

## WATER: creating solutions through local markets

PyTerra has developed an innovative approach to creating solutions to flooding and other water problems. Using sophisticated data analytics, market structures are used to support the development of a network of local solutions.

### About

Flexible and resilient solutions to flooding, water pollution and water availability can be created by using a network of local service providers 'upstream' of the water problem – eg water companies, infrastructure operators, housing developers, industrials and farmers. The 'downstream' beneficiaries of these services can also be many and varied – eg power and telecoms utilities, transportation, homes and businesses. If all these entities can work together through the mechanism of a local market, then solutions to complex water problems can be achieved.

Key to successfully developing a market is identifying the value created for those downstream beneficiaries, ie a value chain.

**The challenge for a market is being able to unlock the potential of such value chains.**

PyTerra's analytical and business services reveal how the potential from a value chain can be unlocked. The result is to create a trading model for local water services which allows many upstream service providers to trade with many downstream service buyers.

The maximum value that can be paid to the service providers is theoretically the total value which is created downstream, whether these are financial values or other types of value such as reputational, societal or environmental. Using accounting techniques such as Natural Capital Accounting, such values can be estimated.

It is one thing identifying value – it is another thing to find ways which will encourage the release of that value by getting downstream buyers and other stakeholders to pay. This is done through a process of collective engagement which allows all parties to see how their role contributes to local water solutions. Such discussions are backed up by analysis of costs and benefits, together with proposals for legal and payment schemes which take advantage of new technologies (below).

Importantly, the development of a local market is better served by the creation of an **intermediary body** which can manage a central fund and provide governance. In this way, trust is created and systems to support trading are established.

Traditionally, single issue (eg flood), centrally located, engineering solutions have been used to address water problems – eg building a £25m concrete flood defence on the edge of a town. This is no longer necessarily the most flexible and resilient approach to cope with changing weather patterns, population growth and increased urbanisation.

Instead, 'distributed' solutions consisting of a number of service providers across an area (they could be distributed across a city or across a catchment), can use data and communications technology to synchronise their services for optimum benefit.

Furthermore, where multiple water issues need to be solved (eg flooding and poor water quality), a local market can be used to provide multi-benefit solutions – eg a farmer developing a mini-reservoir with reed beds to hold back flood water and treat polluted surface water before letting it into the river.

Extensive consultation has been undertaken with organisations such as Ofwat, Defra, NFU, WWF, water companies, Councils and Catchment Partnerships. There is widespread interest in this approach, which is seen as building on current objectives to

take a holistic approach to managing water resources at a catchment level in an **environmentally and economically sustainable way**.

### Case Study

A large new housing development is being planned. However, both potable water supply and sewage services will be difficult to provide because of capacity limitations within the networks of the existing statutory undertakers. The County Council particularly recognises that an integrated approach to water services might be able to overcome current issues and perhaps bring wider benefits to the local community.

Following a review of the value chain both upstream and downstream of the development, changes are recommended to the structure of the water and sewage services provision. The two statutory undertakers would step back and allow an independent utilities provider (the Integrated Wholesale Operator – IWO) to take on an inset-like arrangement and service the development directly.

The IWO works with the developer to initiate a range of on-site water and sewage infrastructure developments, including: rainwater harvesting, grey water recycling, SUDs+ (e.g. smart water butts), constructed wetlands and small scale sewage treatment plant based on membrane bioreactor technology.

In parallel, the IWO works with the County Council (which takes on the role of intermediary) to identify an upstream trading network (eg water rights trading), as well as downstream markets for its own surpluses.

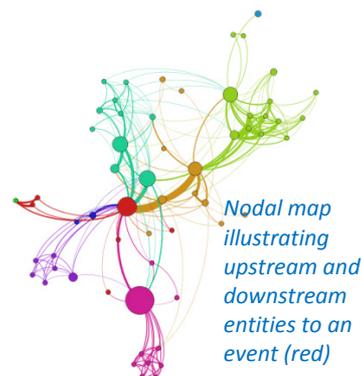
The IWO can generate revenue from beneficiaries within the value chain: rebates it can negotiate with the current statutory undertakers; contributions from the District and County Council for creating a sustainable development; payments from downstream buyers of services (e.g. aquifer recharge); and customer payments for water and sewage services via retailers.

### Technology

PyTerra uses analysis of large data sets of water events and of the entities potentially engaged within a trading network.

Sophisticated data technology is used:

- Hydrological and water quality modelling
- Network analytics, creating nodal maps of entities
- Multi-parameter optimisation algorithms
- Valuation methods, eg ecosystem services
- Financial modelling and automated payments systems (eg Blockchain)



### Team

**PyTerra Ltd** – developer of the methodology and lead consultant, led by David Arscott.

**WSP** – international civil engineering consultancy providing hydrological and water quality modelling together with analysis of the potential of upstream services.

**Jonathan Fisher Environmental Economics** – downstream value chain analysis.

The team has an extensive network of consultants, technologists and academics who can also contribute.

### Contact

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