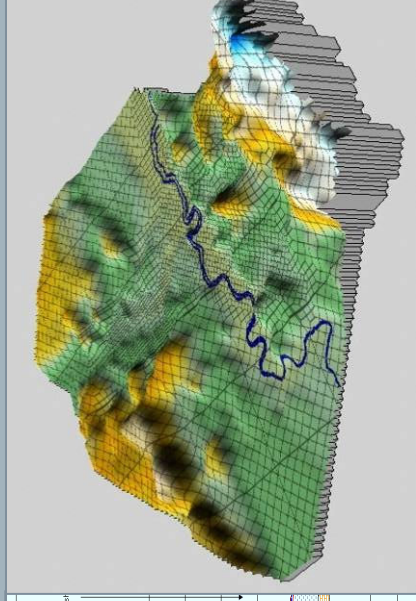
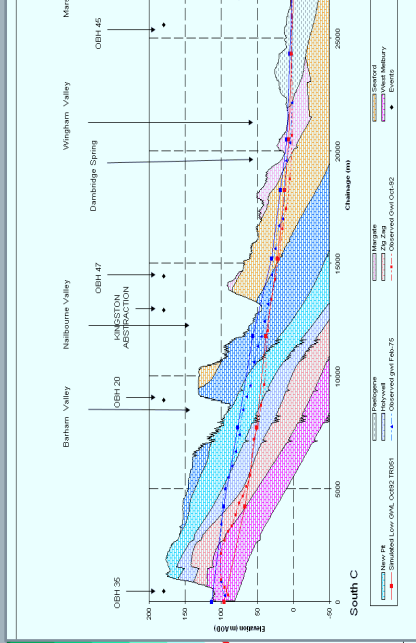
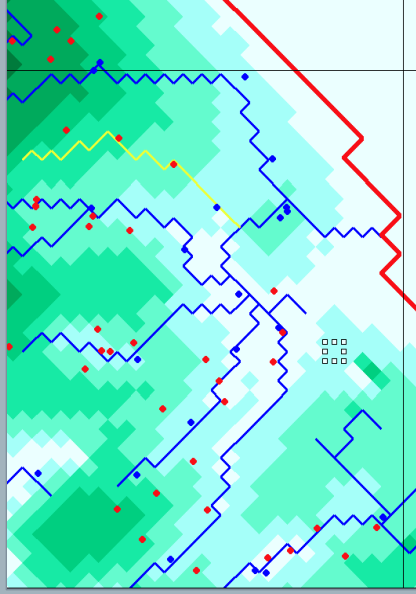


Groundwater Management in the UK The Importance of an Integrated Approach



Jan van Wonderen – Mott MacDonald



Overview of Presentation

- Role of Groundwater in England
- Demands for Groundwater
- Regulation in England and Wales
- Integrated Approach to Water Resources Management
- Resource Assessment Tools
- The Importance of Stakeholder Participation

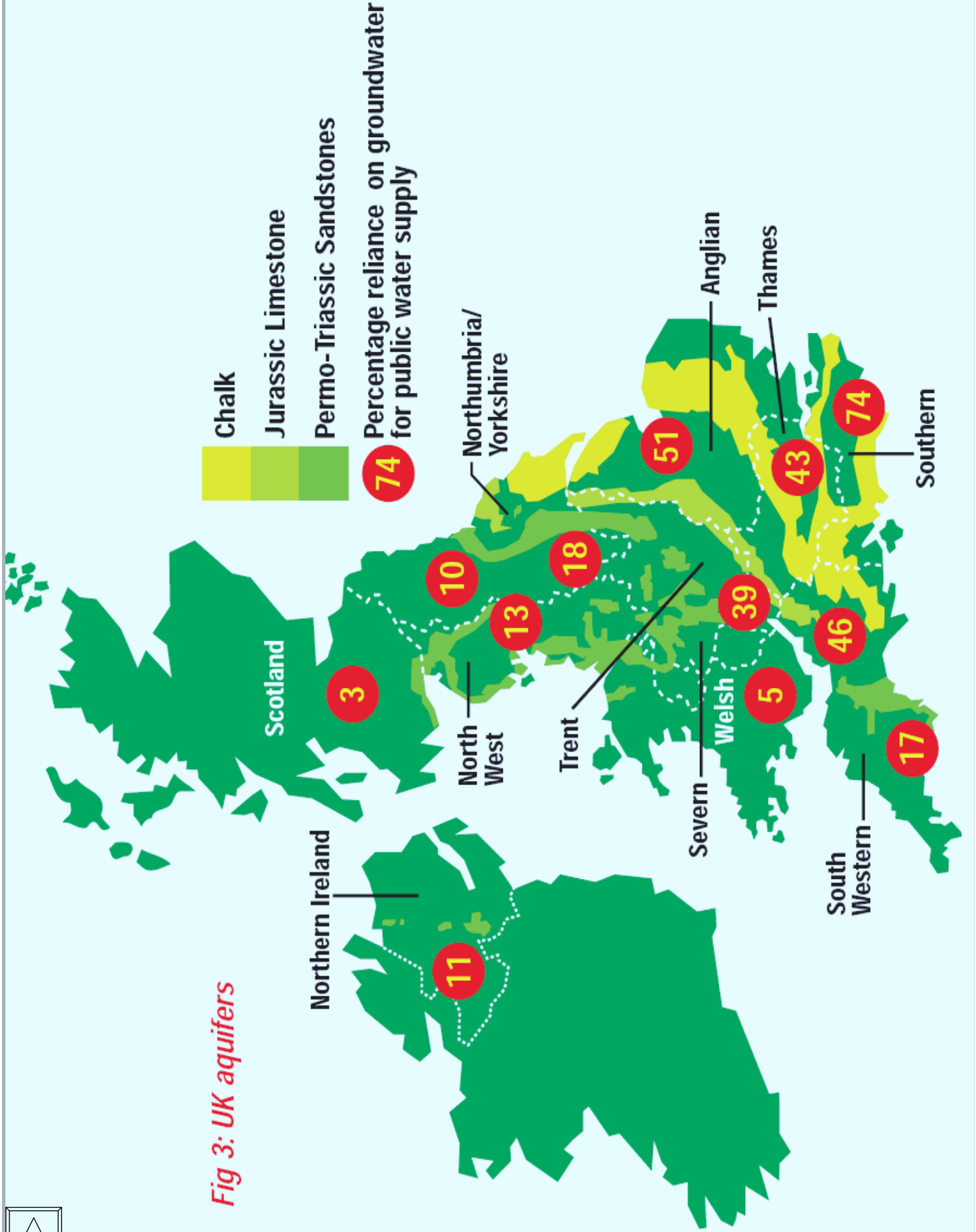
The Role of Groundwater in England

- Depending on availability: a significant and sometimes the only source for PWS and agriculture
- Provides baseflow to rivers, wetlands and marshes
- Aquifers can act as reservoirs for artificial recharge and recovery and thus become strategic reserves





Fig 3: UK aquifers





as an environmental resource – groundwater influences river flow and quality, and sustains fresh surface waters, wetlands and marshes.

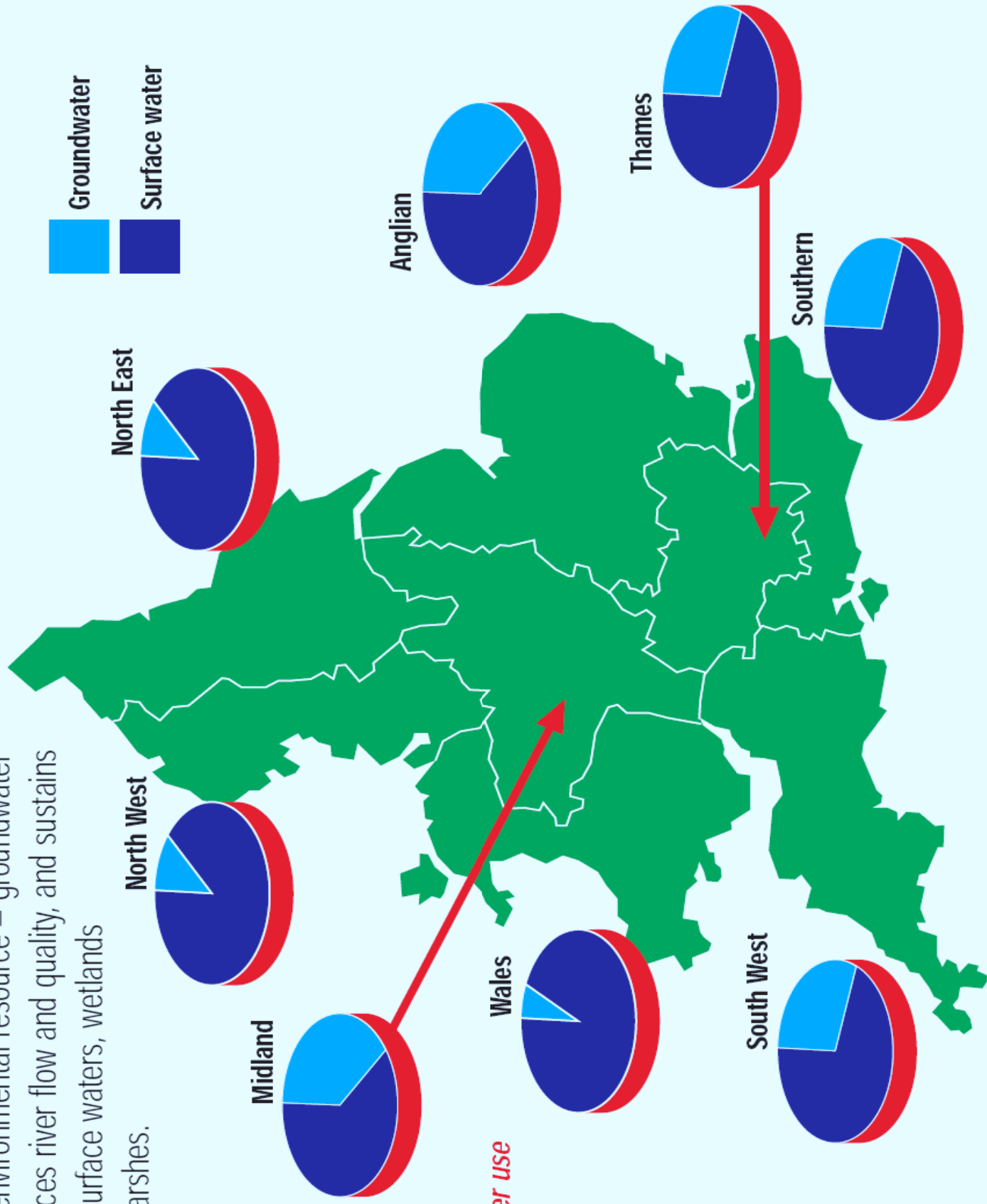


Fig. 2:

Groundwater use in England and Wales

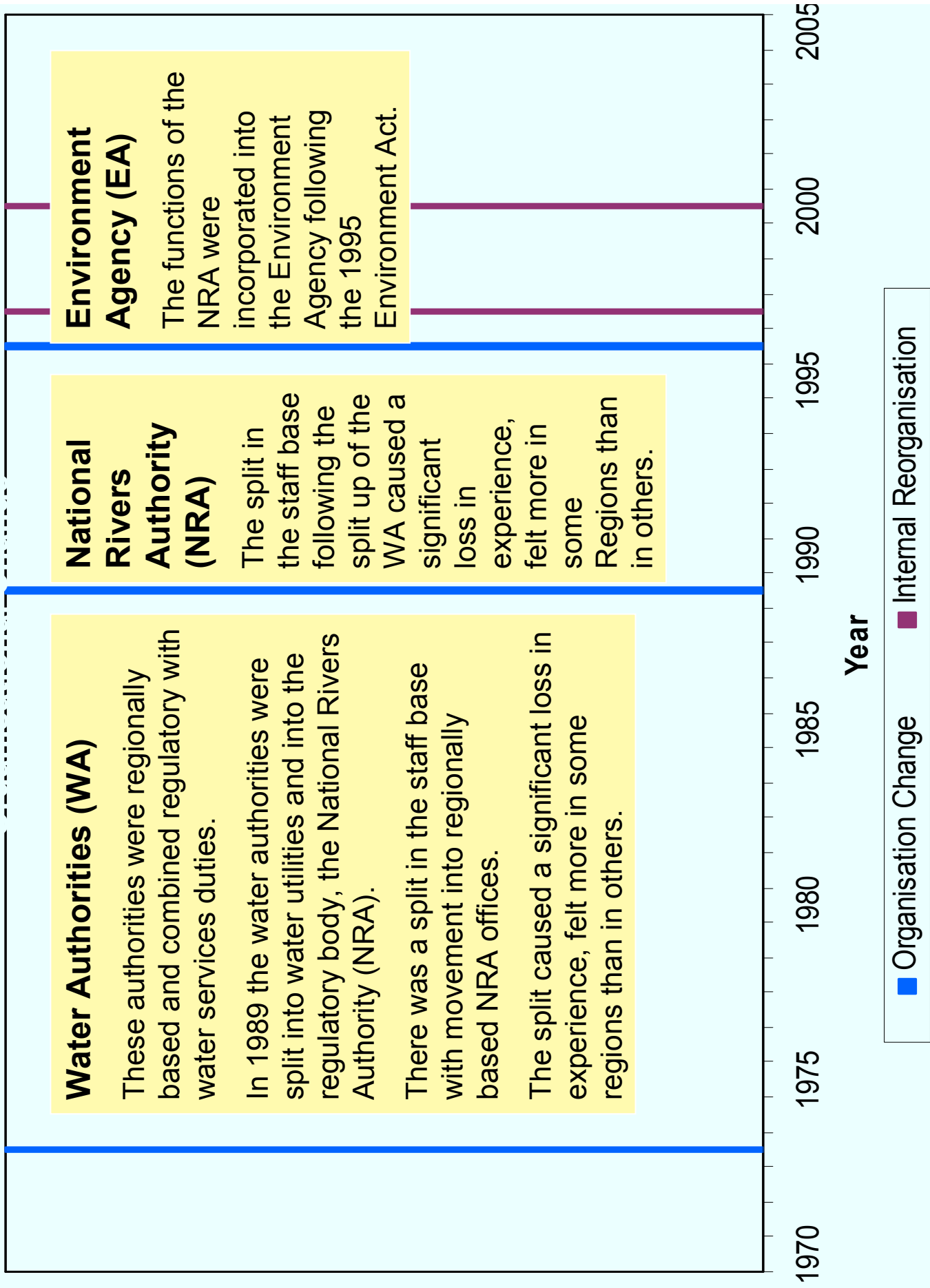
Demands for Groundwater

- Conflicting demands?
 - Public water supply – growing demands (population growth)
 - Agriculture – growing demands (agro-industry)
 - Environment – growing demands (regulation)
- Demands are highest during summers and droughts
- Satisfying demands for PWS and agriculture compromises the environment:
 - Rivers and springs running dry
 - Wetlands drying out
 - Irreversible threats to the ecology of rivers and wetlands
 - Saline intrusion in coastal areas

Regulation

- Historical Context
- Decision Making:
 - Groundwater Resource Planning
 - Operations
 - Groundwater quality
- Groundwater Legislation (EU Directives)
- Close links with stakeholders







Decision-Making: Planning

- Water Framework Directive
- Water Resources Strategy (GW Balances)
- CAMS (RAM Framework)
- Water Company Water Resources Plans
- Restoring Sustainable Abstraction
 - Habitats Directive Review of Consents
 - National Environment Programme
- Groundwater Scheme Review/Design
- Drought Plans
- Strategic Monitoring Network Design

Options Appraisal



Decision-Making: Operations

- Abstraction Licensing
- (Strategic licensing issues)
- Water availability forecasts
- Operation of mitigation schemes
- Operation of groundwater schemes



Decision-Making: GW Quality

- GPZs
- NVZs
- Contaminated land
- Groundwater regulations

International treaties
Ramsar Convention 1971

EU Directives
Birds Directive 1979 (SPA)
Habitats Directive 1992 (SAC)

UK Government

Acts of Parliament
Water Industries Act 1991
Wildlife & Countryside Act 1981

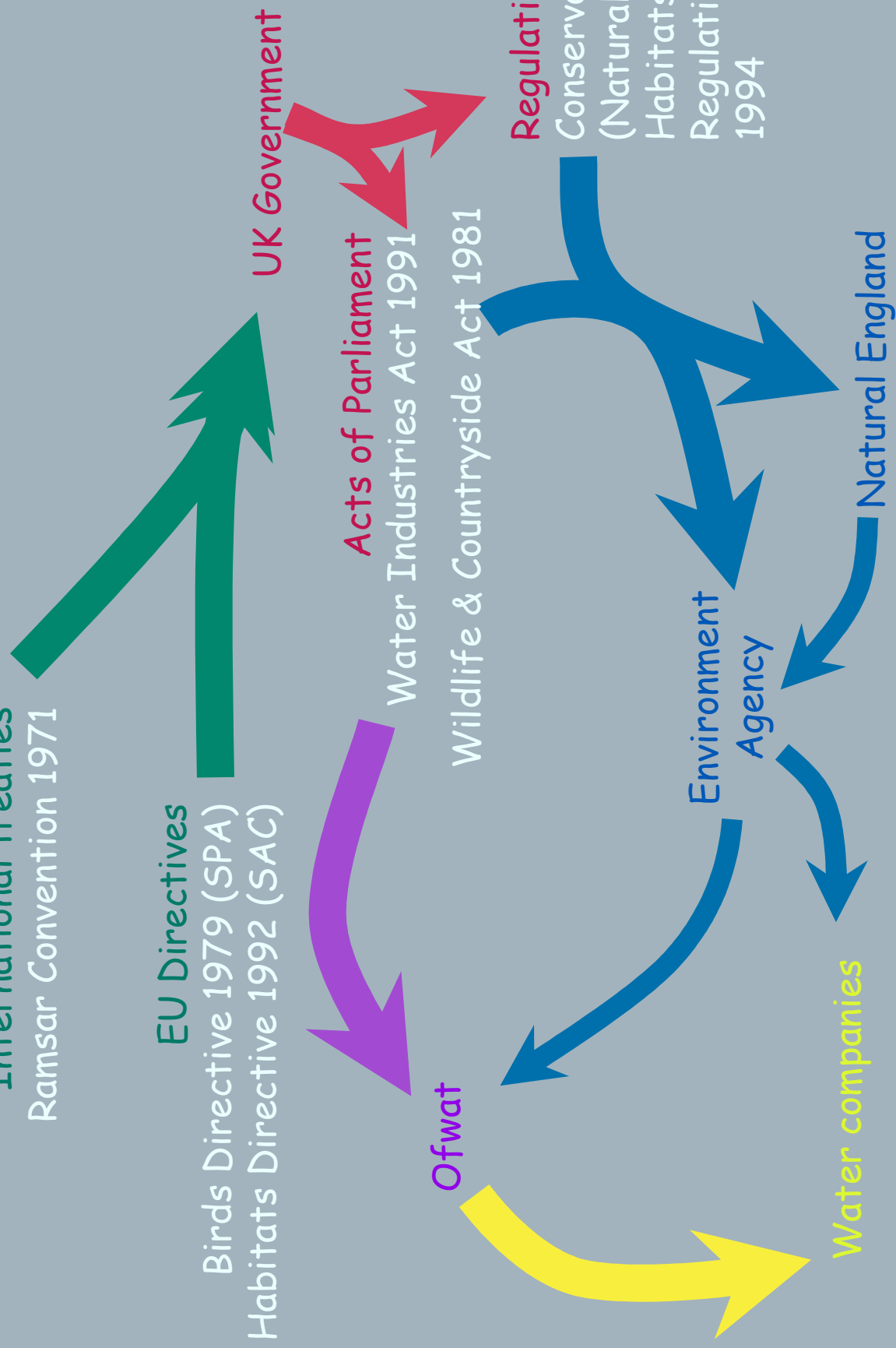
Regulations
Conservation
(Natural
Habitats etc)
Regulations
1994

Ofwat

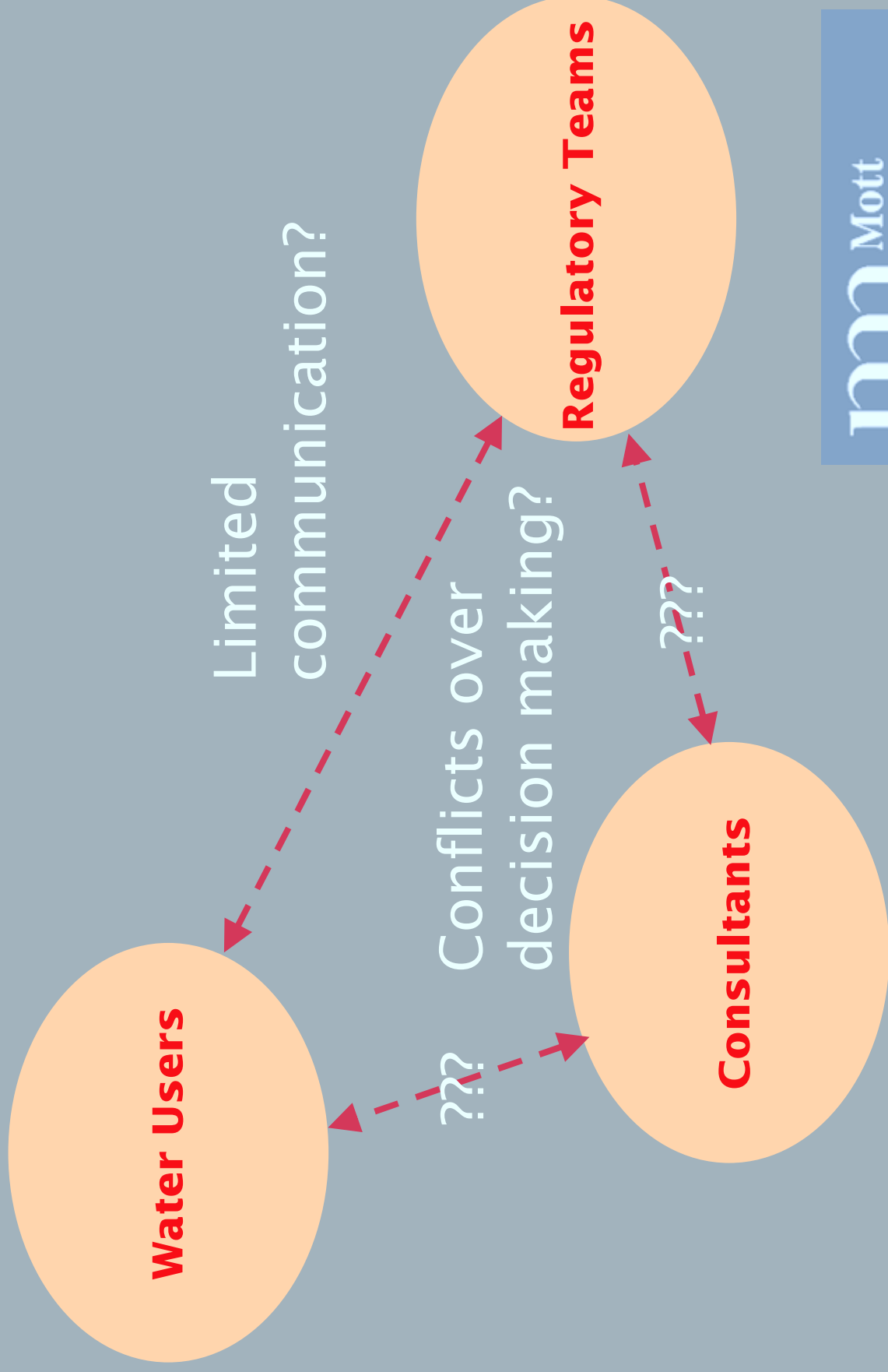
Environment
Agency

Water companies

Natural England



The days of old

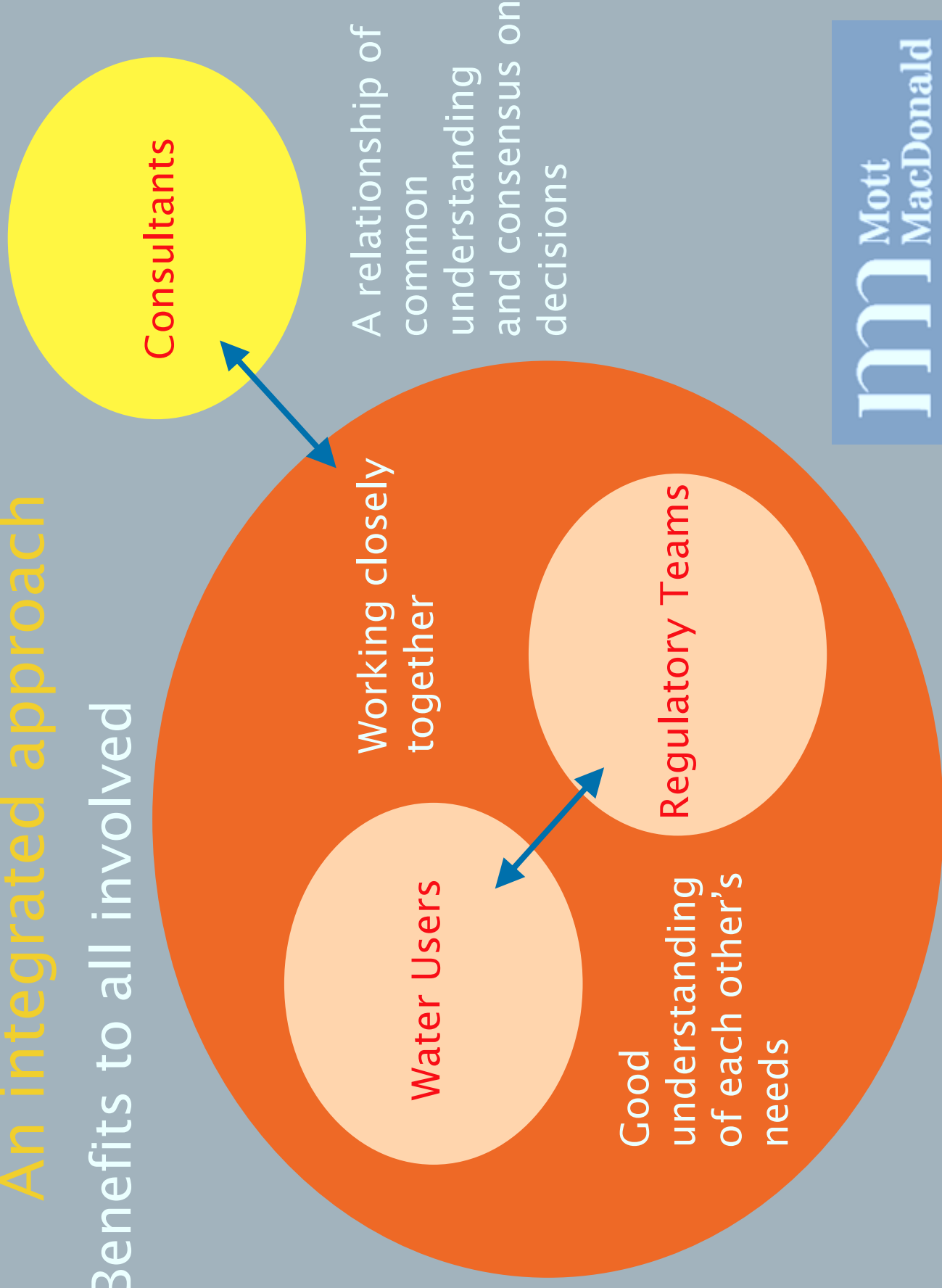


Who do we work for?



An integrated approach

Benefits to all involved



Integrated Water Resources Management - IWRM

Definition of IWRM

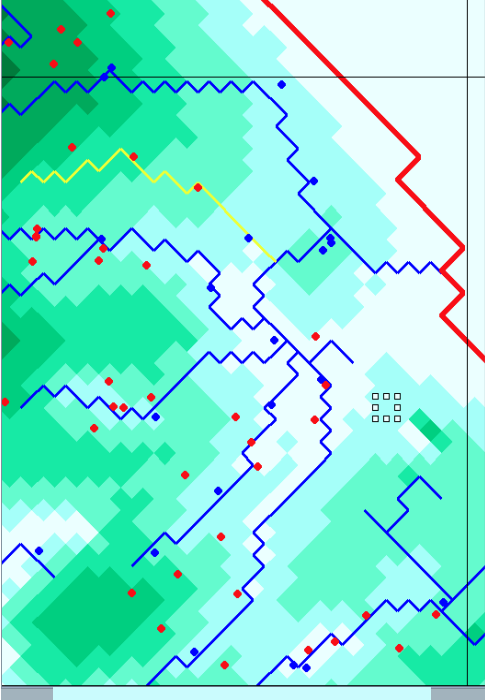
IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems

‘Integration’ in IWRM

- **Natural** and **human** system
- **Land** and **water** management
- **Surface water** and **groundwater** management
- **Quantity** and **quality** in water resources management
- **Upstream** and **downstream** water-related interests
- **Water** and **wastewater** management
- Integration of **all stakeholders** in planning & decision process
- The **natural system** and the **HUMAN system**
 - mainstreaming water in the national economy
 - ensuring coordination between sectors
 - ensuring partnership between public and private sector management
 - involving everybody!



Integration
Participation
Collaboration



People

Technology

Agreement
Consensus
Acceptance



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