

Riverflies, Scientists & Citizens:
A study of the science-society relations & practices operating
within the UK's *Anglers' Monitoring Initiative*

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Abstract

This dissertation considers the collaborations of scientists and trained volunteers within *The Riverfly Partnership Anglers' Monitoring Initiative* (AMI). Primary sources comprise field observations made at two AMI workshops, and semi-structured interviews with a research entomologist, an *Environment Agency* officer and an AMI fly angler. This material is contextualised with wider socio-political and environmental accounts and examined with selected social theory.

Two significant developments are examined in the context of the AMI's science-society strategy. The first is the artificial boosting of riverfly populations by accredited scheme tutors, the other, a change in the AMI's profile away from the angler and towards the participation of community groups.

The AMI is found to be an instance of evidence-based environmental citizenship informed by EU policy, government agency, scientific authority and voluntary participation. In theoretical terms the scheme can be understood as an 'ethno-epistemic assemblage' (Irwin & Michael: 2003) that is a shifting, open-textured set of societal influences, social agents and group relations. The study concludes that ongoing interdisciplinary observation of the AMI can make a valuable contribution to the sustainable management of such a dynamic scheme of environmental stewardship.

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This dissertation is dedicated to the memory of my friend David Fox (1960-1978).
Sadly David was never able to take-up his undergraduate place at Imperial College.

Declaration

This dissertation has not previously been accepted for any degree and is not concurrently submitted for candidature for any other. This work is the result of my own independent investigation, except where otherwise stated. Other sources are acknowledged by explicit references.

Kevin Edge
September 14 2012

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List of abbreviations

AMI: Anglers' Monitoring Initiative

DEFRA: Department for Environment, Food & Rural Affairs

EA: Environment Agency

EPT: *Ephemeroptera, Plecoptera & Trichoptera* index (mayfly, stonefly & caddisfly)

EU: European Union

FRES: Fellow of the Royal Entomological Society

(JH-KE/2012): Semi-structured interview: Josh Hellon (EA) to Kevin Edge (8.8.2012)

(JT-KE/12): John Tweddle, (OPAL Manager/NHM) to Kevin Edge (29.8.2012)

NGO(s): Non-Governmental Organisation(s)

NHM: Natural History Museum, London

OPAL: Open-air Laboratory scheme. Begun 2007, managed by NHM/Imperial College

PR: Public Relations

RP: The Riverfly Partnership

(SB-KE/2012): Semi-structured interview, Steve Brooks (NHM) to Kevin Edge (26.7.2012)

(TP-KE/2012): Semi-structured interview, Theo Pike (AMI) to Kevin Edge (12.8.2012)

UK: The United Kingdom of Great Britain & Northern Ireland

WFD: EU Water Framework Directive (2000)

WP: Wandle Piscators, a south London fishing group

WT: Wandle Trust

WWF: Worldwide Fund for Nature

1.0 Introduction



Illustration 1

Trainee environmental citizens

'Kick-sampling' at the *Anglers' Monitoring Initiative* workshop, Great Abington, Cambridgeshire, (5 May 2012). On the bank: *Cambridgeshire Chalk Stream Group* attendees; holding the net: AMI organizer Louis Kitchen; standing in the *River Shep*: Stuart Crofts, accredited *Riverfly Partnership* and AMI workshop tutor.

(Photo: courtesy Rob Mungovan).

1.1 Pure water

AN UNPOLLUTED RIVER is one of humankind's natural delights. How can this delight be perpetuated? This study examines how those in UK scientific and socio-political quarters are working today with riverbank volunteers to protect our freshwaters in the form of an evidence-led environmental citizenship.

The pleasure of a sparkling stream is bound-up in the fly-angler's pursuit of plentiful fat trout and salmon. However, clean watercourses are not just for anglers; they are essential too for public health and well-being. In 1951, John Eastwood, angler, barrister and founder of *The Anglers' Cooperative Association* wrote of humanity's "instinctive love of pure water." He declared: "pleasure is gone when the water is dead and polluted." (Eastwood cited Bate 2001: 36). The EU's *Water Framework Directive* (2000) asserted: "Water is not a commercial product [but] rather, a heritage which must be protected, defended and treated as such." (WISE 2010: WFD *Preamble*, item 1).

So, how and where in the UK are Eastwood's riverbank values and the supranational imperatives of the EU being met? Both are met by the interaction of institutions and people across *interdependent* macro and micro societal spheres. One sphere is a geopolitical and legislative totality of normative environmental rights and obligations. Shaped largely by EU and national parliaments, these imperatives are 'policed' regionally by scientific institutions and statutory bodies like the UK's *Environment Agency* (EA). The second societal sphere is 'ethnographic'. It comprises the experiences and ethics of experts and lay volunteers – social agents operating locally and 'on the ground' in a collective stewardship of obligation and initiative.

1.2 Counting & reporting

Where can we see an embodiment of such a societal and environmental nexus? Many look no further than the UK *Riverfly Partnership (RP) Anglers' Monitoring Initiative (AMI)*, launched in 2007. Here, European directives, EA assistance, biological expertise and angler participation combine in a strategy of methodologically robust monitoring. The core activity of counting and reporting selected macro invertebrate abundances in UK river systems sees the AMI regarded by public engagement specialists like John Tweddle, OPAL Manager at London's *Natural History Museum*, as an exemplary development.

Anthropologists Ruth Ellis & Claire Waterton of Lancaster University began studying riverfly monitoring in 2002 (*Riverflies*, 2012). Their initial findings on early expert-lay monitoring were optimistic, seeing dialogue between scientists and anglers promise an incipient "environmental citizenship". They asserted such: "discourses create greater scope for new alignments among naturalists, lay citizens and policy bodies [that could] nurture both the natural and cultural components of knowledge [for] a more fully engaged interface with those on the margins." They specifically argued: riverfly monitoring might be "building blocks with which a reconfigured, repopulated and re-humanised biodiversity may be reconstructed." (Ellis & Waterton 2004: 95, 101, 103).

The AMI *appears* to be one of those blocks: a model alliance of biological experts and volunteer fly anglers; a stable grouping of agents with a common purpose, and well able to deliver Ellis and Waterton's hopes. However, further inspection from Ellis & Waterton (2005) and the present study reveal a more pragmatic and mobile gathering. The AMI is in fact a pragmatic, "ethno-epistemic assemblage" after Irwin & Michael (2003: 17, 111-136) accommodating competing experiences, knowledge and outlooks.

What can the origins, current character and changing social relations of the AMI reveal about the scientist-volunteer detection of UK river pollution? Who are its social agents? Is it a marriage of convenience or an effective ‘rough science’ of respectful expert-lay relations? Is the scheme sustainable given emerging angler frustrations and recent involvement of new, non-fishing community groups?

1.3 River canaries

Aquatic invertebrates form a significant part of a river’s food web. Devoured by predating fish, they fascinate fly anglers everywhere. From a broader environmental perspective, mayfly, caddisfly and stonefly – either as demersal larvae or emerging adults – act also as sensitive “river canaries.”¹ Pollution – accidental or reckless – has an immediate impact on the flies’ larval (or nymph) stages. Agricultural, industrial or sewage run-off, and falls in pH or oxygen levels are quickly reflected in riverfly populations, serving as an ‘early warning’ pollution bio-indicator.

This fact, coupled with anglers’ habitual riverside presence has led to the development of the RP’s AMI, an ‘out in the river’ scheme of vigilance. AMI co-founder, and *FRES Research Entomologist* Steve Brooks of the *Natural History Museum* said: “it’s like Neighbourhood Watch.” (SB-KE/14.3.2012). It helps meet governmental prosecution targets and raises environmental awareness in industrial estates and neighbourhoods across the UK. Whilst the EA is charged by *DEFRA* and the EU with such detective work, limited staff numbers dictate that it *cannot monitor watercourses alone*, so collaboration with the AMI is vital. “You couldn’t do this monitoring without fishermen.” They are “monitoring the rivers more frequently than the (EA, and have] more sampling stations [...] it’s very much a complementary scheme.” (SB-KE/2012).

¹ A metaphor devised by accredited AMI tutor, Peter Francis and perhaps first applied to freshwater shrimp (*Gammarus*).

Since 2007, hundreds of UK fly angler groups have received AMI workshop training and field support. Monthly ‘kick-sample’ and net sweeps on home rivers sees the reporting of unexpected population fluctuations to local AMI coordinators. They in turn contact EA officers who re-test, initiate prosecutions and serve as expert witnesses.²

1.4 Methodology

To unpack the background, co-creation and social dynamics of the AMI, the study combines secondary sources with qualitative primary research and theoretical reflection. Current practices and new developments have been followed by observing tutors and attendees at two workshops: (i) Great Abington on the *River Shep* in Cambridgeshire (5.5.2012) and (ii) *The John Spedan Lewis Trust Centre* in Leckford, near the *River Test* in Hampshire, (19.5.2012). Photographs were taken and observations on workshop pedagogy noted in field logs.

Detailed AMI discussion was documented in three, semi-structured and recorded interviews with Kevin Edge (March – July 2012). These appear in the appendices as edited transcripts: *Appendix C*: Steve Brooks (NHM); (hereafter SB-KE/2012); *Appendix D*: Joshua Hellon, *Environment Agency Monitoring Officer* (hereafter JH-KE/2012) and *Appendix E*: Theo Pike AMI volunteer and south London angler group Vice-President (hereafter TP-KE/2012). A fourth interview about science and public engagement was held with John Tweddle NHM, London (29.8.2012), hereafter (JT-KE/2012). Relevant comments from Tweddle appear in the main text.

² Pollution incidents are not always detected by AMI work. However, adverse publicity can foster subsequent AMI involvement. In October 2011, “several miles of river [London’s *Crane*] were seriously polluted, all the fish [10,000] were dead; it was sewage [...] Since then, I’ve been talking to the *Thames Anglers’ Conservancy* and they decided to set-up [an AMI group].” (JH-KE/ 2012); see also *Riverflies* (2012).

Sociological interpretation draws on notions of the interaction of societal forces, institutions and human agency as formulated in Giddens (1984); on readings of Irwin (1995), and the ethnographic work of Ellis & Waterton (2004, 2005). These and other more recent scholarly accounts help to articulate the study's primary research and offer a critique of tensions and changes. Irwin & Michael's view (2003: p.xi), that sociology has something to offer science is used to consider cross-disciplinary contributions to the 'sustainability' of the AMI's facts and values project.

1.5 Stones unturned: a rationale

Brooks has recently recognised that the 2002 action research project observing the AMI's roots now requires a supplementing second perusal. That was "a very useful cross-fertilisation [where] they were studying *us* as scientists, and also the amateur groups [but] there were stones that were left unturned." He added: "they need to revisit it [and] see how the dynamics of the project might have changed, and what the new issues are." (SB-KE/2012). Sociologists too have called for ongoing studies. Irwin & Michael saw a "need to seek and collect data [on] such hybrid alliances [that can provide a] longitudinal study of shifts." (2003: 142). Bell *et al.* (2008) advise that participatory schemes "are complex [with success depending] on culturally and historically specific conditions [so] it is necessary to understand their 'inner workings' " (2008: 3444). Tweddle's view is that such research can ascertain volunteer motivations and reflect on "mission creep". (JT-KE/2012). It is hoped this study serves as a preliminary.

1.6 Short literature review

The emergence, definitions and challenges of environmental citizenship are found in Ellis & Waterton (2004); Ellis (2005); Lawrence (2005); Plater (2006); Bell *et al.* (2008); Dickinson *et al.* (2010); Dobson (2010); Eden & Bear (2010) and Blok (2011). Established and new bio-indicator monitoring methodologies are critically reviewed in Niemi *et al* (2006). The

emergence of a citizens' entomology is to be found in Kühn (2008) and Warren & Bourn (2011). Lawrence's proposed typology of voluntary biological monitoring (2006) is useful, succinctly showing "how people, environmental values, data and governance are woven together" (2006: 26) and compliments Simon, (2010). Ellis & Waterton (2005) examine "shifts and movements of a range of actors and processes [showing] the fluidity and instability of networks of 'knowing nature well', whose stability is often assumed." Jasanoff (2004) considers expert-lay production, the consumption of knowledge and governmental perspectives whilst Cooper *et al.* (2007) and Silvertown (2009) look at the history, typology and new media prospects for wider citizen science. North American comparisons are sketched in Droege (2007); Cohn (2008) and Dickinson *et al.* (2010). Fox *et al.* (2010); Lye *et al.* (2011) and Rich (2011) offer accounts of citizen science as part of an array of community science methodologies. Other social and ecological motivations for lay participation on which successful schemes depend are identified in Bell *et al.* (2008); Lawrence & Turnhout (2010) and Smith (2011).

1.7 Headwaters: early aquatic monitoring

Reading the health of a landscape's resources through knowledge of its wild inhabitants has been sustaining human life since prehistoric times. During Europe's industrial revolution, modernity began a more extensive exploitation of those natural resources. This led to unprecedented rates of production, overcrowding and waste resulting in high levels of pollution, illness and mortality (Attfield 2003: 1; Brundtland *et al.*, 2012). Vulnerable domestic water sources were monitored to combat typhoid and dysentery. Initial testing focused on bacteria, algae and protozoa, but the sensitivity scale of the German Saprobian system – used internationally since 1902 – was the first to use aquatic ecosystems as pollution markers (Bonada *et al.* 2006: 496-7, 499).

Clean drinking water then was a priority in the UK, but for its leisured fishing fraternity, clean rivers were essential leisure amenities too, so water quality in managed fisheries was *also* examined. Commercial game fishing – spurred by easy rail travel – led to debate and legislation protecting UK salmon and trout waters with riparian rights first defended against pollution trespass in 1859. Parliament later stepped in with various river pollution prevention acts (1876-93) and then a 1923 *Salmon & Freshwater Fisheries Act* (Bate 2001: 27-34).

1.8 Postwar aquatic environments & monitoring

After WWII, further legislation saw the River Purification Boards test water quality. However, anglers remained frustrated so *The Anglers' Cooperative Association* (founded 1948) began privately to secure financial compensation in court following pollution incidents (Evans 1997: 96-7). Bates argues the ACA was effectively a “pioneering environmental watchdog” cajoling and warning everyone. (Bate 2001: 15). In 1963, a nascent environmentalism saw *The Water Resources Act* (1963) required river authorities to “consider the preservation of natural beauty and the conservation of flora and fauna.” (Evans, 1997, 97). More water pollution acts were passed in 1974 and 1985. (Bate 2001: 87-95).

Burgeoning consumerism, environmental rights and green politics in the 1970's and 1980s plied extra pressure on privatised water companies (Bate 2001: 97; Bonada *et al.*, 2006: 496). And, as many environmental groups asserted their civic rights, they demanded objective data for court cases. Activists challenging the certainties of a science and technology axis serving economic growth and capitalism (Grant 1998: 76), looked to that same axis to monitor and mitigate environmental degradation. How would environmental values and scientific facts combine?

Spurred by the maturing discipline of ecology, the scientific community itself began to consider values and ethical choices as much as facts. This ‘social and environmental turn’ was coupled with establishment debate about models of scientific understanding, engagement

and dialogue. As a consequence, scientists became attuned to ‘outreach’ (Irwin 1995; Gregory & Miller 1998; Lords, 2000; Irwin & Michael 2003: 56). Rational reduction and specialization was now modified with holistic perspectives and sustained by lay, “out of the laboratory” expertise (Lords 2000: 5.1) forming “a culturally shared ecological intelligence” (Stirling 2009: 78).

1.9 Summary

At the end of twentieth century, the aims and values of UK anglers and Government were now aligned. Aided by science, and NGO interest, an alliance of institutions and citizen agents, was ready to produce “powerful matrix management efforts” Cooper *et al.* (2007). The next chapter looks at the AMI’s formation and its social make-up meeting this potential.



Anglers' dry fly.
(Photo: K. Edge)

2.0 Tying the knot: The AMI & its agents



Illustration 2

Bringing together an ‘assemblage’ of experience, science & new citizen volunteers

Fly fisherman, amateur entomologist and accredited RP tutor Stuart Crofts (left), opens the afternoon session at Great Abington with a practical exercise for the *Chalk Stream Group* in aquatic invertebrate identification.

(5 May 2012).

(Photo: courtesy Rob Mungovan).

2.1 Introduction

This chapter examines particular politico-legal contexts, and the formation and workshop practices of the RP and AMI. It features interview extracts illustrating perspectives on the co-creative elements and on agents creating an effective ‘assemblage’ of knowledge and environmental action.

2.2 River guardians & the RP

In law, wild fish are *ferae naturae* and cannot be anyone’s property (Evans 2005). However, those holding private land or leased riparian and fishing rights can turn to common law in respect of trespass or nuisance. In response, anglers’ clubs have, since the nineteenth century, secured land and rights, with many hundreds of injunctions and financial compensations following reported pollution incidents. In one sense anglers are thus a rooted, single-issue constituency. For them, clean or restored rivers – up or down-stream – mean healthy fly and fish populations.

Governments have never viewed aquatic pollution as personalised infringement but as an abstract market failing. This was a public issue; criminal court fines (not compensation) would send out messages to industry. (Bate 2001: 14, 73). For anglers however, this remote statutory response implemented by a remote officialdom was not protecting *their* stretch.

In recent years anglers have changed their strategy, and today many are members of the RP via local fishing societies and the *Angling Trust*. This trust is the successor to (Eastwood’s ACA that had long regarded its members as “guardians or doctors for sick rivers” (Evans 2005). Previous ACA experience with chemists, biologists and its own pollution officers and water-sampling (but not bio-indicator) techniques presumably proved useful and paved the way for the new approach. (Bate 2001: 48-9). Through the RP and its AMI, anglers can draw upon EA expertise and the politico-legislative weight of the EU’s *Water Framework Directive* (2000). There is some symbiosis as the EA secures extra hands and meets its

domestic prosecution targets. One other societal ‘lever’ to note here is that of the environmental NGO, operating strategically with EU legislative processes but also tactically with angler groups. AMI volunteer Pike gave an example of this: “*The Angling Trust’s* recent threat of seeking judicial review in partnership with the WWF has probably brought the [WFD] river basin management [and] catchment plans into better focus for the EA.” (TP-KE/2012; cf. *WWF* 2011).³

The mediating forum for the AMI’s mix of policy, science and citizen environmentalism is the RP. Its stated aim is to “Protect the water quality of our rivers; further the understanding of riverfly populations; and actively conserve riverfly habitats.” It calls rhetorically for “developing consensus and collaborative action” wanting to gain “the attentions of the “public and decision makers” alike, support training, research and foster management “knowledge [and] techniques.” (*Riverflies* 2012). Achieving this pan-societal ambition begins with rhetoric but requires innovative and cooperative agency too.

Today the RP functions nationally within the *Salmon & Trout Association*, collates riverfly species data and has nearly 100 partner bodies, including the *Institute for Environment Philosophy & Public Policy*, Lancaster University; the WWF and river trusts, all giving a voice to “conservationists, entomologists, scientists, watercourse managers and relevant authorities.” (*Riverflies* 2012).

2.3 Co-creation & “an algorithm that works”

The challenge to co-create a monitoring scheme was two-fold: first, foster a new constituency of anglers willing to be marshaled and second, simplify extant biological method for them to

³ The WFD’s full title is *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy*. (See WISE 2010). It calls for ecologically sensitive controls on emissions and argues for ‘polluter should pay’ principles. The ‘radical’ quality of the WFD is a consequence of (i) a shift away from the Council of Ministers towards a sympathetic EU Parliament; and (ii) international environmentalist NGO lobbying via the *European Environment Bureau* representing some 140 independent groups including the WWF and RSPB (Page & Kaika 2003: 335). The first WFD deadline relevant to the UK is in 2015.

deploy (Ellis & Waterton 2005: 675). To do this, the good offices of the *Natural History Museum*, London were needed.

NHM entomologist Steve Brooks is an RP Steering Committee Member. He recalled that the AMI “started through a project that was funded by *Natural England* who were interested in involving the Museum in getting more amateur naturalists [to engage with] non-charismatic groups of invertebrates.” He continued: “We identified fly fishermen as a potential target group”, an untapped potential highlighted by Ellis & Waterton: “Anglers [...] ‘read the river’, but do not process their ‘river reading’ knowledge into biological records.” (2004: 100). In *reality* said Brooks, “it was very difficult actually to train people [...] and get them to a standard where they could make reliable identifications and records.” (SB-KE/2012).

Nonetheless, the scheme had to be co-created and delivered with anglers to be plausible and so required a re-think. Brooks then “talked a lot to the people at Leckford and between us we [made] a very simplified version of what the EA was already doing.” The AMI sampling scheme was built on angler and accredited RP tutor Dr Cyril Bennett’s early activities on the *Wey*. One workshop tutor commented: “Bennett’s a driving force: scientist and fisherman; he just got on with it [and] drew-up procedures”.⁴ Angler Stuart Crofts’s publications on water quality monitoring were significant too, as were Brooks’s anglers’ entomology courses at the NHM and courses at Leckford led by Warren Gilchrist (amateur entomologist and accredited tutor); Peter Francis (angler and accredited tutor) and others. Additional input came from the formal 2001 NHM - *English Nature* partnership that promoted invertebrate surveying, leading to the *Riverfly Interest Group* (2003). An RP recording scheme was launched at the NHM in 2004, followed by a two-year AMI-EA pilot. The official AMI launch was in 2007 (*Riverflies* 2012).

⁴ Bennett is also an entomologist, who completed a doctorate on the ecology of the River Wey in 1979. Might he be in the tradition of Alfred Ronalds? His classificatory *The Fly-Fisher's Entomology* was published in 1836. (*Fishing Museum* 2012).

For Brooks: “the data the anglers provide are a broad-brush impression of what’s going on in the river; [an] early warning system.” (SB-KE/2012). Brooks’s approach reveals three things: awareness of policy, willingness for methodological modification and an appreciation of inclusivity so that anglers are not just used in an objectified, ‘extractive’ way.

The AMI is there to offer “detection, deterrence and a benchmark.” (Leckford tutor, 19.5.2012). Its method consists of mensurate field study and data analysis involving an *Ephemeroptera, Plecoptera & Trichoptera Index* (EPT) test. It is a method that is systematic, standardised and easily undertaken. Pike views the scheme’s statistical formula as “an algorithm that works.” (TP-KE/2012). Any triggering by data of the local base level results in a more extensive EA/ *Biological Monitoring Working Party Score* survey for corroboration.

2.4 The EA’s role

The EA is a DEFRA-funded quango and ‘competent authority’ on freshwater quality for the WFD. It is an important, ‘Janus-faced’ body meeting WFD expectations of governments “to work with local groups to monitor water quality.” (JH-KE/2012). A sensitive EA approach to their volunteers is expressed in Orr *et al.* (2007). Here EA agents are urged to “listen, [...] be passionate [...] build a common vision [leading to] shared responsibility and decision making [...] where culture and traditions vary, agree key messages and adapt to their needs.” (2007: 347).

Hellon himself is sensitive. “It’s a lot to ask of people to go out so regularly, and through the Winter [...] they have to buy some kit [...] it might be sometimes a little bit of a chore.” (JH-KE/2012). For methodological, social and ecological reasons, Hellon has *personally* seen the need for better EA-AMI communications and onsite visits for new AMI groups: “You can pass on a bit of extra knowledge [...] and they get more and more into the entomology.” (JH-KE/2012). Hellon is not just an actor ‘translating’ statutory ‘scripts’, but is functioning too as a reflexive, empathetic agent. This echoes insect conservationists Tim New and S. Williams

who suggest “government agencies [...] should provide community endeavours with ‘honesty, support, expertise and a sensibility to the community’s concerns for conservation.’ ” (New 2009: 217).

2.5 “We’re watching”

The AMI achieves “capacity building” through its day-long workshops supported by the EA (Ellis & Waterton 2004: 100). Pedagogic style reflects angler experience, scientific sensibility and commitment. Tutor Stuart Crofts is a retired electrician, enthusiastic amateur entomologist and England Team fisherman. He is a sophisticated institutional actor putting hybrid skills to good use. Mindful perhaps of others’ credentials, he modestly asserted at the workshop that his is “the amateur’s perspective”, confessing caddis are his hobby. (Great Abington, 5.5.2012)

Crofts stated the importance of the AMI-EA alliance at the start of the workshop. The EA must not only survey, but also do “whatever else bureaucrats chuck at them [...] they need a bit of help [to] pick up gaps.” Mindful of a collaborative approach, Crofts said it was “essential partners talk to each other, sticking together when fighting for the environment. Without a joint approach we’re never going to win [...] we’re only taking care of [rivers] for a short time, so talk to kids, get them involved.” The “best outcome” for Crofts was the general message: “ ‘we’re watching’ ”, a message underscored with a press photo on the riverbank with newly presented kit.

Crofts explained to attendees that the sampling method was “exactly the same as the EA’s, *our* data is credible.” For Crofts it was “simple, [a] standardized method of repeatability” but “it is critical volunteers liaise with experts” and warned against “passing on training” [as it] becomes less credible”. Crofts acknowledged too there would be an overestimation and underestimate of nymphs, but advised that the system afforded site consistency.

The fundamental skill of ‘knowing your insects’ as mooted by Samways *et al.* (2010) was stressed at both workshops. *PowerPoint* presentations addressed species diagnostics and lifecycles, whilst the live identification session stressed the value of recognizing the ‘jizz’ or movement of larvae. *Bateidae* larvae “swim like a dolphin” said Crofts, whilst tutor Peter Francis told his Leckford workshop: “stoneflies wriggle a bit like a belly dancer” (cf. Ellis 2011). Crofts delivered formal instruction through informality and enthusiasm: “When sampling, I take a bottle of Guinness and a bag of crisps” and said of the hatching mayfly: “it’s all unplugged – imagine the engineering!”

2.6 A forensic barrier?

AMI volunteer Theo Pike has a nuanced reading of societal contexts and angler-regulator social relations at work in the AMI scheme. “One of the clichés of the sector [is] that the anglers are the eyes and ears for the rivers [...] the difference now is that initiatives like the AMI have given anglers a more formalised means of communicating with the regulators.” This increases a sense of ownership and comprehension says Pike “because if you’re in there [...] seeing the natural peaks and troughs, it gives you a deeper level of understanding of how your river works.” (TP-KE/2012). Smith (2011) corroborates such utilitarian and ecological motivations, concluding that many AMI anglers are concerned with improved water quality and environmental protection.

Ellis & Waterton (2004: 100), quoted a volunteer who imagined that: “when he stands up in court, only by ‘wearing a white coat’ will his accounts be granted legitimacy by actors such as the *Environment Agency*.” In fact, AMI readings are *inadmissible* evidence. We might term this the ‘forensic barrier’, policed by notions of legitimate and amateur scientific identities.

Pike argues this barrier is of little concern. “If we detect a problem [...] we’re on to the EA immediately [we] hand over the actual detective work and execution to the Agency.” (TP-KE/2012). Pike is complimentary about *current* EA officers, commenting: “the ones I’ve

come across are all highly motivated, very passionate, and actually genuinely are there because they want to do the right thing.” (TP-KE/2012). His opinions of a previous generation appear in Chapter 3.

2.7 Summary

The AMI scheme is an ‘assemblage’ of values and facts, ambitions and agency. It bridges a gap between an instinct to act, and the facts and laws with which to act. Watercourses are protected through pragmatic collaboration and dialogue between angler-sentinels, EA officers and scientists, creating a public and corporate awareness of ‘cause and effect’. The workshop is a robust component of such an impact but for a fuller picture it is now necessary to look at other AMI features.



Anglers' wet flies.
(Photo: K.Edge)

3.0 Under the surface: attitudes, agendas & tensions



Illustration 3

The AMI is “only here to find pollution; we’re not going to put your flylife back”

A selection of angler flyboards. These are secured in rivers and streams used to encourage the laying of eggs by mayfly, caddisfly and stonefly.

(Photo: © Dorchester Fishing Club. Source <http://www.grhe.co.uk>)

3.1 Introduction

The AMI is an alliance built on cooperation and the *co-creation* of a bio-indicator scheme. Nevertheless, there were initial collisions over agendas, epistemological approaches and standards. The results of systematic (but infrequent) pre-AMI monitoring by the EA seemed to contrast with anglers' intuitive sense of declining fly and fish numbers. This perceived decline led many individual anglers to think they were seeing a poor return on their rod licences used, in part, to subsidise EA work.

On the other hand, as Brooks explained: anglers were seen by the EA “as a thorn in *their* side [...] complaining but not having any data at all.” (SB-KE/2012). Pike spoke of anglers' concerns for the learning and aptitude of older EA officers. “Levels of education do dictate quite strongly how the national-level policies actually get translated. [Some EA officers] had seen the *Wandle* in its darkest days and somehow just emotionally couldn't conceive that it could ever get any better [...] we had to wait for a generational shift [...] a new crop of people [as] ambitious and hopeful as we were.” (TP-KE/2012).

As we saw, The NHM ameliorated these tensions as a neutral, face-to-face forum accommodating ‘Science’ and the amateur naturalist tradition. It was “a kind of lynchpin [...] “both groups saw the museum as kind of honest broker” said Brooks (SB-KE/2012). Today, the work of Hellon, who is both a trained scientist working for the EA and angler himself is also important. He, like Brooks exhibits a reflexivity and agency. Reflecting on his role at Leckford, Hellon said: “I'm just a cog in a big machine [its] brief is very simple [...] so I try and provide feedback as much as possible, but there's no [EA] newsletter [reporting] what other groups have achieved”. Hellon values face-to-face contact. “Once they meet us on the ground [...] maybe we'll be fishermen too, and we're entomologists, I think they can actually see we are people rather than an awkward organisation. [With] a name and a face they know they can contact me.” (JH-KE/2012).

3.2 Science or PR?

The EA is ‘connecting’ through the attitudes of Hellon, but is it ultimately only overseeing a ‘rough science’: a condensed instrumental knowledge for an early warning system? Whilst a proven mode of public engagement, there is a recurring perception that shallowness typifies many expert-lay projects like this, delivering a pseudo-science of only PR value. (cf. SB-KE/2012). For concerns about ‘imperfect’ methodologies see Rowe *et al.* (2008); Powell & Colin (2008); Davies (2012).

With the AMI, the prime driver is not ‘fun in wellies’ but vital data-generation. Even so, its volunteers must step aside, allowing authoritative, ‘real’ *Science* to be done when pollution appears. Hellon commented on the AMI’s methodological limits: “it’s obviously been deliberately simplified [and] it wouldn’t be of any use as distribution data for species [and] it can’t be used directly for WFD assessments (JH-KE/2012). Nevertheless, Hellon asserted: “it *is* science, it is scientific [...] generating long-term data [and] doing exactly the same samples [as the EA] it’s just the analysis of them that’s simplified.” (JH-KE/2012).

Other types of non-rational knowledge also come in to the picture as the tacit, everyday observations of anglers. Crofts formally acknowledged the value of intuition, telling his workshop that they “often get a gut feeling there’s something wrong [...] night after night, no Dace are rising.” Hellon too gave credit to the rigour and superior knowledge lay expertise can bring to the scheme: “I’ve met so many amateur entomologists who are considerably better than I am [and] they know a lot more than what they’re taught on the course.” (JH-KE/2012).

Whilst Hellon praises lay knowledge, Brooks points to a tension between ‘folk memory’ recollection and evidence. Past experience plays a role in angler perceptions, with one Leckford tutor contrasting personal memory of healthy stock with today’s “thin trout” and “poor flylife”. Brooks explained some gamekeepers will remark: “ ‘there’s nothing you

scientists or city folk can tell us that we don't already know.' ” But, Brooks asserted: “it is all anecdotal stuff – maybe close observations, but they're isolated [...] most of them had never even looked under the water.” Brooks then mimicked lifting a stone adding: “they're like “ooh wow! We didn't know anything about this!” (SB-KE/2012). Brooks accepted that country sports people “are quite influential, they are often journalists actually on the fishing magazines, very opinionated [...] they probably do know a lot, *but* [...] I'd put my money on the scientific studies, rather than anecdotal observations of opinion-formers.” (SB-KE/2012).

So, what makes the scheme really valuable? As an out-in-the-field science, does it curb pollution or does its ‘high-visibility vest’ profile simply generate an environmental PR? Brooks accepts in one way it is “ a PR exercise” but a good one, making issues visible and motivates “people to get involved in conservation activity.” (SB-KE/2012). Brooks suggested success can only follow careful forethought: “It's important to try and identify who might get involved [know] the level of their expertise, and what you can expect to get from them, and then tailor the project very carefully so that the data [is] useful.” (SB-KE/2012).

3.3 Wading in: The flyboard issue

One area of expert-lay friction to consider adjacent to AMI work is re-introductory farming to boost ‘low’ Blue-wing olive and other nymph populations. This involves a century-old practice of collecting and incubating eggs using tiles or boards anchored in rivers, or glass plates stored in tanks. How does this active rehabilitation relate to the more passive AMI scheme? Such non-scientific action is problematic for scientists like Brooks. When asked whether the restoration of populations skews data, is a marginal, maverick activity or aid conservation, he replied that it could effect “all of those things in a way.” (SB-KE/2012). In spite of one Leckford tutor telling the attendees that the AMI was “only here to find pollution; we're not going to put your flylife back”, Leckford did incorporate a presentation on flyboards. For Brooks “it is just anecdotal [...] there's very little monitoring data [...] most species [are] capable of expanding their populations very, very quickly.” He added: “It

reflects the frustration of [individuals who] see a lack of progress [...] non-specialists [...] are very, very strongly motivated – probably got a good background in science as well – [but] personalities [mean] they don't operate very comfortably within an organizational framework [they] just 'do their own thing'." (SB-KE/2012).

For Brooks this was an instance of a fish-farming mentality meeting a passive exercise in river monitoring. He accepted that scientific principles needed foregrounding as a counter. For him, anglers "are not seeing progress in conservation, [...] they're not seeing change. It's almost as if they want some pollution incident to happen to add a bit of excitement to it." (SB-KE/ 2012). Hellon is more equivocal about the boards: "it's not sustainable [but] I'm sure it's going to be [an] incredibly useful technique in places." He added a conciliatory note: "As far as I am aware it's not officially part of the training day, [yet] those guys, they deserve to be able to put it in." (JH-KE/2012).

Pike, commenting on one lead AMI angler suggested that he had "pretty much single-handedly founded this entire movement, [so now] he's beyond [...] handing over the results, and he's actually into fly population restoration [unlike] the long-term academic scientists, who apply the precautionary principle wherever possible." (TP-KE/2012).

A tutor at Leckford said: "[There's] restoration opposition, what else do we do? More research? They'll be extinct." Scientific reservation about fly restoration had centred on genetic issues but now, orthodox, evidence-based scepticism around low numbers and caution around riverside radicalism seems to prevail. Is this dismissal of flyboards an unhelpful a bracketing-out of what Ellis & Waterton identify as a lay "signature of expertise" on local patches? (2005: 681). The existence of a scientific flyboard protocol awaiting 'sign-off' suggests compromise is being sought (SB-KE/2012). Irwin has questioned how to incorporate the informal knowledges of "the living laboratory" (1995: 195, 132), because their external

constitution may be awkward for those inside science. The lay expertise and values here are consistent with RP aims, but troublesome perhaps for those following the scientific paradigm. Irwin says, we cannot “replace one set of knowledge claims with another.” (Irwin 1995: xi). Certainly, the challenge in the case of flyboards, Pike observes is “how to get those two sides actually working properly together, so that anglers aren’t seen as the radical cowboy fringe, just doing stuff without scientific basis.” (TP-KE/2012). The solution for smooth running in the AMI is partly a dialectical, synthetic one – a sublation preserving the best of each strand but also one of side-by-side compromise.

3.4 Watermelons

Angler attitude to the bigger environmental citizenship project finds expression in humour. One Leckford tutor said the EA had gone over to the KGB and claimed not to have heard of the term ‘citizen science’, joking whether this all amounted to ideological surveillance by ‘Citizen Smiths’. This individual also described some officials and NGO people as ‘watermelons’: “green [environmentalists] on the outside and red [socialists] in the middle.” However he conceded that the EA “does come out jolly quickly [and the agents] do their job well actually.” Hellon found the ‘watermelon’ label amusing: “that’s one of [the] more pleasant terms for us I think!” conceding that some anglers “often do have hours of frustration” (JH-KE/2012). Concern in a similar context for “extremist pressure from socialists masquerading as environmentalists” is found in Bate (2001: 114).

3.5 New citizen environmentalists

Brooks is aware of angler frustration with ‘uneventful’ monitoring: “The river’s probably fine. If [numbers] are above the trigger levels, it’s sustainable.” He suggests “you have to think of new ways of invigorating [interest].” (SB-KE/2012). One way might already be in train in the form of non-fishing, ‘friends of’ community river groups typified by the profile of the Great Abington workshop. Pike suggested that: “What has started out as an angler’s initiative may well need to expand out beyond anglers for long term sustainability.” (TP-

KE/2012). Significantly, the Great Abington workshop group-photo (Illustrations 1 & 2) features just *one* angler. Has AMI angler participation *already* peaked? The remaining attendees were Cambridge *Chalk Rivers Project* group representatives monitoring on the *Shep* and *Mel*.⁵ Indeed, Crofts told the attendees: Anglers have “led the way [...] so put in volunteers and conservationists when you see [or hear] the word ‘angler’.” At Leckford, Hellon noted that: “increasingly, river friends groups and amateur entomologists are getting involved” adding: “they just see us as sort of kindred spirits I think, ‘surely you’re the good guys?’ ” (JH-KE/2012). A new stream of activists rooted in a traditional concern for locality and wider affairs are seemingly happy to generate AMI data.

Anglers do still see the bigger picture (Smith 2011) yet may have undermined their environmental citizenship credentials with their enduring utilitarian, ‘storehouse’ view of rivers. Local community groups are more likely to foreground aesthetic and ethical perspectives. So significant is this shift that Brooks has said: “we’ve been debating should we change the name from AMI to...?” He added: “We’ve decided not to do that [because] anglers then fall outside the conservationists’ [community] again.” (SB-KE/2012). Tweddle suggested keeping a “sub-arm that’s focusing on anglers.” (JT-KE/2012).

The shift from angler to wider community concern for water quality gives the AMI fresh immediacy. Will this change the pitch of the workshops? Might it even herald the embrace of a ‘more acceptable’, ecological restoration of *habitats* and not just involve narrower flyboard re-population? Significantly – and with a nod to the Cambridge group – the workshop tutor’s introduction at Great Abington referred not only to water quality but “habitat improvement, [where] potential is excellent”.

What characterizes the new volunteers? Many, says Hellon are retired and “are already out there routinely taking flow measurements [...] and they have bailiffs, so they actually patrol

⁵ They were supported by *The South Cambridgeshire District Council* and *The Cambridgeshire Wildlife Trust*.

areas of their river on a voluntary basis, it's pretty impressive." Their interests are wider than anglers, but they do not have their identification skills: "they've never really done pond-dipping since they were kids [...] caddisflies are completely new to them [...] they are learning a lot." (JH-KE/2012). In such groups, Bell *et al.* note delight in nature, in socializing and a "mutual learning" of new skills, (2008: 3449-50). Tweddle sees in the AMI a scheme a willingness to build "local capacity to enjoy the environment, to monitor activity and with a devolvement to new community leaders, suggesting sustainability for the project." (JT-KE/2012). However, given continuing trends *away* from taxonomy and monitoring in some quarters of biology, perhaps the AMI should not be too quick to replace the services of angler entomologists with enthusiastic but non-specialist community players (cf. Lawrence (2006); Cardoso *et al.* 2011: 2650).

3.6 Summary

This chapter has looked closely at the shifting realities of the AMI. Tensions between established alliances may well be eclipsed by the arrival of a new, non-angling constituency. Continuing normative ambition at macro-societal levels and more localised ambitions maintain a case for an inter-institutional and community discourse in a sphere where interaction is dialogical, and environmental action inclusive and timely. The final chapter examines the social workings of the AMI from a selection of theoretical perspectives.



Environment Agency Fishing Licence for salmon & trout.
(Source: www.environment-agency.gov.uk)

4.0 Riverside agency: social theories, concepts, research



Illustration 4

Blurring the science-public divide

Sluice-gate, detail.

(photo: K.Edge)

4.1 Introduction

This study has presented the AMI as a nexus of values and regulation, scientific guidance and volunteering. It is located within a wider societal network, with the whole populated at both supranational and local levels by social agents. This chapter outlines social theories and concepts that can help to crystallise this conception and possibly inform future action research.

4.2 Societal formations & agents

Social agents may be obedient ‘actors’ with societal scripts; altruistic individuals (from officialdom or elsewhere) using science and their own experience as hybrid agents to ‘get things done’; or they may be more independently minded.

We might usefully turn to Giddens’s concept of structuration to see (i) an objective, coordinating structure of “rules and resources” that maintain society and (ii) a local sphere where the individual subject is a reflexive, “knowledgeable human agent” who at once sustains that structure, but *also* purposively performs transformative social actions. (Giddens 1984: xx, xxxi, 3). Arguably, we might view the RP and AMI as examples of Giddens’s “transformation points” between spheres (i) and (ii). These points are real locales where practical, self-aware individuals negotiate both socio-political structure and “institutionalized practices.” (1984: xxxii).

As Pike commented informally after his recorded interview: ‘out there’ are “big institutions, but it comes from the people”. Such people are not fixed in their make-up, but may be in part inflected by public concern, institutional practices, and legal frameworks. They may be Irwin & Michael’s “hybrid actors that [...] blur the science-public divide.” (2003: 67). For example: Hellon is at once a qualified scientist, EA officer and angler; AMI tutor Bennett is an angler with a doctorate in riverfly ecology; Pike is an angler, AMI volunteer, and *Wandle Trust* publicist learning by reading and doing. He explained: “anything I know about science is

entirely self-taught.” Such porosity between roles and status is found in “the hybrid make-up of so-called amateur and professional domains [where] identities seem to stabilise temporarily in some contexts, only to destabilise in others”, (Ellis & Waterton 2005: 676 -7). This has to operate as an “imagined contract” negotiated between expert and volunteer, a “reciprocity” trading ultimately on the “vital contract” of science and the public (Ellis & Waterton: 2005, 684-6).

To summarise, a pattern of complementary environmental agendas and activities is shaped by the interaction of two societal realms: (i) a central macro-social system of normative policy and legislation (the WFD), citizen science agendas, and (ii) the micro-social network of regional administration (the EA) and social agents, delivering, through ‘transformation points’, riverbank expertise and action (the RP and AMI groups).

A productive inter-subjectivity takes place here in a face-to-face “interworld” where officers, experts and volunteers weave themselves into an environmentally significant ‘fabric’ (Crossley 1996). Latour’s Actor-Network-Theory (2005) has been acknowledged in Ellis & Waterton (2005) and is suggestive of yet more ways to analyse the AMI’s hybrid agents and their contexts. Extending beyond Crossley’s face-to-face locales, Latour argues for spatially and institutionally diverse “trails of association” between *remote* individuals (Latour 2005: 5, 201-2). His wider conception of a system of ‘actants’ – be they people, documents or things – may appear reductive and abstract, yet might be a way of factoring in nymphs, nets, magnifying lenses, laptops and EU directives.

4.3 Co-creation

Forms of volunteer engagement have been usefully analysed by the U.S. Public Participation in Science Research Project (Bonney 2009; Simon 2010). It allows us to identify the AMI predominantly as a *co-creative* enterprise devised by scientists *and* lay people, engendering a monitoring methodology fusing lay expertise with scientific principles. The AMI then is, in

some ways striving to be a partnership of equals. Amateur naturalists have had a long relationship with professional science in terms of collecting and specialisation. However as we have seen, there are limits on *fully-fledged* lay participation in the legal phases when lay data from a simplified EPT test must be followed by expert scientific corroboration and expert legal submissions. Moreover, a cultural tension between spreadsheet evidence and in-the-river fly reintroduction is not wholly transcended by the co-creative ethos.

4.4 Plugging the assemblage together

Irwin and Michael's "ethno-epistemic assemblage" is, for them, a way of usefully understanding any instance of "science-society relations." They propose it to be a focused "territory" of interconnected agendas and a meaningful, "collective assemblage of enunciation" (2003: 17, 111-136). "Sometimes these are new social movements, sometimes they are pressure groups bringing together both the lay and the expert. Such hybrid groups entail scientific, political, experiential and communication knowledges and resources [...] they are locally situated [...] and are crucially involved in the establishment of knowledge." (Irwin & Michael 2003: 85). They say of assemblages that they may be competitive and internal "connections or relations" that are not necessarily 'cohesive' (2003: 139, 142). This study saw no rival assemblage overtly competing with the RP and AMI and their very specific early warning remit. However, *internal* divergent opinion on fly and fish populations might arguably be testing AMI unity.

How is the 'assemblage' viewed on the ground today? Pike argued: "any partnership that works is a marriage of convenience to some extent, because both parties see a benefit, [either] for their own, or for some wider, more altruistic good." For Pike: "Everybody's pulling in the same direction in the end. Everyone wants healthier rivers with more fly life, which meet the standards of WFD and therefore don't get the UK fined by Europe [...] it's just an ongoing discussion of what's the best way to get there." (TP-KE/2012). When asked whether scientific and angler knowledge might be reconcilable he replied: "Absolutely, [they are] entirely

complementary, and you just need to work how to plug them together.” (TP-KE/2012). Might we might see concerned social agents like Brooks and Pike looking at the AMI ‘wiring’ and working towards a sustainable socio-cultural ecology that can survive and recover from external pressures and local disturbances?

4.5 Citizen science & environmental citizenship

The AMI appears to lie on a spectrum running between the ambition that is ‘citizen science’ and its more applied form, environmental citizenship (JT-KE/2012). ‘Environmental citizenship’ as defined by Dobson (2010) is “the active participation of citizens in moving towards sustainability”. These citizens are loyal to place, yet also have a cosmopolitan (rather than nation-state) perspective and a sense of environmental obligation towards others now and in the future. “The environmental citizen says, ‘I will, even if you won’t’ ” (2010: 22), an attitude seeming to define the new ‘friends of’ AMI groups.

The bigger label of citizen science is still useful here and speaks, like environmental citizenship of the academic need to define expert-lay work. As a label it makes visible examples of volunteer involvement in scientific activity that bridge an information gap and satisfying a scientific wish for ‘outreach’ that “raises social awareness and changes behaviour.” (JT-KE/2012). Wolseley claims citizen surveys draw people, scientists and politicians into debate, allowing them to ask: “ ‘it doesn’t look good here, why?’ ” (Wolseley 2012). However, Tweddle suggests that co-creative schemes like the AMI are more dynamic in composition and direction than top-down citizen science formations. Co-creative work relies on consensus and tends to “mission creep”, or at least changing cycles of conservation then biological research. Tweddle sees this in schemes as: “a kind of beauty and a challenge because they tend to be influenced by one or two individuals.” (JT-KE/2012). The AMI certainly contrasts with the more ‘extractive’, academically led *participation* model of the UK Open Air Lab (OPAL) citizen science scheme (OPAL 2012a). OPAL’s own aquatic bio-monitoring scheme undertakes physical, biological as well as chemical surveys and has the

RP as a partner, but as a whole it is more orientated towards short garden safaris and *bioblitz* surveys where youthful enthusiasm prevails (OPAL 2012b). Nonetheless, it may have lessons on communication for the AMI.

4.6 Communication: some perspectives

AMI volunteers require effective communications between lead organisers and each other. Communication, be it phatic or more substantial appears to have been a challenge for the RP and AMI for several years, and Fox *et al.* note that it is central to volunteer motivation. (2010: 57). In their theoretical description of a science-public assemblage, Irwin & Michael find a place for communication experts performing ‘intermediary’ roles (2003: 85). Today using old and new media they are able to reinforce the importance of scientific method and maintain volunteer morale. What forms might this take? This might simply be Hellon publishing his *own EA* newsletter to connect with new volunteers, RP articles in angling magazines or an interactive platform provided by the web and social media.

Of course, many keen conservationists and amateur naturalists *may* wish to be ‘plugged-in’ to a bigger social and analytical network, but others may not. Pike is unsure about these connections: “It might [...] motivate people more, and keep them involved on the basis of being part of a bigger movement. [...] whether it’s *essential*, I don’t know.” (TP-KE/2012).

As far as a sense of purpose goes, some academics like Bell *et al.* see value in new media but it is still the case that: “personal interactions energise and stabilise volunteer activities, facilitating sensitive management of the volunteer/amateur/professional nexus.” (Bell *et al.* 2008: 3450-51). A need remains then for *specialist-led*, ‘in the field’ engagement. For Pike, stress should simply fall on basic “lines of communication [...] between the local group coordinators and the people they are coordinating; and then upward from the local group coordinators to the centre. Those should be the most regular, robust and formalised [with] more *ad hoc* communications for the ‘feel good’ stuff.” He argued too for “a biannual

conference, [attracting] more of the individual monitors along rather than just the team leaders.” (TP-KE/2012).

An allied issue is that of collating and sharing data. For Brooks, such “feedback is an issue” (SB-KE/14.3.2012). He later explained that to be: “the shortcoming of the project, and it reflects funding shortages [...] a high priority at the moment [is] to get a national data base [that of *The Freshwater Biology Association*] that anglers can input their data into, and see how that fits within the national picture.” For Brooks, statistical feedback signifies that: “the data is important [...] that it’s being used”. (SB-KE/2012). The AMI still awaits the nationwide posting of its online results.⁶

4.7 Interdisciplinary research

Anthropology and sociology can help to map the social relations of environmental citizenship providing empirical and reflective knowledge to run alongside the objectivism of science (Delanty & Strydom, 2003: 5-6). Active environmental agents might usefully share in academic action research looking at the interplay of human values, institutional cultures and structural forces playing out in their scheme and so seeing themselves within the “policy milieu” (Ellis & Waterton 2005: 691; Wong & Sharp 2009). Human motivations, levels of trust, retention, and advice on ‘brand shifts’ can be glossed by such interdisciplinary attention. Bell *et al.* (2008) also conclude there is a need for institutional stability to manage expert-lay relations; and that a key to sustainability is leader enthusiasm (2008: 3443-54). These findings are joined by those in Kühn *et al.* (2008) arguing that organising institutions must ensure there are resources, thorough coordination, motivational activities, sustained contacts and recruitment (2008: 89-103). There are, of course caveats for any researcher offering such prescriptions. As Tweddle reminds us, you have to know why you are undertaking such a study and avoid discipline-specific jargon. One should “feed in gently”, mindful of

⁶ The OPAL amateur water survey offers a main survey results map and an interactive invertebrate pollution sensitivity graph. Whilst arguably for a younger, and short-term audience with no ‘early-warning system’ function, this appears to steal a march on current AMI data presentation. (OPAL 2012c).

longstanding volunteer commitment and be wary of devising categories and organisation solutions for whilst “rebalancing” from the margins. For Tweddle indeed, internal bottlenecks and disagreements can be self-correcting as disillusioned agents leave. (JT-KE/2012).

4.8 Summary

This final chapter has proposed theoretical perspectives that can assist in conceptualising the AMI and its activities. Combining observation, interviews and theoretical literature may be thought to muddy the waters. Yet literature addressing science-public relations exhibits a multi-perspective approach, indicating an interdisciplinary interest in supporting external and internal reflection aiming geared towards an environmentally beneficial institutional praxis. It is now necessary to draw the study’s findings together with some final thoughts.



Trout on the River Test.
(Photo: Gareth1953/flickr)

5.0 Conclusion

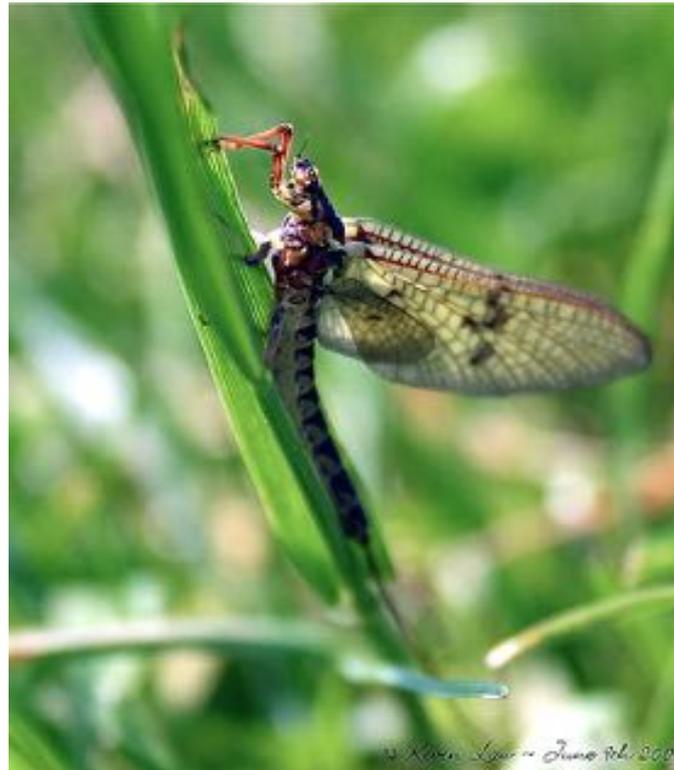


Illustration 6

Adult mayfly, Essex.
(Photo: Law_Keven/Flickr)

5.1 Findings

The study has outlined the origins and development of UK environmental concerns in respect of river pollution. This has provided a context for the facts and values of science-society relations, and also the consequent river stewardship practices as they play out in the RP and AMI.

We saw that there is a tradition of fly anglers operating as private citizens, seeking compensation for violations of their fishing beats. In the parallel public realm, UK governments and European parliaments have laid down laws and levied exemplary fines. Officialdom in general has looked to science (as an objective broker) to determine and police freshwater standards.

The first chapter sketched out the creation of the AMI, identifying it as a marriage of convenience between individuals of diverse status, ambition and expertise. Within it, a lean citizen's science has been crafted, an attenuated scientific methodology, co-created and managed through expert-lay dialogue.

The second chapter looked at the boosting of larvae populations by frustrated and somewhat radicalised AMI tutors. It also drew attention to enthusiastic non-anglers undertaking AMI training in order to oversee their local watercourses. These implications call for a thoughtful approach to what happens next. Communication matters were seen to reveal a possible disjunction between what AMI agents believe volunteers require and what they may, in reality be happy to see pertain.

In the last chapter, the AMI was argued to be an “ethno-epistemic assemblage” (Irwin & Michael 2003); a site of regulatory implementation, discourse and action; a citizen environmentalism partly “developed and enacted” by ordinary people (Irwin 1995: xi). The social agents populating these politico-legal, scientific and non-specialist fields have been

willing to join a wider system of environmental advocacy. The key term: environmental citizenship has proved useful, referring to rights and duties at both a local and national levels and admitting of an activism, within a mainstream polity that can be individualist or communitarian.

Several things have emerged: (i) People value clean aquatic environments; (ii) there remains a willingness for ordinary people to take on river stewardship with scientific and legal support; (iii) angler and now community groups are willing parties here, learning larvae sampling techniques to 'know nature' and monitor the health of rivers; (iv) government, science and society must continue to find ways of functioning together; (v) There is a reflexivity and willingness on the part of several leading AMI individuals to look at the scheme's changing social dynamics and profile, suggesting a resumption of interdisciplinarity and so-called action research, integrating participants and academics alike. (Denscombe 2010: 125-136).

Finally, whilst it may be instructive to compare the AMI to historical and current examples of the so-called 'contribution' mode of *The Big Butterfly Count*, and that of OPAL's programmes, the AMI's distinctness does need acknowledgement. It does not operate with a pre-determined, top-down package of observing. It is rather a co-created scheme of expert-lay elements, an early-warning system that is neither a short route to the great outdoors nor an opening on to scientific literacy.

5.2 Reflections on theory & research

A substantial literature of theoretical work and empirical work now exists on the subject of volunteer wildlife monitoring. It marshals a wide range of observations, issues and interpretations from across the globe. Environmental action, extend by science and social participation now has no shortage of article discussions, tables, diagrams and insights to draw on. The challenge though is to read this literature with a view to understanding its implications for *other* schemes.

Theory does help us to see that sections of society taking responsibility for clean water do comprise a multitude of social agents. These moreover are not to be seen as one-dimensional ‘actors’ but hybrid figures operating intelligently across wide political, spatial, social and scientific networks. Relations between agents are dynamic, but do hold because of shared preoccupations.

The theory, concepts and heuristic suggestions of Irwin (1995), Giddens (1984) and others together with the anthropological work of Ellis & Waterton (2004, 2005) can map out a macro societal system and a localised realm that can be seen as the substrate for individual environmental choices, knowledges and actions. In addition, coalitions of the EU, EA, RP, AMI and ‘friends of’ groups can be modelled as non-hierarchic associations ‘connected’ in the rhizome-like heterogeneous networks suggested by Irwin & Michael’s assemblages (2003: 120, 142).

5.3 Implications

What are the implications of this study for those wanting to defend the natural environment? Firstly, legislative and administrative bodies need the continuing presence of scientific tenets and the latest means of data collation and analysis. Without the lynch-pin that is scientific method and the credibility it carries, evidence-based environmental policy and statutory implementations will lack substance. Those moving in political circles who see the advantages of *en-masse*, nationwide monitoring must be prepared to support willing scientists *and* argue for the funding of extant and any new citizen environmentalism initiatives.

At the same time, biologists and ecologists, equally anxious to increase the numbers of volunteer recorders across the UK must continue to fashion ‘outreach’ schemes that attract widespread participation. This may be a challenge, given that taxonomic and distribution

research is currently under some pressure. Brooks has also questioned the levels of outdoor expertise possessed by some UK science postgraduates (SB-KE/2012).⁷

Data collection is now seen as an outmoded part of the biological science project. Cardoso *et al.* argue that: “the collecting of spatial and temporal data on known species are increasingly regarded as dated science.” (2011: 2650-51). If trained naturalists are thinner on the ground and angler-entomologists no longer take a lead in AMI workshops, where will field expertise come from in the future? Pike has already conceded that anglers may be stepping down from their lead role. Asked whether they were the pioneers he said: “We’ll settle for that.” (TP-KE/2012).

Scientists involved in the AMI need to think about the *culture* of the scheme as well as its science if they wish to see such schemes evolve. Indeed, Brooks agreed that in addition to science restating the importance of data and evidence, there is a need for quite a lot a finessing on the part of scientists in and around the culture of a scheme. (SB-KE/2012). As for anglers who want clean waters, they perhaps must be prepared for a continuing dependency on an administered environmentalism and consider renewed adherence to scientific principles and discourses.

Lastly, society as a whole, through democratic channels, NGOs and community activity needs to articulate its hopes and concerns, and volunteers – anglers or friends – need to make plain their motivations to researchers and lead AMI organisers so sustainable monitoring schemes can be introduced or kept in place.

⁷ At Imperial College, entomologist Simon Leather is seeking to preserve postgraduate entomological study through his move to Harper Adams College in Shropshire in anticipation of courses being suspended at the Silwood Campus. (*Felix*, issue 1519, 25 May 2012: 1).

5.4 Sustainability

Science-society volunteer projects require agile, critically renewed forms of implementation.

As Irwin & Michael assert, there is no “once and for all solution available” (2003: 151-2).

Brooks, for his part recognises that science is sociologically situated, and he values a monitoring of shifting, socio-culturally shaped schemes. Previous anthropological research and sociological readings of volunteer monitoring might now be repeated. Analysis of communications and further unpacking of the motivations of volunteer personnel by using qualitative approaches and a critical sociology may prove helpful too.

In their study of eight participatory monitoring network organisations across Europe, Bell *at al.* stress that “similar levels of attention be paid to the social aspects of the organisation as are paid to the general management of data.” (2008: 3443). This they say requires an understanding of institutional stability to manage such expert-lay relations.

However there are some issues with the mapping of scholarly understanding on to practice, be it action research or more abstract social theory. Giddens argued that “The social scientist is a communicator, introducing frames of meaning associated with certain contexts of social life to those in others” but warned they are “fictional accounts” (1984: 402-3). Caution must therefore be exercised in too rigid a modelling of reality. On this point Tweddle spoke of the need to be clear in the aims and presentation of any sociological research (JT-KE/2012). Researchers should certainly not impose ‘solutions’ from the outside to non-existent problems. Some theoretical modelling needs to be more responsive to hybrid agency as there is a tendency across some of the literature to persist with a false dichotomy of expert and lay.

5.5 Qualitative problematics

Those critical of qualitative methods may raise a number of objections. Could more interviews have been undertaken? Were those interviewed typical? Where were the voices of ordinary anglers and the new community groups? More work may be needed.

All interviewees spoke on record with commitment and reflexivity. Some informal comments made at workshops and in other meetings suggested exasperation, but nevertheless a basic empathy and respect for others in the scheme was heard. The semi-structured interview may elicit a party line, but the supplementary question does allow that line to be examined. Agents will certainly assume certain roles, but they express personal opinions too that are of some research value.

5. 6 Final words

Arguably we might see social agents like Brooks and Pike working towards a sustainable, resilient “socio-ecosystem”: a science-society assemblage that can survive external pressures and local disturbances. Through their efforts, might the AMI continue to be a building block for human engagement with the natural world that Ellis & Waterton had discussed back in 2004? The AMI may not be the site of disinterested activity, but it an influential locus of respected standards and ambition. It survives as an example of the *possible*. It is both normative and pragmatic, overseeing dialogue between groupings and offers a viable, flexible practice at the water’s edge. The AMI offers a citizen’s science that citizen environmentalists of whatever persuasion are still willing and very able to understand and adopt.



AMI volunteer on the River Wandle
© Wandle Piscators, 2012.

Appendix A: The AMI Workshop



Illustration 6

Kick sample exercise on the *River Test* with tutors & volunteers (19.5.2012)



Illustration 7

Inspection tray, separator, pipette, fixed lens & abundance chart ready for larvae identification exercise



Illustration 8

Great Abington attendees work in pairs to identify then estimate numbers of larvae in the collected samples (19.5.2012).

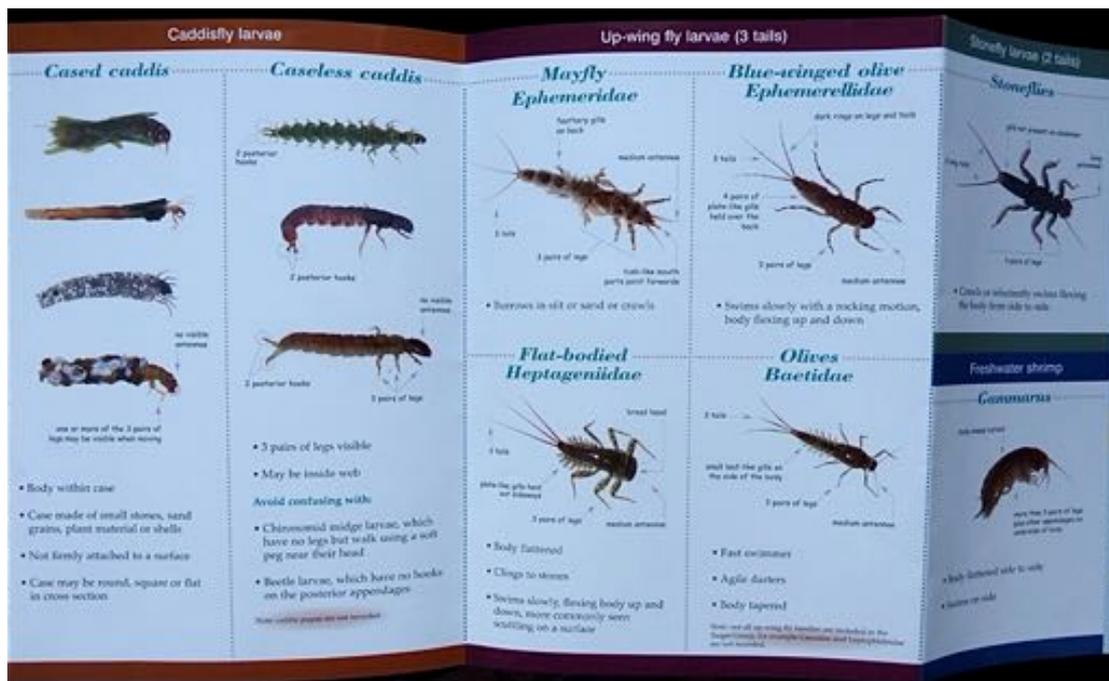


Illustration 9

Field Studies Council 'AIDGAP' chart furnished to all AMI trainees at the workshop. It describes the eight target invertebrates of the AMI monitoring scheme.

© FSC 2007.

River invertebrate monitoring for anglers

Organisation _____

Site name _____

River _____

Grid reference _____

Monitoring Group Coordinator _____

		Example month		Month 1	Month 2
Date		27/06/2005			
Recorded by		C Macdonald & C Bennett			
		Category	Est. number	Category	Est. number
Caddisflies	Cased caddisfly	B	20		
	Caseless caddisfly	A	2		
Up-wing flies	Mayfly (Ephemeroidea)	B	10		
	Blue-winged olive (Ephemeroidea)	B	20		
	Flat-bodied up-wings (Heptageniidae)	C	100		
	Olive (Baetidae)	A	4		
Stoneflies	Stoneflies	A	3		
Freshwater shrimp	Gammarus	A	8		
Notes		Rutches seen. River looking good.			

Note the category and estimate the numbers of each group from the sample, for example:

- if less than ten Cased caddis, enter Category A and estimate the number
- if between 10 and 100 Caseless caddis, enter Category B and estimate the number to the nearest 10
- if between 100 and 1000 Mayflies, enter Category C and estimate the number to the nearest 100
- if more than 1000 Olives, enter Category D and estimate the number to the nearest 1000

Available for free at www.riverflies.org

Abundance	Category	Estimated number*
1-9	A	Count count
10-99	B	Nearest 10
100-999	C	Nearest 100
over 1000	D	Nearest 1000

*Optional

Recording sheet

Illustration 10
AMI 'riverside' Recording sheet with indicative entries.

Appendix B: Riverfly monitoring

Riverfly larvae like other aquatic, macro-invertebrates are good bio-indicators as they quickly and predictably register year-long environmental shifts and ecosystem impact. They are numerous, easy to locate, collect, count and return, Moreover they deliver when chemical testing cannot (Samways *et al.* 2010: 310-11, 14; Bonada *et al.* 2006: 496, 498).

Ecological monitoring of this kind is termed a mensurate field study, the “systematic collection of ecological data in a standardized manner at regular intervals over time [...] detecting shifts in baseline conditions, identifying short-term pollution or disturbance trends or assessing compliance with certain standards” such that as “an early warning [can] catalyse political and management action” (Samways citing I. F. Spellerberg, 2010: 365-6).

More particularly, this is an instance of spatially and temporally defined bioindicator monitoring where “a species or group [...] that (1) readily reflects the abiotic or biotic state of an environment, (2) represents the impact of environmental change on a habitat, community or ecosystem or, (3) is indicative of the diversity of a subset of a taxa or of wholesale diversity within an area” (Samways *et al.* 2010: 406.)

AMI Sampling comprises monthly counts of a predetermined ‘basket’ of 8 invertebrates: cased Caddis, Caseless Caddis, Mayfly (*Ephemeraidae*), Blue-winged olive (*Ephemerellidae*), Flat-bodied-olive (*Heptageniidae*), Olives (*Baetidae*), Stoneflies and Freshwater shrimp (*Gammarus*) located in an EA-registered stretch of river. This is carried out using a three-minute kick and sweep net method by trained volunteers, who identify and enter data. Inexplicable falls below predetermined *baseline data* are conveyed to the local coordinator and EA staff as specialist taxonomists undertake a verifying, more extensive process control sampling using the BMWP (Biological Monitoring Working Party Score for all invertebrates).

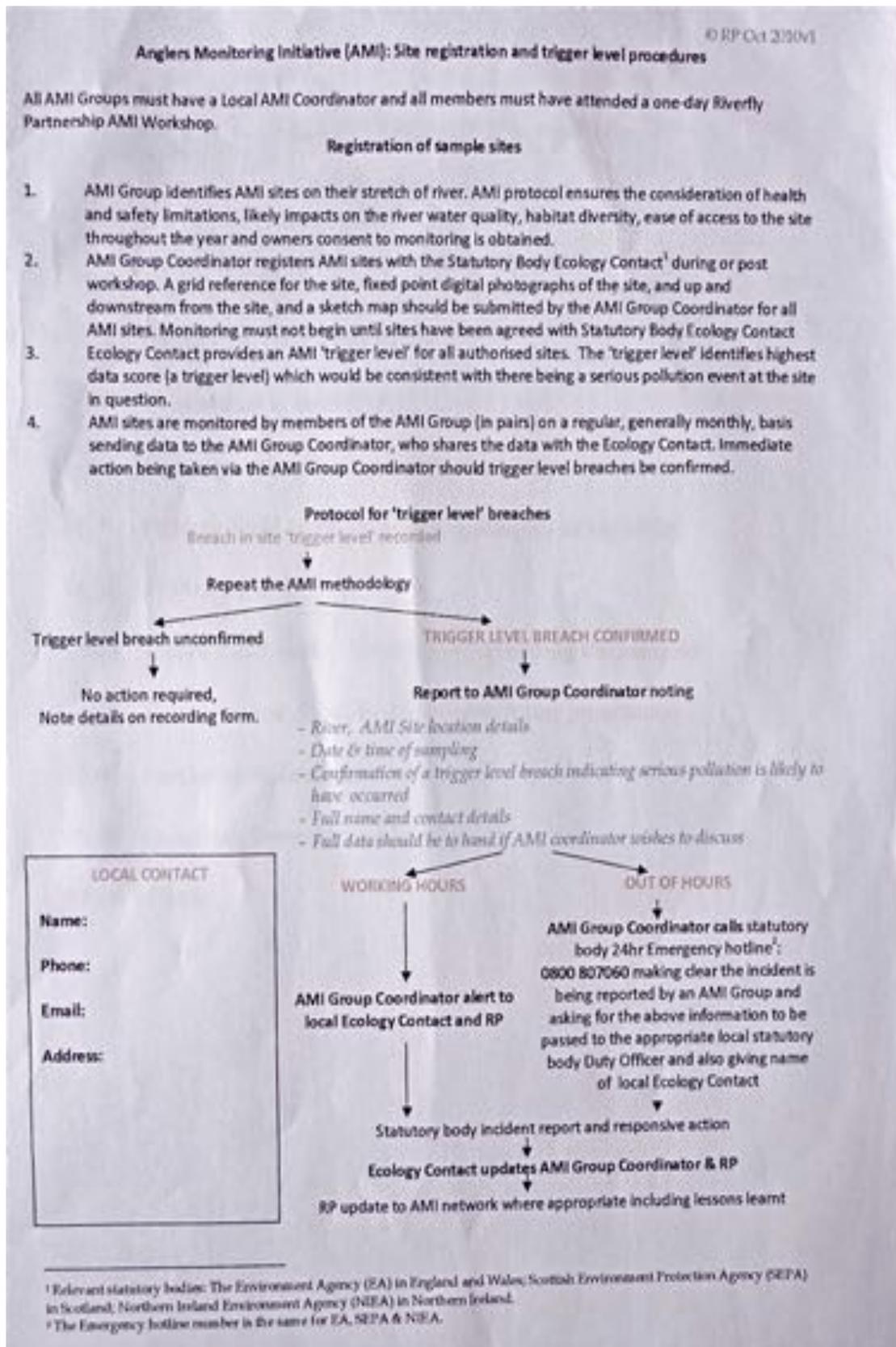


Illustration 11

Protocol & diagram for AMI/Group Coordinator/EA liaison. Sheet furnished at workshops.

Appendix C: Steve Brooks

Edited transcript of an interview with Steve Brooks, FRES Research Entomologist, *Natural History Museum*, London and RP/AMI co-ordinator

26 July 2012

KE: Kevin Edge

SB: Steve Brooks

KE: Steve can you please tell me a little bit about the origins and present success of the RP and AMI?

SB: It started through a project that was funded by *Natural England*. They were interested in involving the museum in getting more amateur naturalists interested in non-charismatic groups of invertebrates. We had several projects that ran under that scheme and one of them was monitoring riverflies, and the way we chose the projects was to think of pre-existing organisations of non-specialists, but who had an obvious interest in the countryside in some way or other, and then thinking how we could link them to these non-charismatic groups [i.e.] groups that hadn't already got a big interest; that weren't like butterflies and there weren't data available. So *Natural England* were interested in getting distribution data on those groups and set up recording schemes that kind of thing.

KE: when was this?

SB: probably early 2000's, so we identified fly fishermen as a potential target group for setting up a recording scheme on freshwater invertebrates, so that's how it started. What then became clear was that it was very difficult actually to train people who had no previous experience in identifying insects and get them to a standard where they could make reliable identifications and records on those groups so we had to rethink the project. And so we talked a lot to the people at Leckford (where the *John Spedan Lewis Foundation* is based) because they were also interested in involving anglers – particularly fly fishermen – in recording what we call riverflies, these are the caddisflies, stoneflies and mayflies. So, between us, we came up with this idea that we could ask fly fishermen to monitor the riverflies on their stretches of river. We basically made a very simplified version of what the EA was already doing in terms of monitoring aquatic insects on rivers.

The point about that is that different families living on the rivers have different tolerances of pollution and you can allocate scores to those families of insects, so sensitive groups get a high score and non-sensitive groups get a low score. You can then look at the overall scores you get from that and it gives you an idea of the water quality.

So, we made a simplified version of that and trialed it and it was obvious that at that very simplified level the fishermen could do it. They weren't intimidated by doing that, it was something they could do, but at the same time it was essential that the environment agency were also happy that the data they were receiving was something they could use. They were therefore involved as well at an early stage to get that reassurance.

KE: And has that simplified approach to workshops, instruction and subsequent combining of data, has that remained pretty much robust and constant or has it been tweaked as a methodology?

SB: No. We had a trial, probably about five years of gradually developing it; bringing people on board [...] there was a lot of mistrust initially between the angling fraternity and the EA. The EA saw the anglers as a thorn in their side really, complaining constantly about the poor quality of the rivers, but not having any data at all to back-up what they were saying. On the other hand the anglers were antagonistic towards the EA because they felt the EA weren't listening to what they regarded as justifiable concerns about declines in abundance and diversity on the rivers. In particular they were conscious that their rod licence fees – which are high – were a major income source for the EA but they weren't seeing any returns on it. So the museum was a kind of lynchpin really, because both groups saw the museum as kind of honest broker in a sense and they were prepared to talk to us and bring them together, so that worked very well. We launched the scheme, three or four years ago. Since then we haven't changed it.

It really quite important I think, not to change it because it confuses the people using it, the anglers, but also, in order to get any comparative data you need to have the same system running really, so it hasn't been modified and it hasn't been changed.

KE: so, dealing with the point of simplification, would you say it was still scientifically rigorous, because I was led to believe at the first workshop that the data that the anglers generate always has to be corroborated by the EA?

SB: Yes.

KE: If it goes to court, if there are prosecutions on the horizon?

SB: Ok, the data the anglers provide are a broad-brush impression of what's going on in the river, and so essentially, what their data show are major declines in abundance and/or diversity. If the water quality has changed so much that that's produced a change in the invertebrates that the anglers system can pick up, that is going to be a major change. The EA obviously pick up those major changes –but they'll pick up more subtle changes as well, so really, what the anglers are showing are really large-scale changes. *But*, what the anglers can pick-up that the Agency cannot is that they're monitoring the rivers more frequently. The Agency only visits the rivers twice every three years, they visit one year, in the Spring and Autumn they do one lot, a series of sampling, then they do not really visit that river for another three years, and in some cases its six years between visits. What the anglers can do is visit each sampling station every month, or every two months, but also they have more sampling stations as well, so they [anglers] could easily have two to five times more sampling stations than the agency will have.

They also sample upstream sections that the agency does not sample at all. So, in a sense, they are complementing what the agency does. The agency were very sensitive to the idea that the anglers might be doing the agency's job in a way, and so it's very much a complementary scheme and I think that's quite important to understand that really.

KE: and do you as a scientist see it as both of them contributing to the greater project of conservation?

SB: yes, definitely.

KE: Do you see it as legitimate and very valuable exercise that's providing dividends? How do you measure success in terms of conservation and awareness?

SB: Well, the agency would measure success by prosecutions, because they input into the scheme, they allow time [for] their staff to work closely with the anglers, and they allow a certain number of days per year for the staff to work on the monitoring initiative. They're contributing funds in that way as well as directly contributing funds to support the RP so they want to see a return on their money and one way they measure that is through prosecutions. There have been several prosecutions now that have come as a result of the anglers spotting

trouble; but then as you mentioned earlier, then the agency come in, and they have to be satisfied that there has been a change, or at least that they can see the water quality is not a good as it should be. So they don't use the angler's data in the court, they rely on their own data, but the angler's have essentially been the early warning system in a way – that there's something wrong.

KE: You mentioned earlier this slight antagonism, or mutual suspicion and I picked it up a little at the second of the two workshops. I would describe this as a marriage of convenience for the greater good.

SB: Yes, I think it is.

KE: How do you see that as a scientist, is that fairly common? Is there now mutual acceptance and understanding, or are there two cultures rubbing up against each other – officialdom, and the guys and the gals on the riverbank?

SB: No, I think that does still exist, but I think you have got all extremes, so you can definitely point to some of the fishing groups that have built up a very good, close working relationship with particular members of staff from the Agency. And you can see within angling organizations there's general support for the scheme and also within the kind of higher echelons of the EA, there's general support for it. But then, within both of those groupings, there's still, you know, suspicion on the side of the anglers that the Agency is taking advantage of them perhaps, that sort of thing, or they're not responding in the way they expect; and also, within the Agency I've heard it said there is still a kind of feeling that it's a waste of money basically you know, they're not providing anything that the agency aren't already doing – I think that's inevitable actually.

KE: Yes, and what are the alternatives?

SB: To come back to the conservation, I think from my perspective, the anglers are also now contributing into the conservation mainstream in a way that they weren't before. I think when we started, there were conservation organizations – easily identifiable – and anglers fell outside that. In a sense, they're a user group of the rivers, but they weren't part of the conservation mainstream. I'm not saying they are now, but they are definitely, as a result of the RP they are more involved in that than they were in the past I think.

KE: let's talk a little bit about citizen science. When I raised the term at Leckford, I was led to believe that was quite a strange and alien term, there was quite a bit of joshing going on! Do you think it's a useful concept, and is it really only an ambition, or has it played out quite effectively over the last ten years to bring about these new relationships that we are now seeing? For you as a senior entomologist, is it just a label that's had its day, or does it really drive policy decisions and activity riverside?

SB: No, it definitely does drive activity. I think there's an increasingly strong drive from funding agencies and government to involve, to get people trained-up so that in a sense they become citizen scientists and make a contribution to science.

I think part of the motivations behind it are the science funding agencies want, in a sense to justify their funding to the wider public so that people can understand what the significance of it, but also, I think another motivation is that in recent years, there's a perception that science is being viewed increasingly with skepticism, with suspicion, basically, in that in some way, science is working against the aspirations of ordinary people in a way, so it is a way of demystifying science I think, by getting people involved.

KE: Is it too cynical to see it as a bit a stalking horse, a bit of a PR exercise?

SB: I think it is a PR exercise. Having said that, the AIM is a good example of how you can motivate people to get involved in conservation activity that can have an impact. You couldn't do this monitoring without fishermen being involved in it; we couldn't get to this level of monitoring. The impacts they are having are real, positive, beneficial impacts. However, I would say though, quite a lot of citizen science type projects *are* much more a PR exercise type approach, and I think some of the data that's generated are not very useful at all.

KE: They seem quite splashy, and quite generalist.

SB: Yes, exactly, I think there's a danger that you turn other people off, and if somebody's been involved in a project that really has been nothing more than a PR exercise in that sense, they're not going to want to get involved in another, similar project. So that's why I think it's important to try and identify who might get involved in it; the level of their expertise, and what you can expect to get from them, and then tailor the project very carefully so that the data generated is actually useful data. So, for example, the *Garden Bird Watch* is a very good example: people are involved in it because it's very easy to do, they don't have to expend much effort, they're interested in getting involved, because it's their garden, so they have a

massive stake in it and also they want to contribute the data. They feel that what's going on in their garden is of interest to somebody else and might generate important data that people can use. So, in a sense, I think that's a good model to use to come up with other, citizen science type projects really.

KE: So, a thorough-going analysis at the very beginning of what and where you go with it and how you retain levels of interest, and how you feed back results?

SB: Yes.

KE: But, as we've discussed before – and I had a sense of this on my visits – they are happy to contribute data and are happy to do that, but do not have a sense of the bigger national picture.

SB: That's the shortcoming of the project, and it reflects funding shortages really, because there are not enough staff. Because the RP is a bigger project than just the AMI, although the AMI is central to the RP, and is the reason why the RP is where it is, exists even, but that is a high priority at the moment to get a national data base that anglers can input their data into, and see how that fits within the national picture.

KE: It needs interpretation too.

SB: yes, exactly.

SB: it is being done but it isn't completed, we're hoping that that will be up and running within a year, because there is now money available. *The Freshwater Biology Association* are setting up essentially a recording scheme, and the AMI will be part of that, so that's how it's being done [**KE:** and that will be accessed how?] through a website, and you'll be able to input your data, and the data will be screened.

KE: And see how your region's performing, how things are in Scotland?

SB: Yes, exactly. That's been one of the aspects of getting successful projects in my experience is the feedback.

So you've got to identify the group – the stakeholders essentially – what their interest is, and why they might be motivated enough to give up their free time. But then the feedback is absolutely essential as well, and you need to spend a lot of time feeding back and showing them why the data is important really and that its being used as well.

KE: and that's built into the methodology, it's just a matter of bodies on the ground, and time and funding?

SB: Yes, well there is feedback, but at this stage the feedback doesn't include distribution maps and putting records on.

KE: Ok, just to underpin the general sense of where things are.

SB: yes.

KE: at Great Abington, only one of those at the workshop was an angler, the rest were from a local chalk stream group. The Cambridge Council representative suggested they had drawn in all the local anglers who were likely to participate and they are now looking to other constituencies, what are your views on that?

SB: I think that's true. The target audience initially was the anglers, they were on the river all the time, but, subsequently there's been increasing interest from other groups, and from what I can gather, there is a higher percentage of new recruits coming from outside angling organizations. So, we've been debating should we change the name from AMI to ... ?

KE: 'Community MI'?

SB: Yes, something like that. But at the moment we've decided not to do that because actually we don't want to alienate the anglers, because there's a danger of going back to square one, where the anglers then fall outside the conservationists' [community] again, and we just don't want that to happen, because I think it's very important to draw them in to that community.

KE: So alongside the science, and the policy-driven work, and the wish to preserve the environment, there's quite a lot a finessing in and around of cultures and ambitions?

SB: yes, I think so, it's quite important.

KE: It's quite a knotty set of issues really.

SB: Yes.

KE: What about the EU and the *Water Framework Directive*, that was raised, where do you fit in as a scientist in all of that, do you advise at that level, or do you just read the reports, and carry on as normal?

SB: Yea, well, from my perspective, it doesn't really impinge on my work, but it does impinge strongly on what the EA do and it's *the* major driver in terms of prioritising the agency's work. And so anything the agency funds as well, or funding initiatives that might be connected with that, are all driven by the *Framework Directive*. So, for example, PhD projects that we might come up with here will be referring to the WFD to see where the drivers are, and how data we might produce will feed into that, so it is the major driver at the moment.

KE: Using the benefit of hindsight, if you were you to set up an AMI now – say abroad, what would you do differently?

SB: After we'd set it up, we didn't really refer much to what might be going on abroad, but I came across some similar initiatives in Canada and the US – it was a similar idea, but they weren't using anglers they were using local community groups, and one of the main differences was that the organization of it was based in a university and they were essentially using students to analyse the data, develop the protocols – either as PhD projects, Masters projects, that sort of thing, and I think if we got some kind of linkage with the university earlier on, we might not have had the problems we've got now, for example in terms of setting up the databases, maybe even the website, things like that, where we really had not got enough manpower to cover those things which actually require a lot of specialisations that may be available through universities.

And it struck me that there are typical masters-type projects where we could have tested the methods, for example, we could have tested data gathering methods, all of those sorts of methods could have been tested using student projects really. So subsequently, I tried to get both UCL and King's interested, and they both said they were interested, but it hasn't

succeeded. I don't know exactly why, but I think it may be because we'd already got it all set up. Maybe they couldn't see a way of inputting into it.

KE: What's your view as a scientist on restoring fly levels in the rivers using flyboards and tiles?

SB: Well, the thing is that it's not proven. It's a bit like the anglers coming along at the beginning saying there's been declines in the flies, because they hadn't got any data, it's just anecdotal, it's exactly the same with all of these things, there's very little monitoring data.

Ah, you are talking about an AMI tutor's work to breed up large numbers of insects?

KE: Yes, it was in the preamble at Leckford. So, does it skew the data, does it change the ambitions of the project, is it too marginal to merit consideration, where does it sit in the project as a whole, is it a little bit of independence and maverick activity or does it have a contribution to make to conservation and fly numbers?

SB: all of those things in a way. It reflects the frustration of [individuals who see] a lack of progress; things aren't moving fast enough, so, the point about it is, and this probably applied to a lot of other citizen science type things is that the non-specialists, people who aren't employed in scientific organizations, but actually, are very, very strongly motivated, probably got a good background in science as well, but they're outside those organizations. They're individuals, the nature of them, their personalities are such that they don't fit really, they don't operate very comfortably within an organizational framework and are strongly motivated and just 'do their own thing' really. Organizations tend to move too slowly for their own agenda, what their expectations are.

And so we're seeing this here, you know, ten years maybe into the project, we've got all these people involved, but as far as [some are concerned, they are] not seeing any improvement in abundance on the ground. So we can pin-point pollution incidents, and get data on changes but, we're not getting the increases they would like to see, so they see these reintroductions as a way of achieving those boosting populations. The problem with it is, is there are [ecological] issues involved in re-introducing or introducing and they are frustrated that the RP won't give *carte blanche* to go ahead, and train other people to do it as well. [...] We have got a protocol, which has been agreed by almost everyone involved in the partnership [...] and so for that reason it hasn't appeared. [...] Its interesting the kind of dynamics of it really. My views on [boards] are that it's a waste of time if you don't really understand the reasons for the declines. The point is that most species of river insects is that they're capable of

expanding their populations very, very quickly once the environmental conditions are suitable. So if they're not there, or more importantly, if they're there in low numbers [...] well there must be a reason why, they are coming at it from the perspective of somebody who is used to trout being introduced into rivers, to boost trout populations for fishing.

KE: it's a managed ecology as far as they are concerned anyway?

SB: Exactly, so what difference does it make? The problem is, you don't know what the impact is going to be on the river system. We do know what the impact of the trout stocking is on the river system, we're starting to get an impression of that, and that is they're probably suppressing the invertebrates, and so actually, one of the reasons inverts might be of low abundance is because of trout stocking, its not necessarily, the farmer, all the other people who get blamed for it, it might actually be the fishermen themselves, over stocking with trout and weed-cutting! Which are two activities that the fishermen themselves do, that might actually be contributing to the declines.

KE: So are these two cultures irreconcilable, what I'd call a scientific culture, a rational, methodological approach to the river, and a more informal epistemology and knowledge base?

SB: No, I don't think they are.

KE: Do you think they can work together?

SB: They ought, they should be able to and in most of the contacts I have they do. Where the problems are, is where you get – a typical example – gamekeepers and farmers: “we've lived in the countryside all our lives, and we know it back to front, there's nothing you scientists or city folk can tell us that we don't already know.” But actually, when you get them, they don't actually know very much at all, it is all anecdotal stuff – maybe close observations, but they're isolated observations that don't mean anything on their own. When we used to take the fishermen down to the river – “yea, we know it all” – none of them had ever looked, most of them had never even looked under the water [mimics lifting a stone and looking at its underside] and taken a net to see what it was like and they're like “ooh wow, we didn't know anything about this!”

Do you see what I mean? But most of them *are* interested, it is just a few [...] who basically think they know better than everybody else, and aren't interested in listening to reasoned

arguments. But you've got to accept people are going to be like that, and also they are quite influential, often, they are often journalists actually on the fishing magazines, very opinionated people, who think they know. Well, maybe they do know a lot, I shouldn't be arrogant, they probably do know a lot, *but* a lot of their opinions actually don't agree with what we know from scientific studies, and I'd put my money on the scientific studies, rather than anecdotal observations of opinion-formers, unfortunately they are opinion formers as well, may have.

KE: Does that mean science needs to repackage itself, re-present itself to be more persuasive about scientific method?

SB: Yes it does.

KE: Where do you begin with that?

SB: Well, the RP have a page or two in the *Wild Trout Trust Magazine* and we contribute articles to the fishing magazines as well so that's one way of doing that. The museum for example has open days (over the last few years) where people are invited in.

KE: This is outreach and accessibility?

SB: Exactly, yes.

KE: Speaking to Josh (EA) about scientists, he said there's an old school culture where you do go and visit the river, and there's a younger generation coming through, and, to paraphrase, he was talking about them being 'data merchants', so there back in the labs, back with their computers in London.

SB: Well, unfortunately, the way science is taught these days, especially in universities, but schools as well, it encourages that. So it astonishes me actually when I meet PhD students, now, most of them know nothing about natural history at all, they know nothing about it, and that's a big problem as well actually.

The one's we've chosen for our projects aren't like that so, we've got a project where we're looking at river management techniques that the anglers are using, with the objective of improving the fishing and flylife etc. So the student there is a fisherman himself, and he's got

a strong natural history background. So he understands the whole system. But other students I've got on other projects, they know nothing.

KE: Any question I've not asked?

SB: We've covered most things, but, in our *English Nature* project I spoke to you about that kick started the whole thing, we had social scientists from Lancaster University involved in the project as well, and I think that was a very useful cross-fertilisation really, they were anthropologists, so they were studying *us* as scientists, and also the amateur groups, we're involving and what their motivations, and that was a very useful element to have in the project, and I think there needs to more of that sort of thing really.

What I regret is we were planning joint papers, joint publications which never happened, and I think there were opportunities missed, actually because of the way the projects are funded, the funding stops after five years and so we all went our separate ways, but I think there were stones that were left unturned. There needs to be closer integration in order to get the success of these sorts of projects really.

KE: I've read their work and other papers that belong to the sociology/anthropology stable, and they're all very, very positive, they're like "wow! the environment has a very bright future, the environment's going to be well-cared for". And it was descriptive, but I'd say relatively uncritical – there was this brave new world, there's this thing called citizen science; but it lacked a certain critical bite.

SB: Well I agree, but I think in part that may have because in a way they were in at the beginning, and so they need to revisit it after fifteen years, and see where we've got to.

KE: so everyone's a little bit older and wiser?

SB: But not just that, but they can see how the dynamics of the project might have changed, and what the new issues are, and I think one of them is this point about, not only the frustration on the part of the people, these anglers, not seeing progress in conservation, but actually, conversely, some of them are losing interest because they're not seeing change. Its almost as if they want some pollution incident to happened to add a bit of excitement to it, in a sense, "we've been doing this for three years, everything's always the same." [...] What they want to see is an improvement, so we want to be introducing stuff. My take on that would be well, you know, the river is probably fine. If the levels are above the trigger levels,

it's probably ok; it's sustainable. So some of them are losing interest from that point of view, you have to think of new ways of invigorating it.

KE: But you have to keep your nerve?

SB: Yes, exactly.

KE: that's what it is, we're here to observe and report. Thank you.

Appendix D: Joshua Hellon

Edited transcript of an interview with Joshua Hellon | *Environment Agency* Environmental Monitoring Officer of seven years standing.

Recorded: The Griffin public house, Totteridge & Whetstone.

8 August 2012

KE: Kevin Edge

JH: Joshua Hellon

KE: Please tell me about your work.

JH: I'm an environmental monitoring officer in the analysis and reporting team. I've been in that role and similar roles for seven years.

KE: Looking at the EA as a whole, do you feel it's an arm of the Government, an independent body? Does it jump to the tune of the EU or is it working for a bigger ecological agenda?

JH: Well, strictly speaking we are a quango, in terms of we're funded by DEFRA. Definitely, the majority of our work now is driven by EU directives, the *Water Framework Directive*, almost all the monitoring we do now is because of that, that's the priority and [an] urban waster water treatment directive that's to do with sewage works and outflows. We do local work as well but the EU work has to take priority.

KE: Do you work directly with Brussels documentation?

JH: I certainly don't! But yes at a national level obviously we have too – [there are] targets.

KE: Does it have the environment at heart with its directives or do you feel its all too heavy handed and a little behind the curve?

JH: No, I think it's pretty thorough to be honest, the WFD. I think it forces us to do some work that maybe wouldn't get done if we didn't have to comply with it. In other ways the EA has had to cut down some monitoring to make room for some other things we've been asked to do. We've had to move certain sites from our monitoring network just to free up time.

KE: Are you seen by your partners and colleagues in the RP and AMI as operatives of the EU, is there some kind of resistance? That you are part of a bureaucratic army or are people pretty relaxed about it?

JH: I think it depends on which members of the public you are talking to. I think fishermen see us more as a regulatory body; they pay licence fees to us and so sometimes they see us as more of a hindrance, whereas when I'm dealing with river groups and people who are interested in wildlife, which a lot of my riverfly groups are, they just see us as sort of kindred spirits I think, 'surely you're the good guys?'

KE: Do they talk about you as the scientists?

JH: Yes, and they like the fact, especially with my team, because we're all entomologists, botanists, a lot of these people are amateur entomologists and very good ones, and I think they see us on the same side really, whereas obviously, some people can see the government as against them.

KE: Could you say something about data merchants – more time in the labs, at computers, spreadsheets, less time in the field?

JH: yea, I think we've become a much more skilled team [...] whereas previously it would have just been about collecting data and maybe not so much was done with it, and if the data was looked at it was often looked at a national level by the science team, whereas now *we're* expected to analyse the data.

KE: What *do* you do with that data? I sensed at Leckford that year after year, data is generated but that fly populations are on the decline and that things are not being done?

JH: Yea, [...] they do often do have hours of frustration at Leckford, and I think they sometimes think we do less monitoring than we do, because we try and do as much as we possibly can and I think we're undersold sometimes: "the *EA* aren't doing any sampling so we've got to get out there, the public have got to go out there and do it themselves," which I don't think is quite correct. In terms of doing things with the data, the WFD has basically forced us to look at the data and say what we can do with it and where the problems are, if water bodies, rivers are failing now, they can't fail so, you know, they're not allowed to fail. There's a target set for us and we've got to do something about it.

KE: Data from where ever you gather it?

JH: Yes, AMI data's got a very specific use really for us, it's a trigger really for pollution incidents, but at the same time we can use it to look at trends but it's not so specific as our data, it can't be used, can't be used directly for WFD assessments and things because it's not quality checked. And they don't recruit as many groups as us basically, so its more there as an early-warning indicator, than we can get out, but at the same time fulfils the need in the WFD to work with local groups to monitor water quality.

KE: That's in the WFD documentation?

JH: Yes, – there's thousands of pages! [It] fulfils partnership working, 'big society' requirements.

KE: At both AMI workshops there was reference to restoration and conservation as well as just monitoring. To what extent does it also give on to restoration projects, conservation projects or is there no real traction there?

JH: I think it helps us to work with local friends of the river groups who are the people we need to get involved with in restoration projects, the people who work on the ground, it helps us forms these sort of links between our biodiversity officers that do take on these restoration projects.

KE: Is it about the way it's pitched and packaged, is that being too cynical?

JH: I don't know, if we have people out there who are aware of the river then its good because its going to stop people dumping, fly-tipping.

KE: so a watching brief can mean, as a consequence, greater awareness?

JH: ...and an awareness by those who might be a bit unscrupulous that there are people watching and there are people down there regularly.

KE: Have you personally been involved in any prosecutions, providing evidence?

JH: I have, yes, I've provided written evidence, I've never actually been called into court as yet, but I still could actually as an expert witness.

KE: What's the total number of successful AMI-linked prosecutions?

JH: I couldn't tell you, none in my area, they are all relatively new, and all in relatively clean chalk streams at the moment. If there is a problem it's going to be a big issue, it's going to cost somebody a lot of money in fines. Back in October, 2011 [there was a] huge pollution on the *River Crane* in London. Several miles of river were seriously polluted, all the fish were dead: it was sewage. I can't talk too much about it because I've written all the evidence and stuff for it. Since then, I've been talking to the *Thames Anglers' Conservancy* and they decided to set an [AMI] on the *Crane* where the pollution was.

KE: A bit of retrospective involvement and engagement?

JH: Yes, to look at how it was improving afterwards. There's going to be huge restoration projects there and there's a lot of money to try and put the *Crane* back basically – they're fish stocking and things.

KE: You have suggested it is worth developing a relationship with bodies like *Thames Water*.

JH: Down on the *Wandle*, *Thames Water* volunteered money for restoration before it all went through the courts, it's good for them to understand that will help their case, and don't try to maybe hide the damage.

KE: You also said at Leckford, more could be done regarding intergroup communication?

JH: I've attended a meeting about that; we know that's a problem. I think that's partly because the EA's brief is very simple, basically set these sites up; help people out when they need it, then go to a site when we hit a trigger level, there's nothing else required of us a such, so I try and provide feedback as much as possible, but there's no newsletter or anything like that, that maybe tells other groups about what other groups have achieved.

KE: There's no EA newsletter?

JH: Our concern was that we want them to know what the *EA* is doing with the data and we want them to know we consider it to be important as well, or people are going to lose interest; they're going to think: "Why are we doing this?" for just an email that says "thanks for the data".

KE: A couple of days every month would be enough to pull it together?

JH: Exactly, I did my own newsletter the first year because we had a few teething issues and so on with the groups, but I'm not obliged to do it as part of my job.

KE: Could you say a bit more about the follow-up sessions, are they formalised, or is it as and when required?

JH: Again, that's really how I've interpreted it, because although I think the workshops are really good, when we [the EA] train people to do invertebrate surveys, we take a lot longer obviously, and I'm quite aware of that when I learnt, just doing it in the classroom just once, and then not doing it at all for several months before you start, it's quite easy to forget.

And that's the feedback I got from the [*River*] *Ver* group, I met them last week or week before, and that was their first survey. I went to a group meeting just to talk about the sites they wanted to do, and that's something we do help with specifically, and then I said "I'll come and meet you on site when you do your first survey". But it takes them a month or so to get all the equipment and they said: "thanks for that because we couldn't remember. If people are out there collecting data this regularly it should be good, as good as...to get the method right. I think they appreciate that, and you can pass on a bit of extra knowledge, about the sites and some of the species, and they get more and more into the entomology.

KE: Is the AMI a unique project as an early warning system?

JH: In terms of those we work with I'm pretty sure it's unique, and it's pretty successful to be honest. I get very few people drop out of it. I was surprised by that, because it's a lot to ask of people to go out so regularly, and through the Winter, I get data all the time.

KE: it's very different from the Butterfly surveys – a long-term investment of time?

JH: Yes, its an investment for these groups, they have to buy some kit, they'll get help maybe from some areas; it might be sometimes a little bit of a chore, it's got to feel important to them I think.

KE: would you regard it as an instance of citizen science?

JH: I would, but it's obviously been deliberately simplified; they're not looking at species and things like that, so the data is limited to this use and uses of the RP limited to declines of these groups of riverflies, so it wouldn't be of any use as distribution data for species which is what you probably get with *Butterfly Conservation* groups [...] it would be impossible to do it with any more precision than that without using people who are highly trained.

KE: Is it still real science?

JH: To be honest, I've met so many amateur entomologists who are considerably better than I am, and they do it as a hobby, they are very good, they know a lot more than what they're taught on the course. I think because of the way it's done, it is a very quantifiable survey; it is science. It is scientific, it is generating long-term data, and it's taken in a very identifiable way, three-minute surveys. They're doing exactly the same samples as we take, they're just not looking at them in quite as much detail, it's just the analysis of them that's simplified.

KE: That satisfies the most demanding of senior of scientists?

JH: (Laughs) I'd say in the survey technique, but in the ID, maybe it's just not quality checked...but if there's a trigger, pollution, we go out and our samples are quality checked and are admissible in court [...] so realistically it's as good as we could hope for, in terms of doing it on the bank [as an amateur], even if you've been doing it for years, you could only maybe go to family level on the bank, and it's very easy to miss things as well.

KE: it's almost an absence-presence exercise?

JH: It is, its abundance groups they're looking at. So they're not looking at an accurate count. We look at abundance groups too really.

KE: It was said that if you are an experienced fisherman you can sometimes rely on gut feeling, sense there's a problem, do you as a professional entomologist understand or do you really not have much truck with it?

JH: It's easy to imagine flylife used to be different, it's a difficult one.

KE: I can remember seeing the air thick with flies in the 1970s.

JH: I think that's probably true, why that is, I don't know, nobody really does.

KE: Steve Brooks's line is "show me the data, show me how it was 30 years ago."

JH: Our sampling techniques changed in around about 1990 [...] which means that data can't necessarily be compared before then, and there isn't the amount of data that we have now, but I'm much happier to look at the actual numbers of nymphs in the water than suggestions of how many flies there used to be, but I'm sure that numbers have declined in a lot of groups. I've only been doing this for seven years and I haven't seen a decline in that time.

KE: 'Citizen science', does that still carry some weight and purpose in the EA or is it a bit of a tired concept?

JH: Its quite a new thing for us now, It's not something I've been involved in until *Riverfly* came along. Obviously we work with friends of the river groups and local wildlife groups and volunteers.

KE: One organiser claimed not to have heard of the term and was joking about 'citizen Smith' and that you are all water melons, green on the outside and red in the middle!

JH: [Laughs] That's one of [the] more pleasant terms for us I think [...] I've had no other contact with anything structured like this in terms of citizen science.

KE: So if you were called from scratch to devise a similar scheme for Ireland or France, what would you do differently, knowing what you now do?

JH: A good question. I think obviously in terms of feedback, I'd want us to be more involved, rather than just the minimum of our brief, I'd want there to be more of a framework – and we're working towards one for working with these groups rather than just waiting for a pollution.

I'm not over keen on winter sampling, but I can see there's a reason for it – but we don't sample in the winter – generally people don't sample for invertebrates in the Winter the larvae are at different life stages and its very hard to do on the bankside, especially when it's cold – you probably want to get home as soon as possible and we do kind of get low scores [...] if the things are very tiny then *nobody* can see them or differentiate them, I wonder if it

should have been restricted to sort of Spring, Summer, Autumn, but I can understand because you are going to get pollutions in the Winter, just as likely to get them, maybe more so, so they'd want to be out there.

KE: Do you think the AMI is just a 'marriage of convenience', an arena where you and your agenda and the anglers and their agenda and the local community groups get things done and you rub along, or is it more effective and generous than that?

JH: It has improved with most groups, in fact we'd all like to say it's improved our relationship with groups that might have found the EA to be a little bit of an enemy, not an enemy, but just something they find difficult to communicate with, whereas once they meet us on the ground, and they see we're interested in the same things as them, and probably quite similar backgrounds and maybe we'll be fishermen too, and we're entomologists, I think they can actually see we are people rather than an awkward organisation that they need to get round.

KE: Some sort of PR in the best sense?

JH: I'd say so, but think it helps us but helps them as well, because they ask us things. I get sent photographs maybe of a dried out river, and they know I'm a contact now rather than it being sent to just a faceless emergency helpline which a lot of people find a little bit: "where's that going to go?" You know it does get to somebody in the end but once people have a name and a face they know they can contact me and say "we think we've got a problem here" and I'm able to pass that on to one of our biodiversity people who go down and have a chat with them about the amount of plants there are in the channel, and how they can manage their piece of river, which is great that they actually ask our opinion, there's elements that can be well-meaning in damaged areas of river.

KE: And this openness and responsiveness is across the EA? Or is it just a case of you being a good bloke getting out there and doing what you think is right?

JH: No, from what I know.

KE: It's part of the culture?

JH: Yes. I don't think we're obstructive people. Most people generally are working locally to make rivers better, but you may not always get that impression from the large, hulking thing that the EA is.

KE: [with reference to the river basin approach of the WFD] do people involved on the riverbank know they're part of such a scheme?

JH: I don't think we've had a lot to do with that side of things, well, we have funded projects [...] with the chalk streams initiative which makes it clear the chalk streams are an incredibly important piece [...] and they pull together all the different groups and rivers and I think they all understand they're part of the same thing. [...] People realise it's not just a bit of river outside their house, maybe you've got to look at the bigger picture.

KE: Tell me about flyboards [...] it's restoration isn't it, it's good?

JH: I find the idea interesting, and it's very clever, and it's a very interesting idea, and I can understand it where a species becomes locally extinct and there's nothing wrong with the water quality; and there's nothing wrong with the environment, and you can go and restock that species of riverfly, that makes a lot of sense to me; because if it has become extinct in quite a large area, it's never going to re-colonise, or take a very long time to re-colonise, but I don't necessarily see [...] the point of putting flyboards in where there's already a population of that species because if the environmental conditions were ok, it would re-stock itself to very high levels very quickly, these species are limited by their environmental conditions, so just putting more in – I think its quite close to fish stocking where you are just putting in fish where they should not be there, putting trout in a river that can't support trout – it's not sustainable, your going to have to keep doing it, but it's very impressive, I'm sure it's going to be incredibly useful technique in places.

KE: Are you happy it's part of the training day down at Leckford?

JH: As far as I am aware it's not officially part of the training day, I mean, those guys, they deserve to be able to put it in.

KE: there's an unsigned protocol for re-stocking.

JH: There's sort of fake concerns about genetics, and spreading, they're not genetically the correct populations to be there, but a lot of that research has been done, and there's not a lot

of difference between local populations, not significantly, but people are just extra-cautious aren't they about moving things around now, especially in this country, it took us long enough to release the knotweed bio-control.

KE: Do you think the anglers are already good ecologists, or that something like this makes them better ecologists, more sensitive to the interlocking and interrelationship of species.

JH: Yes, definitely, A lot of the anglers, they know their species of fly very well, they can tie a fly for every different species, so they really know the entomology, the river groups, a lot of them are new to this, they are more broad, friends of the river, tend to be bird watchers, they've never really done pond-dipping since they were kids, so things like caddis flies are completely new to them, they've never seen them under water, yes, they are learning a lot.

KE: Is it a bright future, an uncertain future for our rivers in general terms?

JH: Yes, I think it is. Every time the EA says the rivers are much better than they used to be, there's an outcry about it, because there are still problems, but they are better than they were sort of 50 years ago or even ten years ago.

KE: I can remember what they were like in the 1960s and 70s, they looked uncared for, and god knows what chemicals levels were in there.

JH: In terms of water quality they were terrible, because sewage works were very badly regulated and there was none of the modern technology there is now and you've got phosphate stripping, things like that, so a lot of phosphates, things like that are gone now. There are still problems with run off from agricultural land and urban land, that's the huge issue.

KE: What do community groups bring?

JH: A lot of them will be retired, so they have time to spend on this, but also in terms of keenness, they are really concerned about their local rivers, they are out there anyway, really concerned, and they see this as another way of just checking everything's ok, another weapon in their arsenal, a lot of them are already out there routinely taking flow measurements – on the Ver Valley, and they have bailiffs, so they actually patrol areas of their river on a voluntary basis, it's pretty impressive, but we've had a lot more interest from them than

fishing groups in our area, they also tend to stay and keep doing it, we get maybe twelve people on one scheme, one river, they're covering a huge area, so they've been great.

KE: Thank you.

Appendix E: Theo Pike

Edited transcript of an interview with Theo Pike |Angler, Chairman of the Trustees of the *River Wandle Trust*; Vice-President of the *Wandle Piscators* and author of *Trout in Dirty Places: Fifty places to fly-fish for trout and grayling in the UK's towns & city centres* (Merlin: Unwin, 2012).

Recorded: *River Wandle Trust* river clean-up, Beddington Park, South London. 12 August 2012.

KE: Kevin Edge

TP: Theo Pike

KE: Please tell me briefly about your early engagement with the river.

TP: I got involved in work on the river here about a decade ago I guess, through an interest in fishing. I was living in Hammersmith at the time and wanted a place that was a bit closer to fish than out in Hampshire, Wiltshire, wherever and discovered that there was this historic little chalk stream called the *Wandle* flowing through the badlands of south London that very few people actually seemed to care or even know about, and it all went from there.

I linked up with a few other people who were just starting to get interested in it at the same time, and we started to develop community clean-ups on a regular basis, [and] 'The Trout in the Class Room' educational programme and it's all gone from there.

KE: If we could talk about that rather grand term environmental stewardship. To what extent do you think the *Wandle Piscators* and the WT are part of that much bigger project or is it much more about local action, and less to do with European initiatives and the broader picture?

TP: I think the bigger picture is that there's certainly a trend towards greater environmental awareness and that is symbolised [by] people wanting to do something on a local basis so that's what we're achieving here on the *Wandle*, giving a lot of local people an outlet for their desire to look after their patch but also contribute to a larger movement.

The WT for example is a member of the *Rivers Trust* [that's] been classified as the fastest growing environmental movement in the world at the moment. And currently, I think about 90% of the rivers in this country are covered by *Rivers Trust* at what ever stage of

development and the WT got in there relatively early in fact, and we are certainly seen as the ground-breaking urban rivers trust because a lot of other trusts have areas of their catchments, which are urbanised but very few are as entirely urbanised as the *Wandle* is and in that respect I think we're pretty much unique.

KE: When I was speaking to Steve Brooks of the *NHM*, he was telling me about the origins of the AMI, and he said *Natural England* were quite keen to bring on board a new constituency that weren't at that time part of that broader conservation movement and they looked to anglers. Is that fair? Do you think that anglers are [...] quite a discrete body of people [...] do you think they were on the outside at that early point in the early 2000's

TP: It's certainly one of the clichés of the sector if you like, that the anglers are the eyes and ears for the rivers and like any cliché there's a lot of truth in it I think. I guess the difference now is that initiatives like the AMI have given anglers a more formalised means of communicating with the regulators: the EA, *Natural England*, whoever. Previously, more or less the only voice anglers had was either local pressure for work in their own right or via the *Anglers' Conservation Association* (ACA) which is now the *Angling Trust*, so membership of the *Angling Trust* could give anglers a voice on the wider sort of stage, but what the AMI does, certainly, is to give anglers the opportunity to get involved and actually get their hands dirty on their own patch, keep an eye on it.

KE: So they would have welcomed the opportunity in the early days of the AMI to be given a platform?

TP: I think so, yes, absolutely.

KE: Without going in to too much detail (because I know it is complex) could you just quickly outline the essentials of the incident in 2007 that led to the pollution and the prosecution?

TP: On the afternoon of the 17 September 2007, a contractor working at the Beddington Sewage treatment works on behalf of *Thames Water* mistakenly released what I think was 6,000 litres of concentrated bleach sodium hypochlorite into the river. They were cleaning the tertiary screens on the works [...] then when it came to the last screen somebody turned a stopcock the wrong way basically, and allowed all the bleach out into the river.

I wasn't here at the time, but there were good and trust worthy people on the ground who helped us with our initial communications with the Agency and so forth. To do them credit, *Thames Water* put their hands up immediately, but even so, about 5km of the river was bleached-clean like your bath tub, absolutely squeaky clean, it killed everything from the bugs to the weeds to the fish everything bleached off basically.

KE: Was the AMI involved in corroborating that spillage, or was the EA on the ground straight away?

TP: The EA was on the ground immediately. We'd actually not quite started riverfly monitoring at that point, ironically; we'd been starting to talk about it from about May or June that Summer; working out where the funding could potentially come from, and then serendipity happened: *Thames Water* put their hands up and one of the first things we identified that they could help us with financially was the establishment of an AMI programme.

KE: Now as I understand it, data generated by the AMI is not admissible in court. Do you think the people involved in the monitoring feel a little bit sore about that; does that make you second-class scientists?

TP: To be honest, the issue really hasn't come up yet. For example, in the course of our monitoring we've certainly detected the effect of pollutions that have already happened. It's been interesting to run our numbers against an incident we've used that as a learning guess, to give us confidence that what we're detecting does indeed corroborate with what's actually happened.

KE: So people are realistic enough to know you do have to get scientists in for a much broader and deeper survey, you are part of an early warning system and in a way that's job done?

TP: Absolutely yes. Because what we're looking at are the 'headlines' and if we detect a problem, if the shrimp number crash or something let's say, that means we're on to the EA immediately. The Agency are the regulators in any case, we're not, it's their job, someone has to be in charge of it and I don't think it's an issue for anglers simply being a kind of early warning system and we then hand over the actual detective work and execution to the Agency. No, it's not a problem as far as I'm aware.

KE: It's a bigger team?

TP: Absolutely

KE: would you say looking at the WT here; the AMI the RP and the EA, this is a kind of fixed arrangement, or more of an evolving constellation, or basically just a marriage of convenience?

TP: To start with, any partnership that works is a marriage of convenience to some extent, because both parties see a benefit, and whether that's for their own benefit, or for some wider, more altruistic good, depends on the individual circumstances. Having said that, I think this is a movement that has legs and will continue I think, because it gives anglers something to get stuck into on their patch and it helps to increase their feeling of ownership and actually of understanding too, because if you're in there once a month, every month having a look at the bugs, counting the abundances, seeing the natural peaks and troughs it gives you a deeper level of understanding of how your river works, and that's very satisfying.

KE: So there are ecological dividends in that respect?

TP: ...and personal satisfaction I think too because an important element of satisfaction from angling I think, and I don't think I'm alone, is the sense of understanding what's going on in the world around you and being able to insert yourself into that, so that's satisfying.

KE: How often do you see the EA here on the ground? Do they offer up follow-up sessions, are they quite friendly and accessible, they've been characterised as being a little bit remote, a little bit like a police force, how would you characterise them?

TP: I'll be honest and say we've put a great deal of time over the last ten years into building-up a good relationship with our EA team. Now we work extremely well with them, they're quite over stretched, so occasionally you don't get quite the follow up [that] in an completely ideal world [it] might be nice to get, but honestly, it's a busy world out there, and I would rather that they were out chasing something else down than just giving me a courtesy call.

KE: Does that good relationship go beyond [individual] personnel? What if there are personnel shifts? Have you seen people come and go and have those relationships remained positive, mutually respectful?

TP: Its very interesting, all this area, because when you get an organisation as big as the EA what inevitably seems to happen is that you get high level policies being translated down on to the ground with a great deal of freedom in fact of translation by the local people. It often it seems their levels of education does dictate quite strongly how the national-level policies actually get translated in practice. So, for instance, there has been a case of progressively educating our flood risk management teams, if possible, to not take out all the woody debris. It's still an ongoing education thing, but [the EA] is gradually understanding it.

KE: for clarification you're talking about people on the river, or the EA themselves?

TP: The EA themselves. It's such a large organisation with several different sectors within it, that the attitudes to the river from these different sectors can vary, whether those be flood risk management, or fisheries or ecology or whatever, and some are more enlightened than others shall we say? And of course we're in a highly urbanised area here so that also makes a difference.

To return to the question, in the early days when the trust was founded, it wasn't very long since the *Wandle* had been at its lowest ebb [and] actually classified as an open sewer in the 1970s. Some of the then EA team that had just converted over from being the NRA [National Rivers Authority] had seen the *Wandle* in its darkest days and somehow just emotionally couldn't conceive that it could ever get any better in fact. And so in some cases – I won't name any names here – we had to wait for a generational shift in the agency to take place in order to get a new crop of people in there who would be as ambitious and hopeful as we were. Then we could actually move forward together, rather than attempting to drag to the old guard with us.

KE: What about the young bucks of the last three or four years? Are they data obsessed, spreadsheet obsessed, or do they get out onto the riverbank as often as they should? Do they have that naturalist's impulse, or are they much more data merchants?

TP: The ones I've come across are all highly motivated, very passionate, and actually genuinely are there because they want to do the right thing. I haven't come across any data merchant stuff at all, and I'm prepared to guess that the *Wandle* may be an exception, but I certainly can't speak for other areas necessarily, but certainly in the course of my own researches for the book for example, I tried to speak to Agency people from each river catchment, and almost without exception, they were really helpful, really fired up, keen to

talk, not remotely unapproachable except where they were simply out on the water all the time rather than sat at their desks. It's a good organisation I think.

KE: Let's talk about communication, and the shifting constituency that the AMI is. An environmental officer for Cambridge told me they are now finding it hard to recruit anglers. The people coming through the door so to speak are members of community groups, friends of rivers. Steve Brooks [NHM] has said there's possibly a chance or renaming the initiative, Do you think this is inevitable?

TP: It's certainly possible. I mean going back to the development of the WT for example, we started basically as a bunch of fishermen who wanted to improve the river, and as time went on we quite rapidly started to attract people who were not anglers hence we spun the *Wandle Piscators* outside of the WT to give the anglers somewhere else to bore themselves and each other (laughs) and I'm an angler saying that!

So yes, I think its entirely possible what has started out as an angler's initiative may well need to expand out beyond anglers for long term sustainability.

KE: Might it need a change in training-delivery as people don't have that riverbank experience?

TP: The training is quite particular and focused. But I don't think it would be a problem for any reasonably engaged member of the *Wildlife Trust* for example. I was out doing my monthly kick sampling this morning. My wingman for this is Derek Coleman, he's not an angler, but he runs the *Wilderness Island Nature Reserve* for the *London Wildlife Trust* [and] he sees the benefit of it. He did the training without any apparent confusion [...] they pick it up pretty quickly.

KE: There currently no national picture of how catchments are performing, but there's a website on the way. Is there any sense locally that you are a little cut off from the bigger operation?

TP: It would certainly be interesting to see what was happening elsewhere, and I think the website which has been talked about for a long time would be a really good idea. It might certainly help to motivate people more, and keep them involved on the basis of being part of a bigger movement. It's nice to have, whether it's *essential*, I don't know.

KE: Do you think as a professional communicator, that laying stress on lines of communication is overdone in a way, and that the enthusiasm, dedication, application is there, and maybe people shouldn't be worry so much about newsletters, email, *Twitter* accounts are they [just] fashionable distractions?

TP: Interesting. In terms of the communications I think the most important lines of communication are first of all between the local group coordinators and the people they are coordinating; and then upwards from the local group coordinators to the centre. Those should be the most regular, robust and formalised. And then you could certainly have extra layers of more *ad hoc* communications for the 'feel good' stuff rather than the operational stuff I guess, from RP Head Office out to the individual monitors, but I would keep that as electronic as possible frankly, and be the sort of thing that the individual monitors can opt into rather than being bombarded by it necessarily.

It's interesting to have a *Twitter* feed out there for example, but it might be most effective if everything is housed within a single portal, which you as an individual monitor go and look at if you're interested; sign up for newsletters by email if you're interested. But there has to be a degree of individual motivation I think in order to cut through.

KE: And also that old-fashioned, face-to-face, presentational communication, with the expert turning up on a Sunday just adding that little bit of a frisson, is there a place for that these days, or is every one just too busy, whether they are professionals or keen amateurs?

TP: People are very busy. I think part of the benefit of the AMI is that people can simply plan to dedicate two hours of their Sunday morning to check whether their river is ok, and then happily hand it over to someone else. It is all back to how much you can rely on the volunteers, and how much of a volunteer's time can you legitimately lay claim to without pissing him off!

Having said that, it's a great idea to have a biannual conference, for example I think. And it would be even better if it were less expensive, and you could therefore get more of the individual monitors along rather than just the team leaders.

KE: The term conference can be a little bit intimidating.

TP: It can be, its how you set it up I guess. You could call it an open day, or get together, seminar or celebration.

KE: Flyboards: are they inevitable, distracting?

TP: I probably don't know enough about them. We tried them for one year and we found that they tended to either get vandalised or washed away, because we're in an urban area with a very flashy catchment. If used properly I can see no reason why they wouldn't work.

KE: It seems to be a bit of a bone of contention at the moment. I think it speaks of a frustration – everything by-and-large is ok, monitoring is happening, the water's ok, there's no kind of action. The EA and scientists could be more proactive in changing things rather than just standing by and watching.

TP: [One of the Leckford tutors] of course pretty much single-handedly founded this entire movement, so he now has got to a stage where obviously he's beyond just the monthly monitoring, and then handing over the results, and he's actually into fly population restoration and so forth, which is all entirely understandable. His attitude is that of the angler who just wants to get stuck in and get stuff done. He's [...] more active in that way, than a lot of the long-term academic scientists, who apply the precautionary principle wherever possible. And that frustrates him, he just want to get on and restore stuff.

KE: That's increasingly the challenge for science, we kind of know what's gone wrong and why, and we kind of know what we might do about it, we move cautiously. We design the rest of our lives with science and technology!

TP: It's difficult. [There is] a programme for re-introducing the March-brown to the *Usk*. [The tutor] knows exactly what he'd have to do, where he'd have to go to get the brood stock. All he's waiting for is the sign-off for the go-ahead and some funding: none of which seems to be forthcoming, he's very frustrated.

TP: [...] And it's how to get those two sides actually working properly together, so that anglers aren't seen as the radical cowboy fringe, just doing stuff without scientific basis.

KE: Do you really think they are seen that way?

TP: [...] you need give and take on both sides, says he, cliché after cliché [laughs] you know what I mean!

KE: And clearly the ability to compromise and rub along is there. There's enough good work being done to prove that.

TP: I think there is yes. But it's like a marriage, you need both sides to see where the other one is coming from and where they want to be, and you need to work together in order to move together in the right direction. It's not easy.

Anything I know about science is entirely self-taught. But it's surprising how much you can learn about river restoration just by reading and doing it. [At interviews there were scientists with MSc. degrees]. But even with my little bit of basic river restoration; I knew a lot more about it than they did. Which I guess is the similar sort of feeling that maybe frustrates [some] people, that their experience on the ground has actually given them a greater amount of practical knowledge than the guys who they are dealing with, than the qualified scientists sitting behind the desks, in a state of what appears to funk!

KE: 'epistemology wars!' – something for the tabloids! But they are not irreconcilable knowledges are they? They are not competing knowledges, they are complementary?

TP: Absolutely, yes. Entirely complementary, and you just need to work how to plug them together.

KE: The wiring at the back?

TP: Exactly. Everybody's pulling in the same direction in the end. Everyone wants healthier rivers with more fly life, which meet the standards of *WFD* and therefore don't get the UK fined by Europe. Everybody wants that; it's just an ongoing discussion of what's the best way to get there.

KE: the first WFD deadline – 2015 is near; what's your opinion of the WFD?

TP: In short; in environmental restoration terms and specifically river restoration, as far as I am concerned, WFD is the best thing to have happened in this sector for a very long time and perhaps ever.

Because there's the higher power of Europe demanding that the UK adheres to the standards it's signed-up to. With 2015 looming, everyone is realising that rivers do have to be brought up to either a good ecological standard or potential. And that in order not to be fined a lot of

money by Europe, a lot of money has to be found and put up-front into WFD work now. So hence the *River Improvement Fund* over the past couple of years, hence the *Catchment Restoration Fund* now and this is giving motivated organisations like the *Rivers Trust* real opportunity to do work that they have wanted to do for years, planned to do, but couldn't necessarily find the funding for before, and now suddenly these large pots of government funding we can all do something about it.

KE: There is a suggestion that the WFD is quite radical, and is what we need on the ground and a lot of came about through pressure from the NGOs Have you heard that too?

TP: I don't know much about the original conception and writing of the WFD.

KE: The suggestion is that NGOs [...] were very strategic and they tapped into this moment.

TP: Certainly *The Angling Trust's* threat of judicial review in partnership with the WWF has probably brought the river basin management plans and hence the idea of catchment plans into better focus for the EA.

KE: *National* NGO pressure?

TP: Exactly. It was that threat of a judicial review of the basin management plans I think which basically started the process of releasing the money for the *River Improvement Fund* and then the *Catchment Restoration Fund*. That was in the last two or three years. That was essentially the *Angling Trust* and WWF taking a look at DEFRA's and the Agency's River Basin Management Plans and deciding they weren't really robust enough: (The RBMP, that's effectively the largest ecological or fluvial unit that can be judged with the WFD), and threatened judicial review if something else wasn't done so the funding was released from central government for catchment plans.

[See 4.5.2011 story of WWF withdrawing action and getting funding commitment at: http://www.wwf.org.uk/wwf_articles.cfm?unewsid=4881, accessed 13 August 2012.]

TP: I think catchment plans and pilots were slightly different from the catchment restoration fund, they were a previous stage of that. I think you'd need to check to be absolutely sure. It was a fairly complex process of iteration. It [the pressure] had the desired effect. As a result, there are now funds available for this work to be done. It's all down to Europe basically, which is great.

Post recording comment:

TP: [The monitoring method is] an “algorithm that works”

KE: Anglers are pioneers?

TP: “We’ll settle for that.”

TP: [There are] “big institutions, but it comes from the people”.

KE: Thank you.

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