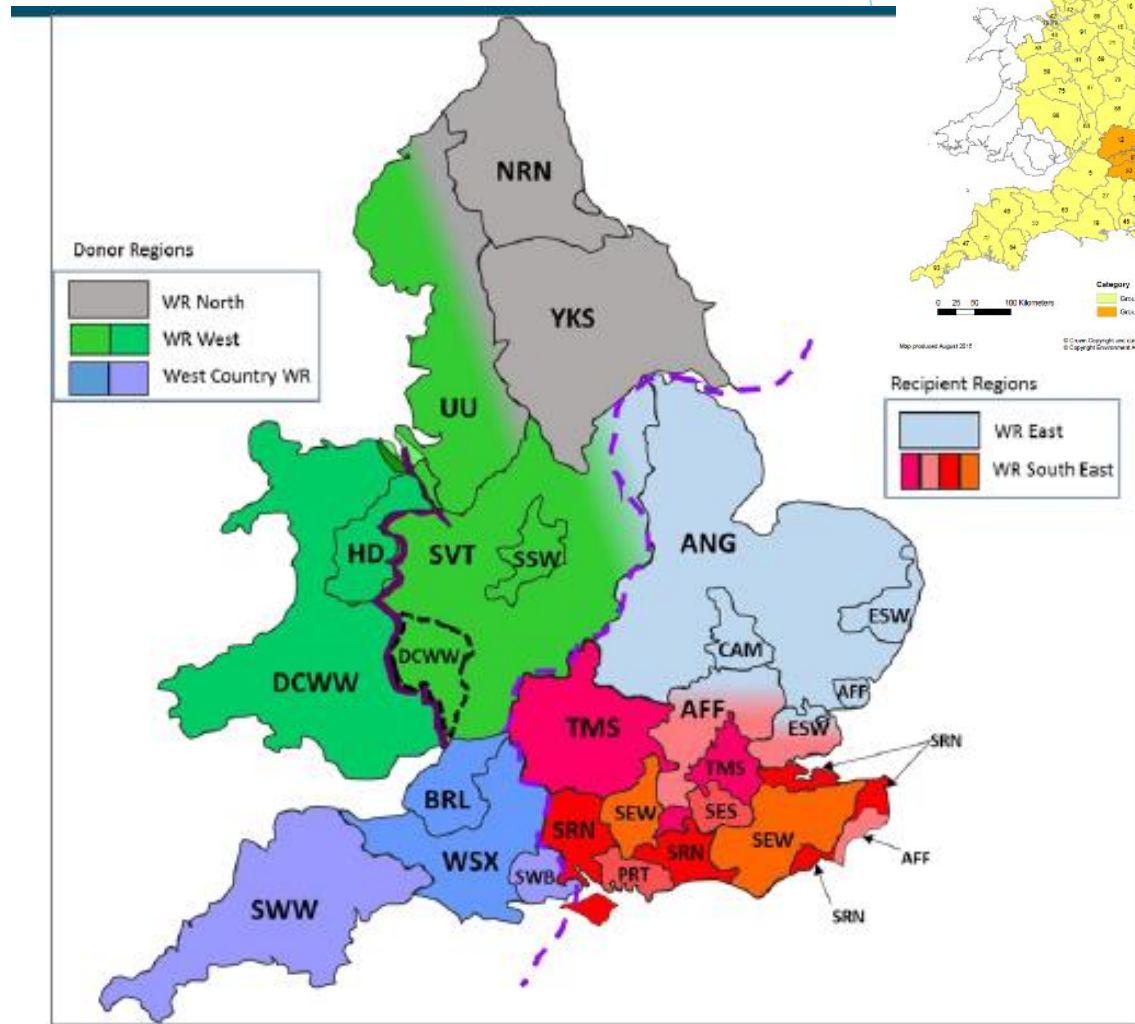
Regional Planning & WatCo Boundaries 2020

The Water Resources East team and Board of Directors wish to thank all of our members and wider stakeholders for their ongoing support for WRE.

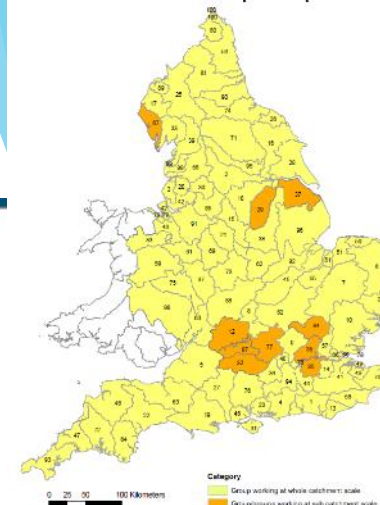


Designed by RED internal communication agency (S.2258) - 01904 479 500

WRE participants 2021 : Source WRE Updated Resource Position Statement March 2021 [WRE-RPS-report-March-2021-FINAL.pdf](#)



Catchment Partnerships in Operation



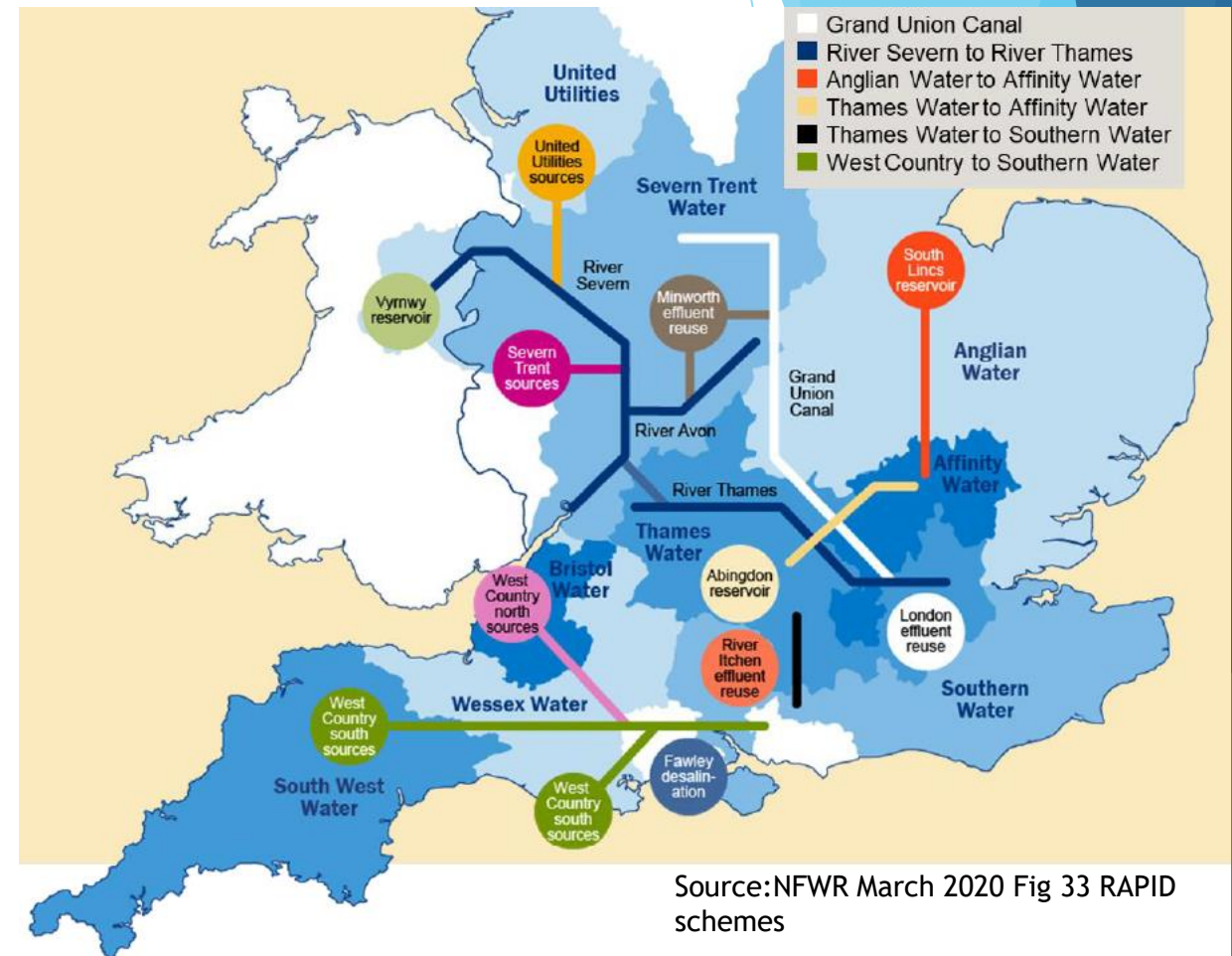
Map produced August 2017

Recipient Regions



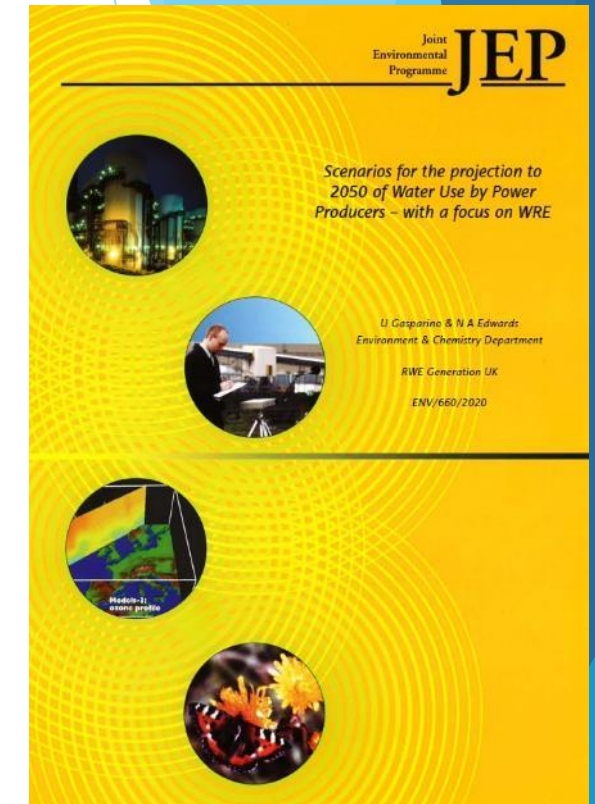
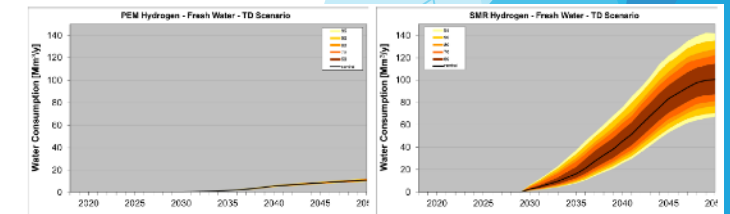
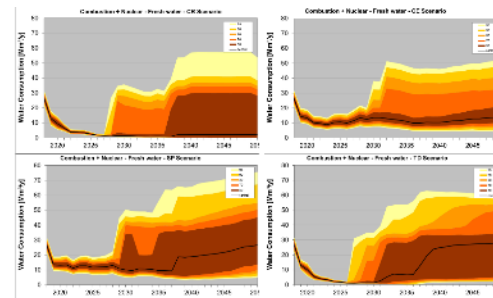
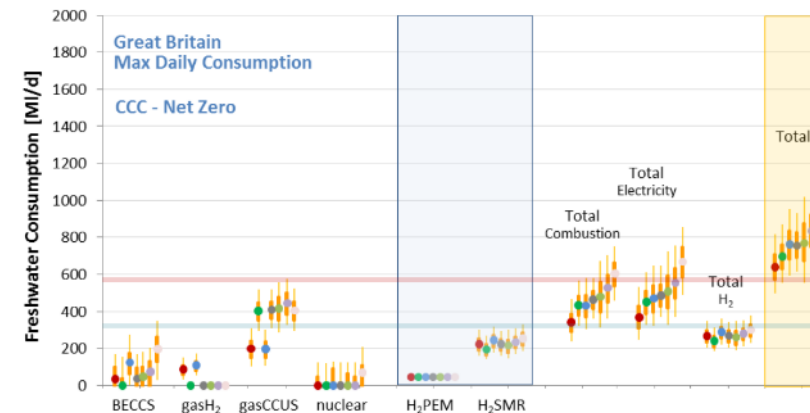
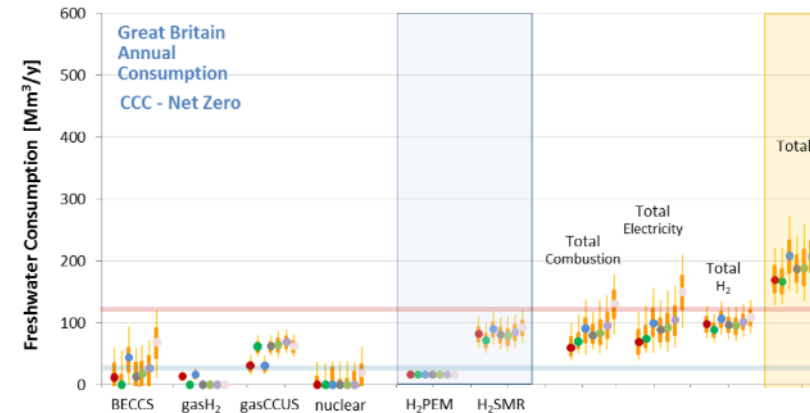
Water Resource Strategic Options England

- ▶ Key Research -are major droughts spatially coherent at length scales relevant to UK?
 - ▶ Research 2017-18 suggested some major droughts could extend over much of UK
 - ▶ 2019 Research suggests climate change will increase drought severity at a given frequency with little correlation beyond 100-150km
- ▶ Hence
 - ▶ little point in local connections for drought resilience but ...
 - ▶ ... Longer range transfers useful
- ▶ Arrangements for PWS drought resilience could also remove much water resource risk for other users in situations other than PWS drought
 - ▶ Mechanisms to enable this water sharing?
- ▶ Possible change in activity locational signals if water-available sites are created?



Establishing future power/energy sector freshwater need

- Decarbonisation pathways
 - UK GHG net zero statutory target
- New technologies
 - CCUS
 - BECCS
 - Hydrogen
 - Direct air capture
- New locational signals
- No sector plan
- Stochastic modelling of water consequences of FES19/CCC19 scenarios
- Considerable uncertainty in volumes, timings and locations!



Source: Gasparino & Edwards 2020, JEP Report ENV/660/2020 based on FES19/CCC19 soon to be superseded,
<https://www.environmentalchemistry.org.uk/publications/Trade-Files/download?id=7666>

Regional Water Resource Planning - Multi-Sector resilience



Going beyond 'traditional' least cost Economics of Balance of Supply & Demands (EBSD) planning for Public Water Supply towards 'Best Value'

Who judges 'value'
'Value' to 'whom'
How?



Providing new supply options (or revised resource allocation) for non-PWS sectors

Who should pay?
Should non-PWS agents be left with supply options PWS don't reserve for themselves?



Should non-PWS seek (or be forced) to ...

Adopt non-optimal reduced or non-water intensive alternative technology
move to the coast to use salt-water (responsibly), possibly with desalination

Responsible Abstraction As An Activity - Beyond Water Resource?

Intake structures

- Flood risk
- Safety of navigation
- Safety of Instream Users

Protection of biota (entrainment/impingement)

- Intake placement and design
 - Approach velocity
 - Orientation
- Configuration of process (abstraction need trade-off with other aspects of activity)
- Acoustic Fish Deterrent (AFD)
- Light
- Bubble curtains
- Mesh size on intake screen / Fish recovery and return system (FRR)

Noise

- Pumps
- Acoustic Fish Deterrent

Visual amenity

- Structures
- Light

Nuisance

- Odour
- Noise
- Vibration

Responsible Use of Rivers includes all of ...

Legal compliance (licences, permits, planning...)

- With compliance robustness?

In line with activity Best Practice/BAT

- Mindful of investment cycle
- Risks of new technologies/techniques

Performance monitoring beyond legal compliance requirements

- Eg water use metrics (gross water/product, net water/product)
- within wider basket of metrics covering other aspects (eg fuel, feedstock, non-aquatic environment...)

Continuous Improvement

- Water focus?
- Environment focus?
- Balanced optimisation evolution?
- Not 'minimise'/eliminate every impact aspect

Environment Management System (EMS)

- Procedures
 - exist
 - are adhered to
 - are kept under review as circumstances change

Appropriate Frameworks

- Stakeholder processes
- Water Resource allocation processes
 - With re-distribution arrangements (eg markets, trading, water sharing agreements)
- Regulation

- Not all of these within control of individual user - some are societal!

Discussion / Case Study



Upland Interests and Lowland Interests in Perceived Change in Flood Risk 1878-9



- ▶ Over centuries lowland landowners had installed mills, weirs, locks, bridges, fishing engines etc for commercial gain (and societal benefit)
 - ▶ partially obstructing flow of river
- ▶ Increasing lowland town population following Industrial Revolution
 - ▶ Building in lowland flood plains
 - ▶ in earlier times used higher ground only
- ▶ Upland landowners
 - ▶ Responded to increasing demand for food from lowland towns
 - ▶ Used increased mechanisation
 - ▶ Sought to make land more productive
 - ▶ drained existing agri-land better,
 - ▶ increased agri-land by de-foresting, draining marshes
- ▶ Consequences
 - ▶ Changed run off response to rainfall
 - ▶ More silt transported downstream?
 - ▶ Perceived intensified lowland flooding
- ▶ Lowland Interests argued Upland Interests should be taxed to contribute to appropriate measures
- ▶ Is anyone not acting responsibly in their use of 'the river'?
- ▶ Should something be done?
 - ▶ If so:
 - ▶ What?
 - ▶ Who should pay?
- ▶ Over to you

Case Study : Some Pertinent Facts?

- ▶ Disastrous flooding had occurred in 1877
- ▶ No actor was asserted to have acted illegally
- ▶ Lowland activities had generally been installed without provision of 'flood relief measures'
 - ▶ eg relief channels, elevated banks etc
- ▶ 'drainage' was dealt with through 2000-3000 individual private Acts of Parliament
 - ▶ overlapping and complex jurisdictions
 - ▶ Cities, Towns, Parishes
- ▶ Lowland rates tended to be higher than upland (eg 15s/acre v 1s/acre, R. Nene catchment)
- ▶ No specific taxation of towns, houses independent of 'land'
- ▶ Commercial river navigation traffic had dramatically reduced in recent decades as a result of railways
 - ▶ revenues reduced and little prospect of recovery
 - ▶ maintenance (dredging, locks) neglected

Case Study : What Happened?

- ▶ Case for 'rivers conservancy' was accepted
 - ▶ Recognition of need to deal with multiple issues
- ▶ Several differing possible implementations were suggested at the invitation of the Council of the Society of Arts, notably Toplis 1879 ...
 - ▶ 12 river basin districts
 - ▶ Each with body of commissioners
 - ▶ With legal and technical advisors
 - ▶ Powers to acquire existing waterworks and manage them together with the rivers in the interests of
 - ▶ Water supply
 - ▶ Pollution prevention
 - ▶ Flood prevention
- ▶ ... but only adopted gradually over following decades in stages with varying emphasis on
 - ▶ drainage (flood risk management),
 - ▶ pollution
- ▶ water resources leading to the 1973 Water Act 10 river basin authorities
- ▶ ... and process of revising geographical and functional scope continues
 - ▶ Separation of holistic River Authorities into National Rivers Authority and Public Water Supply Companies
 - ▶ Water Company activity Businesses divided into
 - ▶ Regulated
 - ▶ Unregulated
 - ▶ Water Companies use multiple Water Resource Zones within their areas
 - ▶ 5 Regional Water Planning Groups England (2019-date)
 - ▶ Several Internal Drainage Boards continue
 - ▶ Water Framework Directive River Basin Districts (established RBMP1, 2009-15)
 - ▶ 11 in England & Wales, 3 Scotland (Solway-Tweed shared)

Want to learn more?

Current Water Resource Planning Processes England

Environment Agency

Natural
Resources
Wales

Office for Water Services

Guidance

Water resources planning guideline

Updated 17 March 2021



Meeting our future water needs: a
national framework for water resources

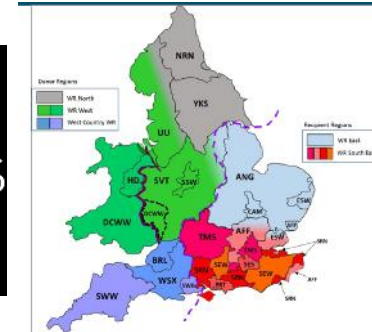
16 March 2020
Version 1



Policy paper

Water abstraction plan

Updated 25 September 2020



Thanks for Your Attention

Neil Edwards

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29th April 2021

- ▶ Water - Pixabay-free
- ▶ Pego Power Station - Neil
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- ▶ Footpath on top of flood defence bank [cc-by-sa/2.0](#) - © [Martin Dawes](#) - [geograph.org.uk/p/6100632](#)
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Supplementary Material

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29th April 2021

England - Water Resource Regulation <1945

▶ PWS originally seen as a public health issue

- ▶ 18th C provision by local authorities or private companies with powers by local act of Parliament
- ▶ Problems as populations grew
 - ▶ Competition for new sources of supply (each of which was 'assigned' through a new local act of Parliament)
 - ▶ No 'area' policies though 'Regional Advisory Water Committees' (Min Health led) set up 1924 to co-ordinate water supply schemes with more than one supplier. Govt scope was domestic supply only

▶ Thames Conservancy (created 1857)

- ▶ Crown reclaimed rights from City of London
- ▶ gave them to a new Thames Conservancy
- ▶ extended from Staines to source at Cricklade in 1866
 - ▶ Navigation (trade, tolls, structures)
 - ▶ Protected rights of anglers against landowners
 - ▶ Later evolved into a Catchment Board in 1930, and Thames Water Authority

▶ River Conservancy Bill 1878

- ▶ Responding to Select Committee Report

- ▶ Suggested new single body Conservancy Boards for each River

▶ Thames Preservation Act 1885

- ▶ Protected right of public to use of river for recreation, preventing 'shooting'

▶ Land Drainage Act 1930

- ▶ Flood risk management oriented but created ...
- ▶ Catchment Boards (for 47 of 100 identified catchments)
- ▶ Little gauging of river flow took place!

▶ Water Act 1945

- ▶ Introduced non-domestic supply
- ▶ Minister of Housing & Local Govt to ...'promote the conservation and proper use of Water Resources ... and secure effective execution by water undertakers ... of a national policy relating to water'
 - ▶ Conservation to be delivered through some powers on abstraction controls (but not constituting a full abs licensing system)
 - ▶ Ensuring sources of water supply were protected against pollution

England - Water Resource Regulation 1948-63

▶ River Boards Act 1948

- ▶ Led to 17 larger River Boards replacing the 47 catchment boards - each by individual act of Parliament. Ultimately became 32 River Boards
- ▶ River Boards have responsibility for fisheries (subsuming the work of Fishery Boards which had come into being through salmon fishery act 1861, salmon and freshwater fisheries act 1907 & 1923)

▶ Rivers (Prevention of Pollution) Act 1951

- ▶ Introduced discharge licensing

▶ Water Resources Act, 1963

- ▶ 27 River Authorities replacing River Boards
 - ▶ For conservation, re-distribution and

augmentation of water resources in their area or ensuring that water resources were used properly in their area, or were transferred to the area of another river authority

- ▶ + duties/power on fisheries + prevention of pollution + gauging

▶ Abstraction licensing system

- ▶ Existing users having 'licences of right'
- ▶ Charges levied
- ▶ PWS abstractors required licences

▶ Primary focus was protection of interest of abstractors (FCFS principle)

- ▶ Not a basis for allocation
 - ▶ perception of surplus in most places
- ▶ Not about protecting aquatic environment

England - Water Resource Regulation 1973-91

▶ Water Act 1973

- ▶ 10 regional Water Authorities (=Water Board) replacing Rivers Authorities - integrated control over individual river basins

▶ Water Act 1989

- ▶ Separation of regulatory roles (National River Authority, OfWat) from
- ▶ PWS delivery by 10 privatised WatCo (eg Southern Water plc, Thames Water plc ...)

▶ Water Resources Act 1991

- ▶ + Water Industry Act + Land

Drainage Act + Statutory Water Act consolidating 20 pieces of water legislation

▶ Environmental Protection theme

- ▶ Quality (GQA) for controlled waters
- ▶ quantity of water functions - Minimum ecological flow concept
- ▶ Definition of pollution
- ▶ Offences
- ▶ Discharge consents (offence if #cause' harm no need for negligence or intent = strict liability)

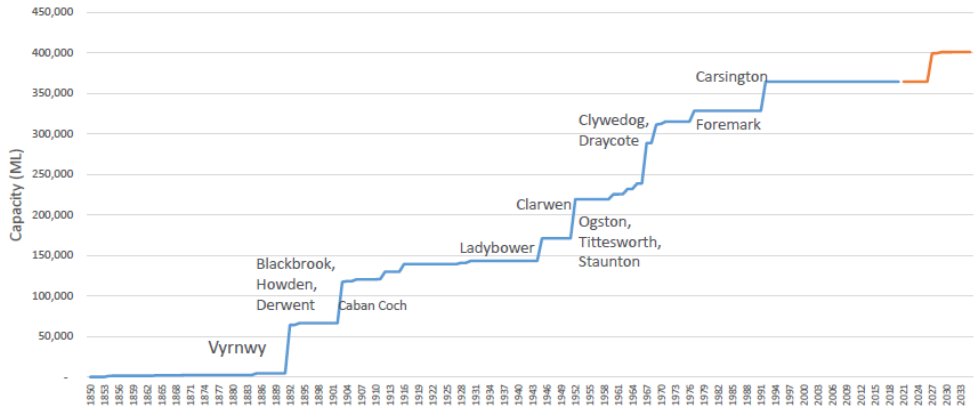
England - Water Resource Regulation >1996

- ▶ 1996 Environment Agency formed and absorbed National River Authority
- ▶ 1999-WatCo produce voluntarily Water Resource Management Plans following EA guidelines (becoming statutory in 2003) with consultation process covering +25 years and subsequent refinement of guidelines (2007)
- ▶ 2001 -all new licences or major variations to be time-limited (previously was locally determined time-period or 'without end date')
- ▶ Water Act 2003
 - ▶ Followed Taking Water Responsibly 1999
 - ▶ Drought plans, permits, orders
- ▶ [Abstraction Reform initiative 2013-2017]
- ▶ Abstraction plan 2017
 - ▶ Environmental protection initiative (unsustainable abstraction)
 - ▶ Catchment focus (CaBa)
 - ▶ WatCo working with others to find 'best solutions'
 - ▶ Initial Priority Catchment Trials
- ▶ Environment Bill 2021
 - ▶ Curtailment of damaging or underused abstractions without compensation (from 2028)
 - ▶ 25 year Environment Plan targets
- ▶ Transition to Environmental Permitting Regulations (2023)

Regional Planning & WatCo Boundaries 2020

RESERVOIR DEVELOPMENT

Severn Trent Water raw water reservoir storage capacity 1850 to date and planned increase from 2020 to 2035



Source: John Deval, Head of strategic asset planning STW, 2019

