PyTerra

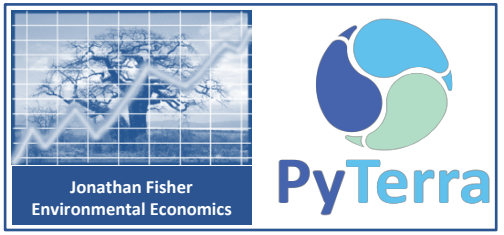
giving water value

Presentation to COST Action CA15206 / PESFOR-W
Developing a Catchment Water Quality Trading Platform

19 October 2017

Dr Jonathan Fisher,
Jonathan Fisher Environmental Economics
David Arscott
Managing Director, PyTerra Ltd

Outline



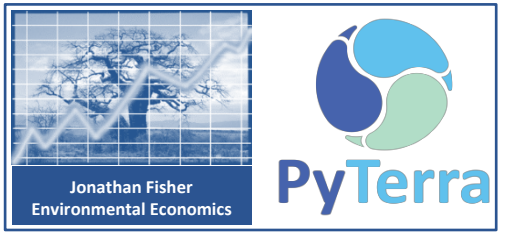
Slide no:

Consortium

	Cluster Lead		
Cluster 1 Catchment Modelling	wsp	University of Surrey Department of Computer Science	rezatec analyzing earth data
		Centre for Ecology & Hydrology, Natural Environment Research Council	
Cluster 2 Trading System	PyTerra	consult hyperion	Jonathan Fisher Environmental Economics
Cluster 3 Telecoms Engineering	wsp	University of Surrey Centre for Communication Systems Research	Aquamatix

Recent report "Do Trees in UK Relevant River Catchments Influence Fluvial Flood Peaks?"

Trading Models Across the World



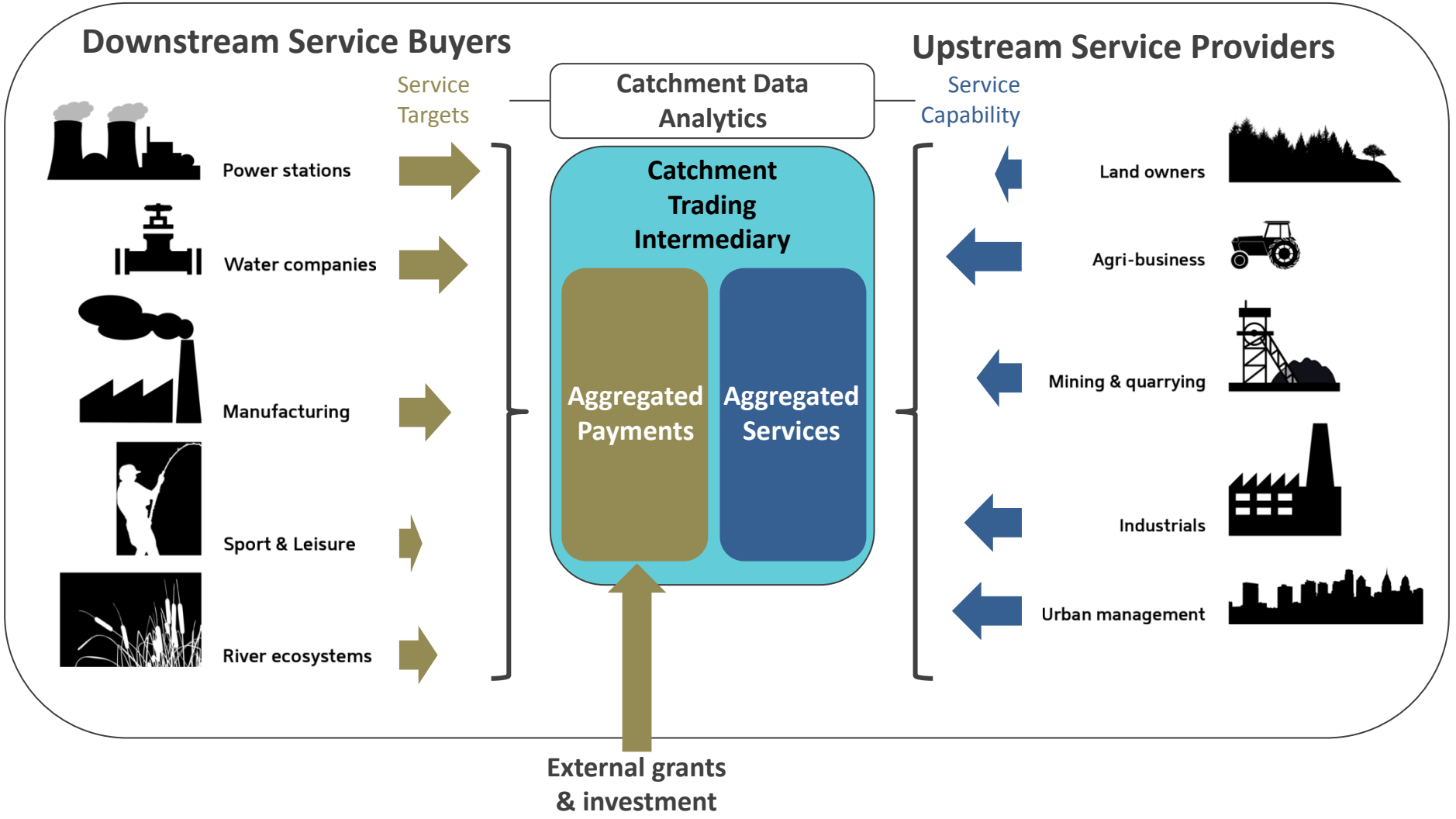
There are many different types:

- **Credit trading in nutrients,** eg Illinois Wetlands Initiative
- **Displacement schemes,** eg Catskill & Delaware (US) residential buy-out programme to protect source waters for New York
- **Incentive schemes,** eg Riversmart Program in Washington DC using incentives, rebates, grants & end-user fees
- **Reverse auctions,** eg Cincinatti, (Ohio) – residents' bids to accommodate rain barrels and rain gardens on their properties – highest environmental benefits and lowest costs selected; eg EnTrade, an online platform run by Wessex Water to pay farmers for land management that reduces nitrate run-off
- **Multi-buyer and multi-seller model,** eg PyTerra – this is characterised by collaborative projects delivering multiple environmental outcomes. These are typically brokered by an intermediary, like the Rivers Trust, and frequently use public or charitable grant funding combined with agri-environment subsidy payments.
- **Green bonds,** eg San Francisco Public Utilities Commission issued under Climate Bonds Standard
- **Biodiversity offsetting,** eg Defra's 6 pilots 2012-2014 & research into US & Australian examples
- **Water rights trading,** eg 'Waterexchange' in Australia, a broker-led trading platform for water entitlements - matches buyers with sellers, auctions and forward trading

Trading Structure for a ‘Many-to-Many’ Market

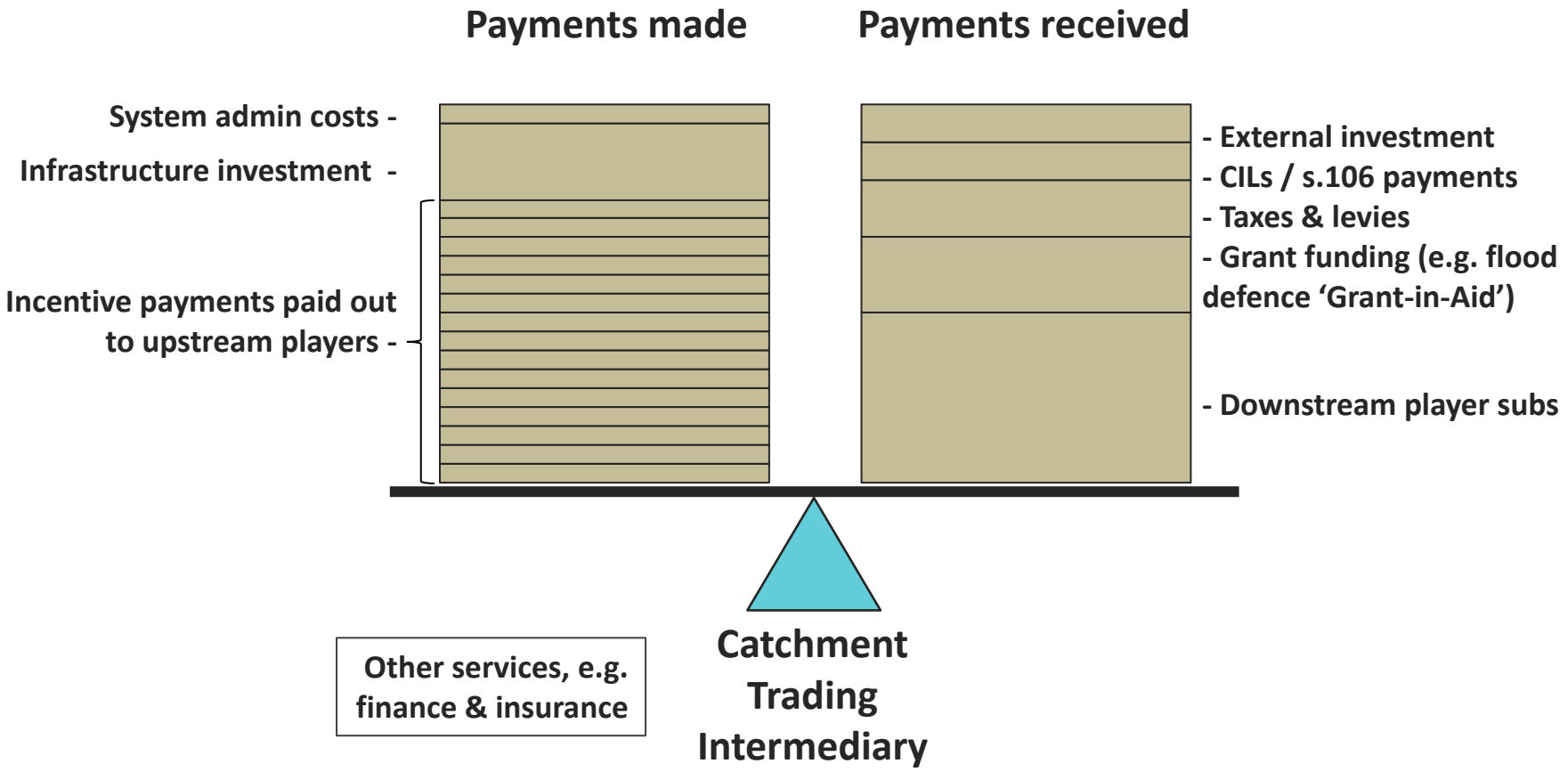
Jonathan Fisher Environmental Economics

PyTerra



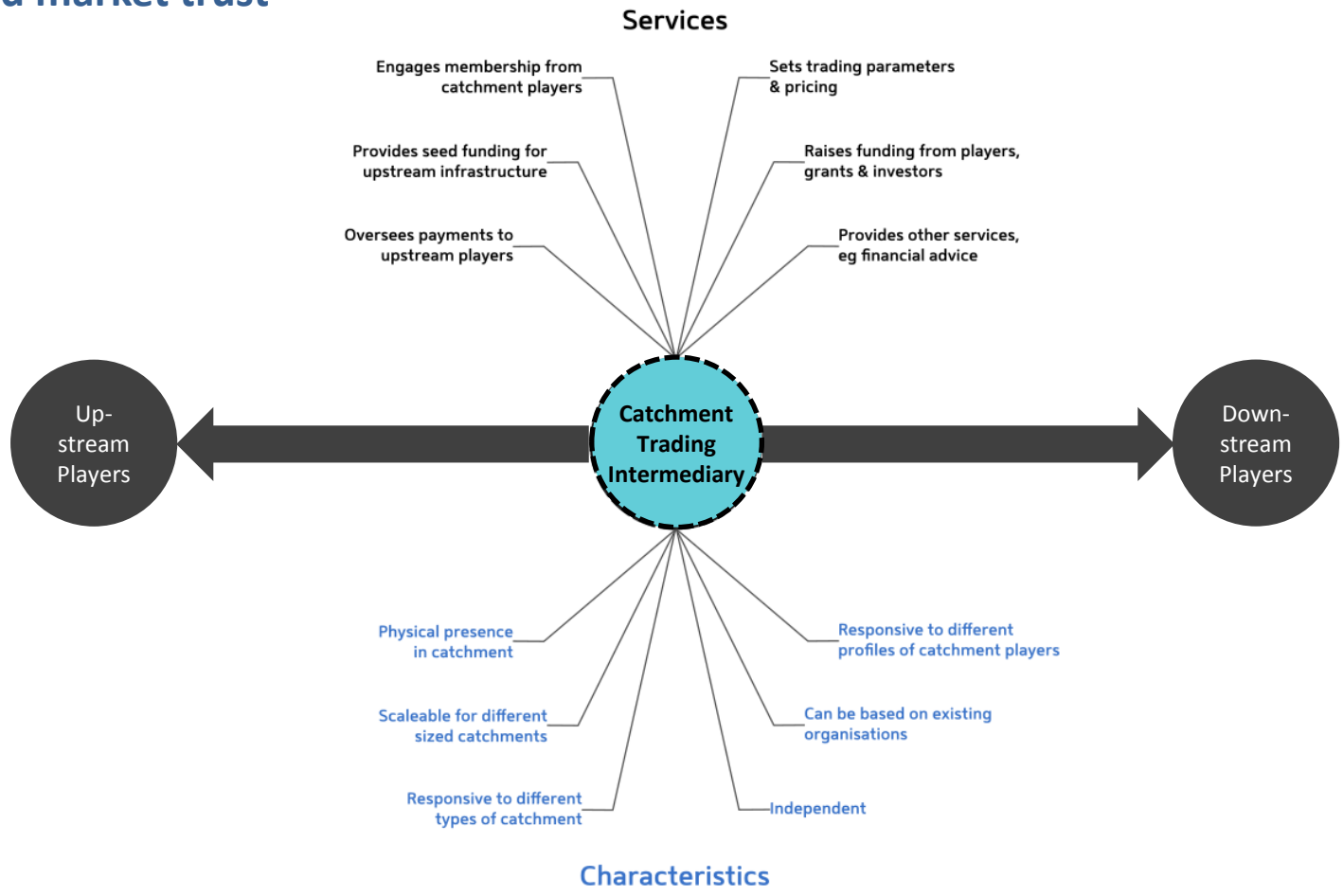
Funding

There are multiple funding streams overseen by the Catchment Trading Intermediary

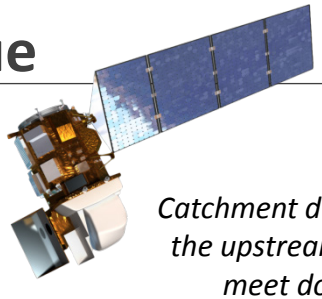


Catchment Trading Intermediary (CTI)

The presence of an independent (non-regulatory) body to provide governance of trading, allocation of investment and support services, will build market trust



Using Technology to Unlock Value



Catchment data analytics to identify the upstream actions necessary to meet downstream targets

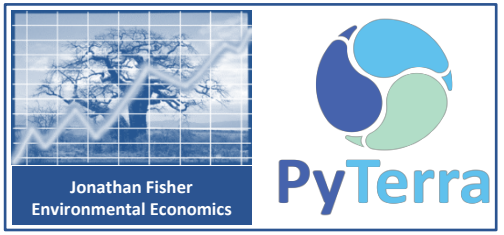
Payment every time a positive action is taken (using Distributed Ledger technology)

Upstream process automatically (using IoT) does something positive for the health of the river

Payment into Cloud-based system

Downstream process benefits (confirmed e.g. by sensor)

Forestry – PES Potential



Specifically looking at the example of ***woodland and forests for reducing diffuse pollution and moderating flooding by delaying and attenuating peak river flows*** (a 'regulating service')

Markets can be created if there are:

- agreed common methods for:
  - measuring services
  - valuing the services
- entities who will pay land owners to cultivate woodland
- sources of capital investment

Contextual requirements:

- Government needs to establish ecosystems markets as part of national policy
  - increasing government interest in PES – need to ensure that this can lead to practical developments
- Trading should consider both positive action (to implement a forestry development) and negative reaction (to stop a development such as deforestry)

Forestry – Case Study

Denmark *http://ec.europa.eu/environment/forests/pdf/grounwater_report.pdf*

- **Problem** - threat of groundwater pollution stemming from pesticides and fertilizers used in agriculture
- **Impact** - during the last twenty years Copenhagen Energy has lost about 14 million m^3 of groundwater per year
- **Solution** - 1994 Danish government implemented a 10-point action programme. This included changing land use from agriculture to forests and under-planting of conifer stands with broadleaf trees to increase groundwater recharge
- **Projects** - largest and best reservoirs of groundwater designated as protected drinking water areas. – 2 forest PES schemes to date:

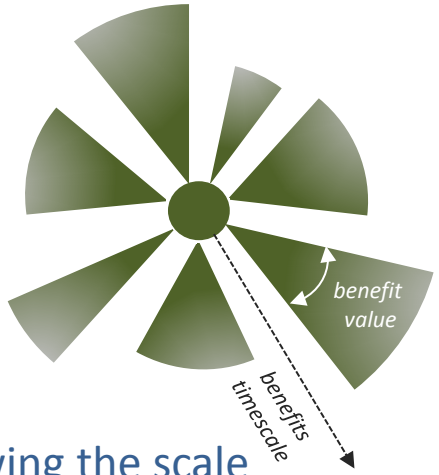
  The *Danish Forest and Nature Agency* cooperated with *Odense municipality* and the *local water*works to establish more than 2,000 hectares of new forest close to Odense over 30 years. This new forest will strengthen the recreational possibilities as well as protect the important drinking water resources located in this area.

How to Handle Multiple Benefits of Forest Schemes

Jonathan Fisher Environmental Economics

PyTerra

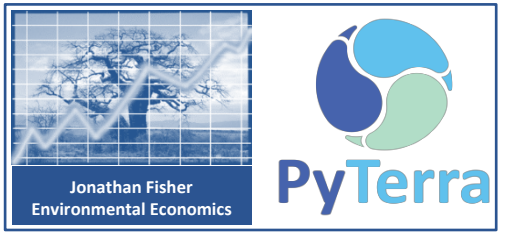
- **Forestry services involve one or more value chains with multiple benefits**
- Multiple value chains in which a natural resource can be part of the solution (at the centre) and can yield multiple benefits such as
  - Alleviating water pollution
  - Protecting quantity and quality of (ground) water resources
  - Reducing water treatment costs
  - Reducing risks of fluvial flooding of downstream urban areas
  - Reducing releases of greenhouse gases



- Represented by each wedge in the value chain with its size showing the scale of the benefit and distance reflecting the timescales for realising each benefit
- **Need:** Upstream actions (using natural processes such as forestry) rather than traditional 'edge of town' civil engineering
- **Costs** of upstream actions < multiple benefits but > single (readily realisable) benefit

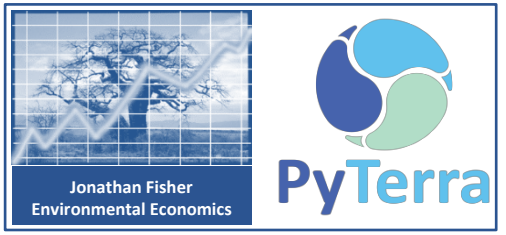
  => **Challenge** how to realise and secure (payments for) these **multiple** benefits?

Forestry PES – Who Will Pay? And How?



- **Payers will be those who:**
  - Benefit from tackling negative externalities (flooding, pollution)
    - Communities, businesses, infrastructure operators, emergency services, utilities
    - Who can best represent them?
  - Have a responsibility to mitigate the risks of these negative externalities
    - Regulators, statutory water and sewerage providers, central, regional and local government
  - Have an interest in creating the above benefits
    - Central, regional and local government and their agencies, insurance companies
- **How can these potential payers be made to pay?**
  - Market forces (effectively buying a service that a beneficiary is willing to pay for)
  - Pressure (eg from NGOs and regarding corporate social responsibility)
    - Eg Blue Print for Water Coalition – see http://blueprintforwater.org.uk/wp-content/uploads/bfw-publications/Blueprint%20for%20PR19%20-%20Environmental%20Manifesto%20%5b2017%2004%5d.pdf
  - Compliance (eg Government & Ofwat guidance for English water companies on payments for catchment management solutions; see:-
    - https://www.ofwat.gov.uk/consultation/delivering-water2020-consulting-on-our-methodology-for-the-2019-price-review/
    - https://www.ofwat.gov.uk/publication/resilience-in-the-round/

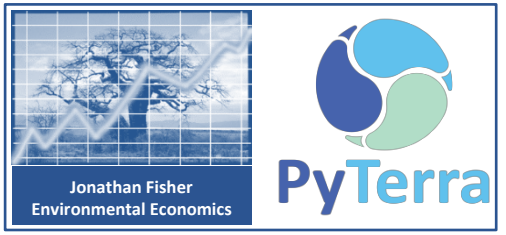
Issues for Forestry



- **Barriers to uptake – who is addressing these?**

1. Do beneficiaries have the insight which makes them ready and willing to pay?
    - Cash strapped local authorities/communities
    - Lessons from history of neglect by myopic local authorities: 1998 floods in England
2. Who is obtaining and collating the hard 'certain' evidence of investment returns?
    - Lags before forestry investments yield benefits with increasing certainty
3. What sort of bodies would be suitable for the role of 'Catchment Trading Intermediary'
    - new partnerships
    - opportunity for a new breed of eco-entrepreneur? How to enable?
4. How can local market activity be scaled up from 1:1 trading to many:many?
5. How can climate change and other natural risks to forestry be mitigated? (eg red band needle blight, where over 50% of pine forests in Britain could be affected by the 2050s, could undermine the value of the asset)

Practical Application and Issues for Forestry



- **Clarify roles to remove barriers**
  - Consider new structures with clearer roles for Government, regulators, land owners, developers and investors
  - Consider who can act as intermediaries in local markets
- **Applying PES internationally**
  - Geography - issues of scale and national boundaries: a trading structure which can be pragmatic about the geography of market places
  - Flexibility: a trading structure which can operate within any catchment type and any economic and regulatory environment
  - Localism: a trading structure which tackles strategic catchment issues but also supports local economies and gives voice to local communities
- **Any evidence and points from Conference**
  - Interest at Workshop in practical applications?
  - WG2: effectiveness of woodland creation for reducing agricultural diffuse pollution
  - WG3: cost-effectiveness of woodlands for water PES schemes

Hvala
Thank you

Jonathan Fisher
e: jonathanfisherenvecon@virginmedia.com

David Arscott
e: d.arscott@pyterra.co.uk

PyTerra

www.pyterra.co.uk