Water into Words

A Creative and Discursive Investigation

into the Relationships Between Ecopoetry and River Ecology

in Selected Anthologised River Poems

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Abstract

This creative writing thesis concerns ecopoetic engagement with river environments, and it uses a number of forms and responses in order to consider the ways in which Ecopoetry might be employed to convey the complex environmental pressures that rivers face in the early twenty-first century. The thesis is an experimental investigation which addresses the interactions between science and poetry, river ecology and verse.

The thesis is primarily a creative investigation into river environments, taking the form of lyrical essays which explore particular environmental issues, and a collection of poems which responds to notions of water becoming words, rivers flowing into poems and being transformed, and potentially transformative.

As its starting point and provocation, the thesis examines the claims made by editors of leading anthologies of Ecopoetry, namely Neil Astley's *Earth Shattering* (2007), John Burnside and Maurice Riordan's *Wild Reckoning* (2006) and Alice Oswald's *The Thunder Mutters* (2007) concerning the ability of environmental poetry to address environmental concerns and inform readers. Considering carefully poetic responses to environmental problems affecting river environments, the thesis then examines closely selected poems from these anthologies to consider their scientific exactitude and veracity in describing and portraying particular environmental problems associated with rivers.

The thesis also contains a series of aligned lyrical essays in which I seek out key ecological threats to water environments: diffuse pollution; potential for catastrophic pollution events, and morphological change. I use these essays as a means of discussing the ubiquity of environmental threat to rivers, and barriers to popular understanding of the issues involved, through personal reflection. These key themes are then picked

up again in a selection of poems which portray water environments in a way which is informed by a deep knowledge of river ecology and which seeks to communicate specific issues to the reader.

The thesis is an eclectic investigation during which I reflect upon my dual roles of river ecologist and writer. I seek to reconcile through creative engagement the two lenses through which my committed environmental concerns are conveyed. Indeed, the thesis demonstrates that ecopoetry is a practice, as well as an art. Many ecopoets insist that the writer to get out into their environment, rather than experiencing it 'in virtual glimpses' (John Burnside).

The thesis is constructed as an experiment as well as a series of reflections, then, providing a scientist's view and critique of Ecopoetry, but also reflecting on my own poetic practices, and considering how key environmental issues can be conveyed using verse.

Contents

Section 1: Motivations

Among the layers of motivation for undertaking this thesis exploring how poetry and ecology relate to each other, two personal perspectives play tug of war. This tug of war is between my professional training as an ecologist and scientist, and my role as a poet. And here also is my hidden agenda. As an ecologist I am constantly writing about our natural world – mostly the water environment – and trying to get you as excited and enthused about it as I am. I know it is important to make everyone aware of the basic scientific facts about water, so that in our everyday lives we make sensible, informed decisions. Don't waste it (even Dumfries and Galloway, where I live, we can suffer droughts), don't pollute it (all those things you put down your drains, where do *you* think they go?), don't damage it (by putting it in a culvert) and don't underestimate its importance (to wildlife, industry and to keeping you alive). As a result of my scientific work, I am not expecting everyone to rush out to their nearest stretch of water and stand in awe and amazement, but I would like that river, loch, coast, estuary or groundwater not to be taken for granted.

I have been involved in trying to communicate all of this to as wide an audience as possible in a factual way, giving people the information, the evidence, in neat chunks linked to the river and its catchment. But, would I achieve more connection, more impact, with my audience, if I wrote as a poet?

Alastair Reid is very clear about scientific writing on the environment – it kills it dead. In the opening stanza of his poem 'Growing, Flying, Happening' he tells us:

Say the soft bird's name, but do not be surprised

to see it fall

headlong, struck skyless, into its pigeonhole -

columba palumbus and you have it dead,

wedged, neat, unwinged in your head.

That that black-backed tatter-winged thing

straking the harbour water and then plummeting

down, to come up, sleek head a-cock,

a minted herring shining in its beak,

is a *guillemot*, is neither here nor there. [1]

'Growing, Flying, Happening' is one of my favourite poems, which as a reader I enjoy and as a poet I can only admire for its skill. I can see the birds sweep in and out of the lines.

But the scientist part of my brain cannot help but notice that the spelling of *columba palumbus* should be *Columba palumbus*. An error, perhaps deliberately introduced to get under the scientist's skin, and it works.

As a poet I admire the repetition of 'that' at the beginning of the sentence and the alliteration in the run of single syllable words and vowel sounds to give a sense of urgency. In my reports I would never get such wording past the communications unit.

[1] Alastair Reid, *Weathering, Poems and Translations* (Edinburgh: Canongate, 1987), (p. 3, lines 1 - 10).

Alastair Reid says that ‘names are for saying at home’ (line 24). Reid is implying that science does not give you the freedom to feel any connection with, or understanding of, what this bird is. It is something you can engage in at home, but when you are outside, at the harbour, you need only admire the bird and you will have all the information you need. He suggests that what is required to make this connection is not the knowledge of the scientific name, but a feeling of amazement and awe when you see the bird ‘straking the harbour water’ (line 7). In this analogy, poetry is the bird in flight: alive and vivid; the scientific explanation is a lifeless thing, like something seen in the taxidermist window.

My opinion is that science does not ‘pigeonhole’ (line 3) something, it does not block the connection with the natural world, but enhances it. However, this thesis does not enter into the two cultures debate. My starting point is that science and creative writing can, and do, work together. The thesis investigates the interactions between science and poetry, river ecology and verse, through analysis of existing poetry and my own writing practice.

Section 2: Methodology

Reviewing environmental poetry and its connections with ecological science required me to adopt a unique epistemology. However, the first step is common to all research, a review of existing literature. The role of ecology in ecopoetry is considered in papers by John Burnside and Dana Phillips. These papers helped me develop my methodology by setting out the positive and negatives of including ecological science in a poem – whether it constrains the poem or not.

I then tested my theory that science can be successfully integrated into poems. I chose as my source three ecopoetry anthologies developed by respected editors, which included environmental poems covering a wide range of subjects and time period. These anthologies set my baseline as poems considered to be of the highest quality and representative of the form. As well as providing me with evidential material for further analysis, they also provided inspiration for my own writing. This is, first and foremost, a practical thesis and the development of my own work was an important part of the study.

My research area is water-related ecopoetry. From the anthologies I selected four poems that reflect the main pressures on the water environment – diffuse pollution from agriculture, individual catastrophic pollution incidents and morphological change. I also selected a poem that encapsulated aquatic monitoring – how we register deterioration in water quality. My knowledge of these environmental pressures and approaches comes from working on the Water Framework Directive and the production of the River Basin Plans for Scotland and the Solway Tweed[2].

[2] Available at: www.sepa.org.uk/water/river_basin_planning.aspx, accessed 1/04/13

I reviewed the poems using comment boxes directly connected to words or phrases, as this provided me the most effective means of identifying and interpreting the underlying message and content within each of the selected poems.

I accept that there may not be a direct, recognisable linked between the ecological process and its description in the poem, but it can be inferred, just as the science of fingerprinting can be traced back to the *Lycopodium* spores first used in its development. The closer the poem is to the original concept, the easier for me, as a scientist, to grasp the image but that cannot be used as a marking scheme for the creative response. The poem provides a representation of the environmental issue, my analysis considered how the metaphor is constructed, whether the imaginative leaps that the writer makes carries me along too.

I then expanded this analysis in the discussion section after each of the poems and, where possible, set it against a current or real situation.

Once I had reviewed the poem, I developed my own writing around the same subject. I did this by undertaking a series of walks, in locations where I knew that there would be similar issues to those discussed in the poems. My aim for my own writing was to use my scientific knowledge more effectively to create writing and poems which communicated to the reader on multiple levels, at once aesthetic and scientifically grounded. Each piece is an experiment, using different mixtures and clarity of scientific information. These pieces are varying ways of looking at the same ecological issue, giving the reader a different perspective each time, as if they were walking around a loch, pausing to admire the view. It is always the same loch, but it changes with each new compass bearing. I review my own writing practice in the final section – Water into Words.

This thesis exemplifies the multi-disciplinary approach. It has become more than the sum of ecology and creative writing. It is an assimilation of experience, knowledge and creativity. It explores ecopoetry using all of my understanding and appreciation of the natural world represented in verse.

Section 3: Walking as a 'Science of Belonging'

I have a reputation among my friends for going for a walk, getting lost and then finding my way back to my starting point somehow. I do not understand their concern about the 'getting lost' bit of the journey. I am not lost – how can you truly 'get lost' in a landscape like ours, perforated by houses, roads, rivers? But I am usually away from a recognised, defined route – a marked path that brings comfort that you are on the right road. But who has determined that this is the right road for me?

I probably have a map, but I am not studying it for the dotted lines that denote a right of way. I am looking at it for the spaces: the block of woodland, which I can see in my mind's-eye as a three dimensional cube of conifers, dark green, shade heavy and sighing in the slightest wind; or the fan-symbol of marshes, dimples of stagnant water between rushes; or the nothingness of improved pasture.

To visit friends in the parish I can either walk on the road, walk along a sign-posted path, or I can take a more direct route across six large fields, the way the crow flies. This direct route includes fences of barbed wire and rylock, a couple of gates that hang off their hinges and are tied so tightly to the uprights that they can never be opened, a gully overgrown with blackthorn and brambles, farm animals of various ages and types. But it also grants me the opportunity to see badgers and foxes, deer and hares, geese in winter. Sometimes I do not see the animals themselves, just evidence of their presence: fox scat, flattened grass at the edge of the field, fresh soil and bedding at the badger sett, and I feel better for knowing they are still there.

I am not lost, instead I am walking with the ever present possibility of diversions to distract me from my route. I am open to suggestion by the

sudden growth of Northern marsh orchids in the boggy ground between the fields and the estuary. It takes me longer to walk this way, and in this way, than if I took to walking along the road or on the formal, managed, footpath with its kissing gates and stiles. These 'getting lost' sessions are me giving myself permission to notice, rather than note, to listen rather than hear. I do not have to monitor or report back (unless I want to). These are slow, idle moments when I give the occupants of this space and myself time for our paths to cross.

I am, in John Burnside's words, more able to attune myself to 'the rhythm of the earth, the feel of the place, the presence of other animals, the elements, sidereal time, the divine.' [3] Such walks – sometimes only short excursions of a few hundred yards – provide opportunities to for my mind to wander further than my feet.

Burnside advocates that 'on foot, we are able to imagine an accord between poetry and ecology' (Burnside, p. 105). That from such foot-based experiences writing and poetry emerges that is a combined 'science of belonging' (Burnside, p. 106). I agree with this 'philosophy of dwelling that includes all living things' (Burnside, p. 93). I have always believed in the importance of environmental education as a way not of teaching, but experiencing – of being outside and to provide a memory for children that they can carry with them: environmental education as a way of developing a habit of looking, not just learning.

Burnside instructs us to 'stop reading and go for a walk anyway' (Burnside, p. 97). This is good advice. Put on your shoes and coat and go for a walk. Burnside gives the importance of walking such gravitas, which he is aware of, he says 'if all of this sounds far too fanciful (or

[3] John Burnside, 'A Science of Belonging, Poetry as Ecology', in *Contemporary Poetry and Contemporary Science*, (Oxford: Oxford University Press, 2006), pp. 91 – 106 (p. 101).

grandiose), that's fine' (Burnside, p. 97). But most walks are taken on the formal path – the guided route. The results of such walks are not necessarily fully reflective of the environmental situation. While our entire environment is influenced by our own activities, formal walking routes are a further modification. Wildlife that can move will tend to avoid people; wildlife that cannot move has often been cleared to make way for the path anyway. Most routes show you only a snap-shot of a location. Another place may be subtly different. Another place may be very different – it may all be labelled woodland on the map, but you need to look more closely, look at the trees.

Burnside is encouraging you to get out there, and by phenomenologically experiencing the real world, develop a better sense of belonging and connection. Burnside is describing the poet-ecologist, walking around where they live – 'the basic ground of our being' (Burnside, p. 92) – experiencing what is happening at that time. He considers this experience to be 'ecological in the broadest philosophical sense' (Burnside, p. 95) and while he is clear that he does not want to brand this kind of philosophical ecology as a science, he does make the claim that 'this discipline, this "poetry as ecology" is, for me, a form of *scientia*' (Burnside, p. 95).

Burnside imbibes his interpretation of ecology with a strong feeling for the sense of place, of belonging and of the now, less about ecological process, explaining that it is a way of 'reclaiming the authentic, a method for reinstating the real' (Burnside, p. 95).

For Burnside, walking reinstates the connections with the earth and begins to build a new way of thinking and a new version of the ecological science – 'a new science of belonging that, in turn, may change the way we dwell in and with the rest of the living world' (Burnside, p.105). This is because Burnside suggests that 'on foot, we

become ecologists because, walking, we have the potential to see the world as it is, not in virtual glimpses through a VCR or a car windscreen, but as the here and now, the immediate, the intimate ground of our being.' (Burnside, p. 97).

I propose that walking is only the beginning. Walking is proto-ecology.

Walking should generate interest and enthusiasm so that the walker wants to know why there is a dawn chorus, not just how beautiful it sounds or to rail against its absence. It should increase our understanding of how we have managed/damaged the landscape.

Getting to know a place, observing its changes has, according to Mitchell Thomashow 'extraordinary theoretical power; it encompasses a perceptual wisdom that is often neglected and has been forgotten'[4]. This occurs for Thomashow whether he uses 'quantitative yardsticks or [relies] on intense qualitative attention, what we might distinguish as scientific observation or vernacular wisdom' (Thomashow, p.128). This egalitarian approach values local knowledge and scientific study equally. It does not require you to choose which approach to use, it is the accumulation of both approaches that benefits the place.

It is this mix of local experience tempered with a wider understanding that interests me. My ecological knowledge is my companion during my walks. It draws my attention to details and provides a commentary on what is happening in my local environment. It allows me to move away from the "here and now" and add a predictive element, what might happen in the near future. This adds a greater depth to my experiences as I walk. It encourages me to listen more intently, to look more closely.

[4] Mitchell Thomashow, 'Towards a comospolitan bioregionalism' in *Bioregionalism*, ed Michael Vincent McGinnis (London: Taylor and Francis, 2005), pp 121 - 132. (p 128)

This mix of local knowledge and scientific observation better describes the poet-ecologist.

Dana Phillips suggests that wider knowledge of the environment is essential. He suggests that good intentions do not lead to ecological understanding:

> a considerable body of what has to be called "theory" must be surveyed, at the least, before one can speak sensibly about ecology. Good intentions and a receptive attitude while out hiking or canoeing do not enable one to make ecological judgments. [5]

I agree with Phillips that it is all too easy to look at the environment without necessarily understanding its full complexity. This does not mean you have to study and pass exams and gain qualifications, but it does mean that you have to be prepared to look *into* the environment at all of the layers of influence, management, consequences and happenings. It is simply not enough to walk through it, admiring what you can see on the surface.

Thomashow encourages you when you are out walking to be in the moment, but also not to neglect the wider environmental relationships which reach outside your space. He is promoting bioregional sensibilities which allow 'a way of exploring spatial and temporal relationships that show the connections between place-based knowledge and global environmental change' (Thomashow, p. 121). Extraordinary insights can be gained by joining together the immediacy of the experience with a greater ecological understanding.

[5] Dana Phillips, 'Ecocriticism, Literary Theory, and the Truth of Ecology' in *New Literary History, a Journal of Theory and Interpretation,* 30.3 (Baltimore: The John Hopkins University Press, 1999), pp 577 – 602 (p 582)

Section 4: Ecopoetry and Ecology – finding the jizz

Dana Phillips questions how ecological information influences poetry and how it should be reviewed. He cautions us that 'scientific realism and literary realism are not only not the same thing, they may even be opposed to one another' (Phillips, p. 596).

Scientific realism is observation and experimentation that proves or disproves scientific theories and contributes to our knowledge of our world. It is investigation that aims to be as objective as possible and then can be repeated again and again. It is to accept as part of the investigations things that cannot be seen – sub atomic particles, such as quarks. Literary realism has different boundaries and it is the writer who decides what these are. Nothing need be agreed between the writer's peer group and the only limit to the unknown is set by the writer's imagination. The degree of interpretation of an event granted to the writer is far greater than that given to the scientist – this is the "poetic licence" that a creative writer holds. These are the seemly irreconcilable differences Phillips is referring too. Although both the scientist and the writer are trying to convince the reader or reviewer to understand and accept, if not agree to, their outputs, the scientist must aim to do this using a repeatable format, while the poet strives for originality.

Phillips is concerned that if the scientific realism is given too great a priority, then the ecocritical practitioners 'may be reduced to an umpire's role, squinting to see if a given description of a painted trillium or a live oak tree is itself well-painted and lively' *(*Phillips, p. 586). He is suggesting that the risk is that the only way to review scientific information in the poem is using the same parameters that a scientist would, looking for accuracy, validity and whether it can be replicated

and therefore the ecocritic is constrained to adopt a '"Spot-on, Hopkins"' type response, (as Phillips describes it, p. 589). This argument presumes that it has to be an either/or situation – you can either use the scientific information, as with the Hopkins example, in which case the poem becomes 'merely appreciative' (Phillips, p. 589) or you can adopt a more literary approach, which allows the writer the freedom to present the oak without reference to any of its specific scientific identifiers.

It is this dichotomy that Alastair Reid is writing about in his poem 'Growing, Flying, Happening'. You do not need the name of the plant or bird to appreciate it. But I do not agree that it is either scientific realism or literary realism, as if they are separate paths, which the poet has to choose between. This is not a Shrődinger's cat paradox, where the theory says that the cat can be both alive and dead at the same time, but the reality that we all understand is that it can only be in one state.

Burnside says: 'The great thing about being an ecological poet is that one is utterly inconsequential and so entirely free to propose anything. Even the impossible.' (Burnside, p 94). This reads to me as too much like a 'get-out clause'. Yes, the poet can reconstruct the environment in any way they see fit, to give us some idea of the impact of industry, commerce, capitalism; to show us the alternative realities that could come about if our existing management of the environment continues as it is. But I feel that ecopoetry needs to show that it is an *informed* imagination. Informed imagination does not provide restrictions by setting boundaries as to what is and what is not real. The link back to the real situation that stimulated the poem can be tenuous; it can be presented as an allegory or metaphor, but must be there to be considered ecopoetry rather than passive poetry that does not ask the reader to be engaged or wish to see change.

Burnside's poet-ecologist can write about all possible variations that could come about with or without the interference of man. The alterative realities are always present in our countryside, because, released from the bindings of human impact, some of these alternative realities could happen. But understanding these complex alternative scenarios requires a questioning and knowledgeable approach to the world.

Phillips summarises very neatly how ecological information can be presented in a non-scientific format. The example he cites is a bird guide, but one that uses jizz[6] to aid identification. Jizz knowledge allows the ornithologist to recognise the bird from its overall impression, rather than specific identification features. The reader uses identification hints, such as the way the bird sits on the branch or how it flies, rather than fixed, quantifiable features, such as the length of a wing feather. Jizz is not a taught skill, but one based on scientific knowledge and years of field study. This accumulation of experience allows the ornithologist to draw on intuition, when there is not a clear view (or sound) of a bird, to make an identification. It is not guess work, but a sifting of probabilities and evaluation of the few clues available. The jizz-based bird guide cited by Phillips, in his opinion, influences our perception and understanding of the natural worlds. He explains how, as part of the process of identifying the bird, the reader must keep referring to the text for identification hints that she can then look for on the bird: 'I think that it is this going back and forth between text and world, and between nature and culture, and the development of tools and techniques, like binoculars and computers and "pishing[7]," to

[6] Jizz or gizz, the spelling is interchangeable, but there is speculation that the original spelling was GISS which stood for general impression of shape and size. This cannot be verified.
[7] A pish, in birding terms, is an imitated bird call, often used to encourage the bird to come closer to the observer.

enable it, which gives a notion like getting "in touch with the environment" whatever worth it may have' (Phillips, p. 596).

Although a specialised example, I do feel that this is a statement that is worth considering in a more general way – that it is the interaction of reader and words that is important. This use of contrast of two forms of representation (text and world) is the essence of an ecopoem and it allows the complex ecological description to be presented successfully within the poetic form. It is an example of using metaphor to further illuminate the scientific context, for example, the bird may have a "lazy flight," conjuring up an image of the bird that is easy to recognise, even though it is open to personal interpretation. It still has to be an accurate portrayal of the indicator signs, sufficient for the reader to make a correct identification.

Jizz is an alternative perspective, one based on accumulated knowledge and field craft, but considered to be a valid aid to identification by ornithologists. This, for me, is also a description of an ecopoem: an ecopoem is jizz. The poet is able to use their accumulated knowledge to give the reader the hints that they can use to interpret a situation. The reader can use the images as part of their guide to understanding their environment. Like lazy flight, the interpretation will be their own, but it is description sufficiently specialised and directional to give a clear indication of the most likely bird. The jizz within the poem will provide an insight they might not otherwise have had.

I may have an over-ambitious aim for ecopoetry, but I hope that some readers of the poem may, after reading it, be inspired to want to look specifically at the subject of the poem, but not just the place or the view, but to look also at the specific ecological issue underpinning that poem. To go beyond the jizz based clues to find out more. Poetry has this ability, it can move people, change their lives. Eco poetry has

defined itself as poetry that can stir the reader's resolve and 'strengthen the collective call for change.'[8]

There is no manifesto that says that environmental poems, which begin in the imagination, should tether themselves to science, but the link should be seen as a strength, not a limitation, as it presents another connection with the knowledge about this earth.

[8] Ed. Neil Astley, *Earth Shattering* (Tarset, Northumberland: Bloodaxe Books, 2007) (p20).

Section 5: Eco poetry anthologies – source material

I proposed that ecopoems are the equivalent of Jizz, that they provide an interpretation of the natural environment, guided by the acquired knowledge and direct observation of the poet, and that through the dynamic relationship between the poem, the reader and the environment in which they live, they can reach a greater understanding of the issues impacting upon that place.

However, my hypothesis is that for this to work successfully, then the readers interpretation of the Jizz aids must allow them to identify the issue in the field – and it is this interpretation that I can analyse.

John Burnside and Alastair Reid encourage, expect even, their readers to be outside, in the field so to speak. Alastair Reid suggests in his poem 'Growing, Flying, Happening' that it is sufficient for the reader to be outside experiencing the awe in order to appreciate the natural world. I am pushing that idea further, that the reader should be outside, experiencing the awe and have the opportunity to develop a greater appreciation of the natural world through the insight gained from the poem.

I chose to test this hypothesis on four poems selected from three well known and critically acclaimed eco poetry anthologies:

- *Wild Reckoning*[9]
- *The Thunder Mutters*[10]
- *Earth Shattering*[11]

[9] Ed. John Burnside and Maurice Riordan, *Wild Reckoning* (London: Calouste Gulbenkian Foundation, 2004),
[10] Ed. Alice Oswald, *The Thunder Mutters* (London: Faber and Faber 2006)
[11] Ed. Neil Astley, *Earth Shattering* (Tarset, Northumberland: Bloodaxe Books, 2007).

Wild Reckoning, published in 2004, takes its inspiration from the work of Rachel Carson. However, it is a mistake to think that this anthology is just about Rachel Carson and her writings. Carson is lauded not just for her work, but for bringing together science and environmental writing, for mixing factual ecology with writing creatively. The editors explain:

> that while science and art do not always agree in emphasis, we do share a common understanding that intelligence has to do with the making of connections, with the linking of one thing with another, in order to apprehend a greater whole (Burnside and Riordan, p.15*)*.

To illustrate this coming together of science and art the anthology contains a series of seventeen poems commissioned as collaborative works between scientists and poets. These poems celebrate the 'wonderful marriage' (Burnside and Riordan, p. 20) of lyricism (of the writer) and area of expertise (of the scientist). But the commissioned poets often admit that their starting point is not necessarily the science, but its reflection – sometimes several steps removed from the main theme the scientist is studying. Paul Farley explains that his inspiration came from the boxes that the egg collections were stored in (Burnside and Riordan, p245). The poet is using science as a Camera Obscura

mechanism, to project the image onto another space or medium. It allows the poet to isolate a particular aspect of the issue, which they can then capture in their verse. Farley takes the common-place, metal biscuit box to illustrate how our attitudes to egg collection have changed. It represents the mundane, everyday life of the collector. The biscuit boxes allow the poet to focus in on a topic that the reader can associate with, from amongst the many possible themes that he could have written about: extinction from over collection, changes in legislation, perceived value of certain egg types, etc. Reading the poem with an ecologically critical eye, it has the feel of keeping the science at arm's length. The poets are describing the shadow, rather than the issue that is causing the shadow to fall across our environment.

Wild Reckoning aligns itself closest with my own interests – the linking of science and ecology. But this is not the only approach taken. Alice Oswald, editor of *The Thunder Mutters* also aims to connect people with their environment to bring about a better understanding of the issues. She states that all the poems in the anthology lie somewhere 'along the line of encounter between the human and its context (Oswald, p.*ix*).' She selects 'restless poems' for her anthology. She chooses poems that do not:

> pronounce any one ecological message. Their work is to tinker with our locks, thereby putting our inner worlds in contact with the outer world (Oswald, p. *x*).

Her selection is wider than poems about the natural environment, it includes examples that reflect the way man works within this environment, so she selects poems about cutting cotton and lowering anchors. She links all of her selections to the feeling of connectedness developed during raking leaves:

> When you rake leaves for a couple of hours you can hear right into the non-human world, it's as if you and the trees had found a meeting point in the sound of the rake (Oswald, p. x).

The example she gives to illustrate not being able to hear this sound is the leaf-blower. She concludes her introduction with the emphatic statement 'This book has nothing to do with the leaf-blower.'

Janne Stigen Drangsholt suggests that:

> in her introduction to the poetry anthology *The Thunder Mutters*, Oswald emphasizes the importance of movement,

connecting it directly with the kind of nature that pulls 'a man directly back into the ground[12].

Maintaining this underlying energy of restlessness and movement is perhaps the reason why Oswald chose not to include any themed divisions to help the reader, instead she suggests that they 'come in drifts' (Oswald, p x). By avoiding obvious boundaries between her selections she is asking the reader to answer the question: 'where am I?' Janne Stigen Drangsholt feels that this personal geographical element is important to Oswald's own poetry, noting that 'the poetic speaker's question of 'Who am I?' is always attended by that of 'Where am I?' (Stigen Drandgsholt, p 171).

I feel that there is a tension between Oswald's aim in asking the reader to connect with the landscape and environment by listening to it, by switching off the leaf blower and spending time raking the leaves; yet, at the same time, presenting the reader with a collection of restless, sometimes urgent, works, which promote movement. I suspect Alice Oswald would counter

[12] Janne Stigen Drangsholt, 'Sounding the landscape: Displacement in the Poetry of Alice Oswald', *in Crisis and Contemporary Poetry*, Ed Anne Karhio, Sean Crosson and Charles I. Armstrong, (Houndsmill, Basingstoke: Palgrave Macmillan, 2011) chapter 10 pp. 167 – 214. (Page 169)

this by explaining how she would like the reader to immerse herself in 'one poem at a time.'[13]

As a scientist I see this as studying the poem and unpacking all its evidence, treating it as a single experiment As a poet I appreciate that she is asking me to emotionally and intelligently find myself within the poem's landscape and so to connect with its source inspiration to gain an understanding. At first this seems that the approach is again emphasising the difference between science and art, but like feather and fur, they may look and feel different, but their aim is the same. They ask the reader to move intellectually and emotionally from one understanding to another.

Neil Astley, the editor of *Earth Shattering,* sets out the purpose of his anthology in a manifesto-type statement at the end of his introduction:

> As the world's politicians and corporations orchestrate our headlong rush to Eco-Armageddon, poetry may seem a hopeless gesture. But Earth Shattering shows that the power of poetry is in the detail, in the force of each individual poem, in every poem's effect on every reader. And anyone

[13] *Poetry Society Bulletin*, 205 (Summer) pp. 5-7

whose resolve is stirred will strengthen the collective call for change. (Astley, p.20).

Neil Astley provides a variation on his own statement in an article in the Guardian in 2008, when he states that 'poetry, like music or art, is not supposed to make anything happen, except in our response to it.'[14] However, the last part of the anthology's statement above, that 'poetry's power is in the detail, in the force of each individual poem, in every poem's effect on every listener or reader' is how Astley sees the change being brought about.

This theme of raising awareness of environmental issues among the general public is symptomatic of ecopoetry anthologies and is perhaps best summed up by the comments made by the authors of the Common Ground anthology of river poetry *The River's Voice*[15] who explain that Common Ground and its publications are 'attempting to create a popular culture of wanting to care.'

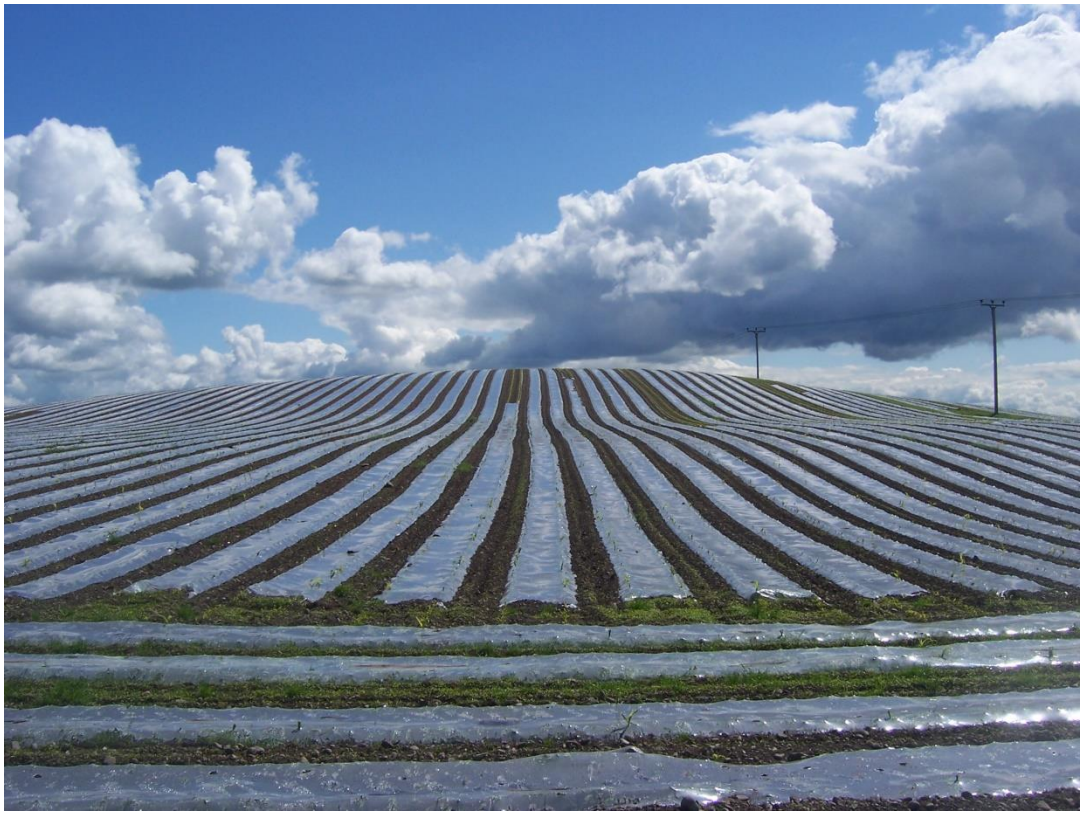
I am supportive of this aim. I, too, want people to care more for their natural environment and ecopoetry can help to achieve that. To demonstrate the depth of appreciation of

[14] *Something in nothing*, Guardian Tuesday 26th Feb 2008. Accessed 22/3/13
[15] Ed by Angela King and Susan Clifford, *THE RIVER'S VOICE An Anthology of Poetry*, (Totnes, Devon: Green Books Ltd, 2000) p. 221.

environmental issues encapsulated within an ecopoem the following poems were selected for detailed analysis:

- ‘On the Tarka Trail’ by Ted Hughes (*Earth Shattering*, p. 65)
- ‘Milk’ by Brendan Kennelly (*Earth Shattering*, p. 67)
- ‘Now that the rivers’ by Colin Simms (*Earth Shattering*, p. 82)
- ‘Ephemeroptera’ by Allison Funk (*Wild Reckoning* p. 53)

Section 6: Diffuse pollution in ‘On the Tarka Trail’ by Ted Hughes



from 1984 on 'The Tarka Trail'

Ted Hughes

(without analysis)

The river is suddenly green – dense bottle green.
Hard in the sun, dark as spinach.
Drought pools bleach their craters.
The river's floor is a fleece –
Tresses of some vile stuff
That disintegrates to a slime as you touch it
Leaving your fingers fouled with a stink of diesel.

The river's glutted – a boom of plenty for algae.
A festering olla podrida, poured slowly
Surfactants, ammonia, phosphates – the whole banquet
Flushed by sporadic thunderbursts
But never a flood enough to scour a sewer,
Never enough to resurrect a river.

A bottleful is like sap, a rich urine,
With minuscule flying saucers whizzing in it.
Down near the estuary – this goes into the mains.
But nothing can help the patient. In the August afternoon
The golden picnic sunrays leaning dustily
Through the conifers, gaze down
At a ditch-carcase, a puddled horror –
Bile draining from rags, the hulk of ribs.

Charlie found a stranded mussel. He bought it
Up the fishing ladder.
The lips gaped. We peering in, and pried wider,
Parted her pearly gates to get a peek
At her curtained uvula: Queen of the River
Still in her silken chamber, or was it - ?
A yawn of putrid phlegm.

Then the stench hit us. He yelled
And flailed it from his fingers as if it had burnt him
Into a blaze of willowherb
'God! The river's dead! Oh God!
Even the mussels are finished!'

The tale of a dying river
Does not end where you stand with the visitors
At a sickbed, felling the usual
Nothing more than mangled helplessness.
You cannot leave this hospital because
Peter, the good corn farmer, with his three plus
Tons of quality grain to the acre (behind him
The Min. of Ag. and Fish.'s hard guarantee
Which is the hired assurances of hired science)
Heaps the poisons into too.

His upriver neighbour – just as overwhelmed –

wades through slurry and silage. Where his dad
Milked a herd of twenty, he milks ninety –
Oozing effluent ‘equal to the untreated
Sewage of a city the size of Gloucester’.

But Peter, our clean corn farmer, nature protector,
Striding between lush hedgebanks he lets go bush
To gladden the spider, past his carefully nursed
Neglected nettles (a crèche for the butterflies),
The birdwatcher, binoculars thumping his sternum,
Has measured his medicines towards maximum yield
Into your dish for years. Yes, and smiled
Up towards the colluding sun. And returned
Over his corn (which now, near ripe, seems burned
Oak-dark with some fungus) thirteen times
Between the drill and the reaper.

Three hundredweight of 20-10-10 to the acre,
A hundredweight and a half straight Nitram.
Pesticides, herbicides, fungicides, the grand slam –
Each time twenty gallons to the acre
Into your dish, with top-ups. And slug-pellets
A bonus, with the rest, into your cup
(Via the lifeless ditch – meaning your tap).
Now you are as loaded with the data
That cultivate his hopes, in this brief gamble
As this river is –

as he is too,

He can’t escape either, nor can his lively young wife,

Who laughs if you ask them why they do what they do

(Her voice ventriloqual, her shoulders jerking on their strings)

‘But the children have to be educated.’

Ted Hughes

from 1984 on 'The Tarka Trail'

The river is suddenly green - dense bottle green.

Hard in the sun, dark as spinach.

Drought pools bleach their craters.

The river's floor is a fleece -

Tresses of some vile stuff

That disintegrates to a slime as you touch it

Leaving your fingers fouled with a stink of diesel.

The river's glutted - a boom of plenty for algae.

A festering olla podrida, poured slowly

Surfactants, ammonia, phosphates - the whole banquet

Flushed by sporadic thunderbursts

But never a flood enough to scour a sewer,

Never enough to resurrect a river.

Comment [JG1]: This change from the river's typical state to dense green indicates a sudden algal bloom

Comment [JG2]: Algal blooms require several triggers, one of which is temperature

Comment [JG3]: Slow flow allows the temperature of the water to rise and is another of the conditions which combine to allow algal blooms to happen

Comment [JG4]: Blanket weed or silt weed (*Cladophora* sps) forms Long filamentous growth in slow or stationary water

Comment [JG5]: This river is glutted with nutrients, which are detailed in the next lines.

Comment [JG6]: Meaning 'rotten pot'

Comment [JG7]: Typically wetting or emulsifying agents from household products (such as detergents) and industrial processes

Comment [JG8]: Fertilisers that become pollutants of water at concentration

Comment [JG9]: The nutrients described above are spread on the land, but can seep into the water course either on soil particles or in rainwater run-off

Comment [JG10]: This is another hint to the weather and summer, but it is also the sudden heavy rain that is most likely to run off the fields and into ditches and water courses

Comment [JG11]: This line suggests that high flows of water would cleanse the river by carrying off the stagnant nutrient rich water.

A bottleful is like sap, a rich urine,

With minuscule flying saucers whizzing in it.

Down near the estuary - this goes into the mains.

But nothing can help the patient. In the August afternoon

The golden picnic sunrays leaning dustily

Through the conifers, gaze down

At a ditch-carcase, a puddled horror -

Bile draining from rags, the hulk of ribs.

Charlie found a stranded mussel. He bought it

Up the fishing ladder.

The lips gaped. We peering in, and pried wider,

Parted her pearly gates to get a peek

At her curtained uvula: Queen of the River

Still in her silken chamber, or was it - ?

A yawn of putrid phlegm.

Then the stench hit us. He yelled

And flailed it from his fingers as if it had burnt him

Into a blaze of willowherb

'God! The river's dead! Oh God!

Even the mussels are finished!'

Comment [JG12]: This refers to the algae, which often have unusual shapes

Comment [JG13]: Hughes introduces this image of the patient, death and science here, which is repeated in the next verses

Comment [JG14]: Freshwater pearl mussels, which require clean, unpolluted and silt free water

Comment [JG15]: mouth images including uvula below – hint at images of dying (pearly gates) – this is linked to oxygen depletion caused by algal blooms

Comment [JG16]: Colloquial name for the FWP mussel- the female references are in comparison with the farmer's wife mentioned at the end of the poem

Comment [JG17]: Silken is linked to the spider imagery below, which Peter is allowing to live in this wild patches.

Comment [JG18]: The pearl mussels become the barometer to measure the quality of the river, due to their habitat requirements

The tale of a dying river

Does not end where you stand with the visitors

At a sickbed, felling the usual

Nothing more than mangled helplessness.

You cannot leave this hospital because

Peter, the good corn farmer, with his three plus

Tons of quality grain to the acre (behind him

The Min. of Ag. and Fish.'s hard guarantee

Which is the hired assurances of hired science)

Heaps the poisons into too.

His upriver neighbour - just as overwhelmed -

wades through slurry and silage. Where his dad

Milked a herd of twenty, he milks ninety -

Oozing effluent 'equal to the untreated

Sewage of a city the size of Gloucester'.

But Peter, our clean corn farmer, nature protector,

Striding between lush hedgebanks he lets go bush

To gladden the spider, past his carefully nursed

Neglected nettles (a crèche for the butterflies),

The birdwatcher, binoculars thumping his sternum,

Has measured his medicines towards maximum yield

Into your dish for years. Yes, and smiled

Comment [JG19]: A river polluted by nutrients – as shown by the algal blooms – suffers from reduced oxygen, which kills the biota by suffocation

Comment [JG20]: Hughes identified Peter and the MAFF as the cause of the decline of the river through the use of fertilisers etc They are the ones using the poisons

Comment [JG21]: Many of the products listed in this poem are toxic if applied at the wrong concentration or accumulate in the environment either because they are not used up by plants or bioaccumulate.

Comment [JG22]: Potential source of nutrients such as phosphorus that cause pollution

Comment [JG23]: Defra report that silage is 200 times more polluting that human sewage, depleting oxygen which is emphasised by the last two lines of this stanza

Comment [JG24]: Another example of changing agricultural practices that Hughes sees as contributing to the death of the rivrer

Comment [JG25]: Clean may seem ironic here, but it also the description of the crops when they are weed and disease free

Comment [JG26]: The medicines are the fertiliser and pesticide inputs

Up towards the colluding sun. And returned

Over his corn (which now, near ripe, seems burned

Oak-dark with some fungus) thirteen times

Between the drill and the reaper.

Three hundredweight of 20-10-10 to the acre,

A hundredweight and a half straight Nitram.

Pesticides, herbicides, fungicides, the grand slam -

Each time twenty gallons to the acre

Into your dish, with top-ups. And slug-pellets

A bonus, with the rest, into your cup

(Via the lifeless ditch - meaning your tap).

Now you are as loaded with the data

That cultivate his hopes, in this brief gamble

As this river is -

as he is too,

He can't escape either, nor can his lively young wife,

Who laughs if you ask them why they do what they do

(Her voice ventriloqual, her shoulders jerking on their strings)

'But the children have to be educated.'

Comment [JG27]: This is the proportions of N, P, K in the fertiliser

Comment [JG28]: Brand name of ammonium nitrate fertiliser

Comment [JG29]: Peter, the farmer, is trapped and forced to farm this way by MAFF and it is harming him, (his profession) as much as it is harming the river

Analysis

Diffuse pollution, even its name is vague. Walk along the dividing line between the agricultural field and the river and the chances are that beneath your feet are many, tiny trickles of pollution into the watercourse, seeping through the soil into the water. Individually they are too small to matter, but collectively they will harm the ecology of the water habitat and presents a risk to our health.

This is what Hughes is writing about. He knows that there is a link between the fertiliser put on the land and the algal blooms and dead mussels in the river.

The Tarka trail runs beside the Rivers Torridge and Taw, made famous by Henry Williamson's 1927 book, *Tarka the Otter*. Against this subliminal image of Tarka's home, Hughes begins this poem with a river that is in crisis:

> The River is suddenly green – dense bottle green.
>
> Hard in the sun, dark as spinach.
>
> Drought pools bleach their craters.
>
> The floor is a fleece –
>
> Tresses of some vile stuff
>
> That disintegrates to a slime as you touch it
>
> Leaving your fingers fouled with a stink of diesel. (Lines 1 -7).

This is a clear and accurate description of diffuse pollution, and the clues are there in the first stanza. This is a river that has reached the tipping point and is suddenly green with algae and plant growth. It is

summer, warm and reduced flow – drought conditions. Algae are always present in the river, but to reach these 'bloom' conditions they require the right temperature, water velocity and an over abundant source of food, such as nitrogen and phosphorus, so that any previously limiting factors have been resolved. Hughes goes on in the poem to make it clear where the nitrogen and phosphorus have come from.

The relationship between the pollutant (in this case nitrogen and phosphorus) and its impact can be complex. The pollutant is sometimes one step removed from its consequences. What is interesting here is that it is not the food source itself that is causing the pollution, it is the change that it brings about in the algal community. It alters the balance so that the algae, which are vital food for fry, molluscs and some bird species, becomes toxic to that ecosystem. The excessive growth in algae smoothers other plant and animal communities, covers the gravel (where fish breed), changes the amount of oxygen in the water as the algal communities first grow and then decay – Biological Oxygen Demand – and changes the turbidity (clarity) of the water.

Hughes is immensely troubled by the changes to the river and its inhabitants. The first half of this poem (37 lines out of the 74 lines) describes what he sees on that August afternoon. He captures the sense of overabundance of food for the algae as 'The river is glutted – a boom of plenty for algae' (line 8). He knows what is causing this and lists them: 'Surfactants, ammonia, phosphate – the whole banquet' (line 10). He also knows how they got there: 'Flushed in by sporadic thunderburst' (line11), sudden torrential rain that is more likely to run off the soil carrying with it the pollutants, whereas low intensity rainfall has time to percolate through the earth. He tells us about the 'stranded mussel' with its rotten innards like 'A yawn of putrid phlegm.' (line 28) and he puts into the mouth of Charlie (his companion on that visit to the river) a direct statement that collects all the clues we have been given in the

previous lines and tells everyone: ‘‘God! The river is dead! Oh God!/Even the mussels are finished!’’ (lines 32, 33). Here, Ted Hughes is providing evidence as eye witness testimony, but it is not impartial. The witness for the prosecution is Charlie and it is his voice that tells us that the river is dead. Those on charge are the farmer, the farmer’s wife and government policy. This poem is a polemic, directed at modern farming methods. In several places he uses direct speech, such as when Charlie speaks in lines 32 and 33 or when he is quoting the farmer’s wife in line 74, making it just a little easier for us to spot the culprit.

Hughes begins to change the focus and tone of the poem from line 34 onward:

The tale of the dying river

Does not end where you stand with the visitors

Nothing more than mangled helplessness.

You cannot leave this hospital because

Peter, the good corn farmer,…(lines 60 – 63).

In this stanza he introduces us to the farmer who has caused the pollution – Peter, and what Peter sees as the medicine for his crops. Here, Hughes is taking the reader directly to the source of the pollution, without ambiguity or poetic devise. He is pointing the finger – this medicine has put the river into the intensive care ward of the hospital, according to Hughes. Peter, ‘the good corn farmer’, applies to his crop:

Three hundredweight of 20-10-10 to the acre,

A hundredweight and a half straight Nitram.

Pesticides, herbicides, fungicides, the gram slam –

Each time twenty gallons to the acre' (lines 74 – 77).

Hughes is dismissive of this farmer's attempt to be the 'nature protector'. Peter has 'carefully nursed neglected nettles' and bushes to 'gladden the spider'. These are token gestures, but acknowledges that Peter is influenced by government policy 'behind him/The Min. of. Ag. and Fish.'s hard guarantee/Which is the hired assurance of hired science' (lines 40 - 42). He puts the final line of the poem into the farmer's wife's mouth: "But the children have to be educated.'' Even she is nothing more than a puppet – '(Her voice ventriloqual, her shoulders jerking on their strings)' (line 73). Here he is highlighting the disconnection between the farmer and the environment, driven by Government incentives. He implies that this family are earning an income, achieving a standard of living at the expense of the environment.

Hughes does not just focus on Peter, he also describes:

His upriver neighbour – just as overwhelmed –

Wades through slurry and silage. Where his dad

Milked a herd of twenty, he milks ninety –

Oozing effluent 'equal to the untreated

Sewage of a city the size of Gloucester (Lines 44-48).

The problem of disposal of farm yard manures and slurries remains with us. Farmers increase their herd numbers, but still have the same hectarage of land available to them on which to spread the effluent.

Hughes never allows the river a voice, emphasising its subjugation to agriculture. Instead he gives us an image of the river and farming that is contrary to the romantic idyll.

Hughes retains a complex rhyming scheme on the consonant or vowel sounds, (for example 'Surfactants, ammonia, phosphate…/flushed in by sporadic thunderbursts' lines 10 and 11), or alliteration ('The river's floor is a fleece' line 4*)* emphasising the impact of the pollution. But Hughes does not avoid the rhyme where he knows it will add impact, for example:

A hundredweight and a half straight Nitram.

Pesticides, herbicides, fungicides, the grand slam – (lines 61, 62)

He avoids mentioning fish – probably deliberately, he is conscious that salmon is seen as a rich man's play thing – mussels replace the fish in death. He wanted to direct this poem at all readers, not a selected few, following an elitist sport and with a specific interest in one species. Instead, he chose another iconic species – the freshwater pearl mussel. The freshwater pearl mussel attracts a wider audience because of its economic value and romantic associations as a source of pearls, but the informed angler also knows that it has a special connection with salmon. A juvenile stage of the freshwater pearl mussel's life cycle is spent as a parasite within the salmon, therefore if the salmon die out, the mussel will also become extinct.

The repetitive use of phrases including 'you' and 'your' brings the reader fully into the poem. This is Hughes ensuring that the reader has to accept part of the responsibility. The reader cannot sit outside the verse as an observer, but must imaginatively walk the river banks and fields with Hughes as he writes and accept their part in the consequences of Government policies and farming practices. Hughes

understands that to bring about change he must also change the minds and heart of those who read his poem, especially if the reason why they have not altered their behaviour so far is a lack of understanding. They have not made the association between farming practice and river quality. Not surprising, as the mechanism by which the pollution enters the water is not easily apparent – there is no sudden change to the river, as is usually the case with a single point source pollution incident. Hughes sets out the causes for his reader, accurately describing agricultural diffuse pollution, a significant pollution type even today.

Discussion

Terry Gifford explores environmental issues within the poetry of Ted Hughes in his paper 'River and Water Quality in the Work of Brian Clarke and Ted Hughes'. In this paper he concludes that it is Hughes' knowledge and understanding of environmental issues and, equally importantly, his involvement in trying to actively bring about change outside his role as poet that allows him to communicate it so successfully to the reader. He states:

> The argument of this essay, then, is that really communicating to readers the scope of the environmental crisis we face today depends on integrating the talent for literary writing with a real knowledge of environmental science and real experience of environmental activism. [16]:

It is this combination of knowledge, action and writing, that, according to Gifford, allows Hughes to really communicate 'to readers the scope of the environmental crisis we face today' (Gifford, p76).

[16] Terry Gifford, 'River and Water Quality in the Work of Brian Clarke and Ted Hughes' in *Concentric: Literary and Cultural Studies* 34.1 March 2008, pp. 75 – 91, (page 76)

These three strands, the talent for writing, the depth of knowledge and environmental activism, combined to produce poetry that allows for a reconnection between all inhabitants of the river catchment. In these safe hands, we the reader are shown 'the subtle links in the ecological chain of a watershed's total population, human and non-human' (Gifford, p 76).

Like Gifford, I also believe that the poem is better able to communicate to the reader when knowledge about the environment is symbiotic with the writing; that it is not sprinkled on like cake decoration, but feeds directly into the concept and construction of the poem. The value of ecological knowledge is often overlooked in preference for an intuitive connection with a place; what Hughes' writing demonstrates is that scientific understanding can provide a greater depth to the reading of the poem. The cause of the diffuse pollution would not be immediately obvious to a casual observer on the river bank, Hughes' poem provides insight and gives the reader with a greater understanding.

Ted Hughes' knowledge began first as an interest, based on observation, rather than a scientific study, influenced initially by his childhood experiences in Mytholmroyd. Hughes grew up 'beside the West Yorkshire River Calder – 'in which the only life was a teeming bankside population of brown rats.'[17] Industry in the Calder valley used the river for their textile and mill processes, both to drive the machinery and as part of the manufacturing processes, returning the waste water back to the river contaminated with toxic chemicals and metals, such as cadmium. The last salmon was reportedly caught in the river in 1850.

This experience of a living and playing beside a polluted river stayed with Hughes so that he came to believe that a water course without fish

[17] Ted Hughes, *River Poems by Ted Hughes, Photographs by Peter Keen.* (London: Faber and Faber, 1983), (endnote).

communicated to him 'one of the ultimate horrors' *(*Hughes, end note to River, 1983).

It is Hughes' enduring interest in fishing, or more accurately salmon fishing, that prompted a deeper study of environmental issues – he wanted to understand the scientific reasons for the declining numbers of fish in the rivers he visited.

> The poet's unpublished letters and documents in the British Library and the Hughes archive at Emory University in Atlanta, Georgia, reveal an impressive commitment of time and thought, for example in the attending of committee meetings, site visits and reading scientific reports with titles like 'The effects of surfactants in the Rivers Exe and Creedy' (Gifford, p. 84).

Terry Gifford explores how Hughes' increasing understanding of the causes of river pollution developed into a political and campaigning role to improve the water quality of rivers. Gifford highlights that Hughes was instrumental in setting up the first Rivers Trust – Westcountry Rivers Trust – in 1983, the same year that Hughes was publishing *River*. In 1985, Hughes went on to give evidence at a Public Enquiry on the potential impact of sewage on the receiving waters of a river and estuary. The success of his contribution is, according to Gifford, due to the 'vivid, detailed material' he presented. This is the environmental activism – the final part of the triptych of writing ability, knowledge and activism – that Gifford states is required to really communicate with the reader.

This is a poet who knows the value of accurate scientific information, but has the literary skills (Ted Hughes became the Poet Laureate in 1984) to make it real to the listening public. Equally importantly, he is emotionally connected, so he wants to make a difference. Not that this role as 'eco-shaman', as Ed Douglas describes him, was entirely

welcome. Gifford quotes Hughes as writing to a friend 'I have made the mistake of getting too involved' (Gifford, page 86). But Hughes also recognised the benefits of his position as Poet Laureate. Ed Douglas, writing in the *Observer*, reports how he took the advantage of his position when writing his first poem as Poet Laureate:

> In an unpublished letter to his friend the academic Keith Sagar he [Hughes] expressed satisfaction at the flutter of agitation the poem caused among Devon local councils, alarmed at the references to water quality smuggled into the verse. [18]

In letters and conversations, friends of Hughes talk about his passion and understanding of the rivers. This poem is bursting with ecology. It is accurate, knowledgeable and full of detail that I recognise and understand. The authority of this poem is strengthened by such detail and its ability to bring about an awareness of the environment (an aim of ecopoetry) is increased. Gifford maintains that Hughes reached a personal turning point 'when he began to write poems in which he was no longer an external observer of this relationship [between individual human life, landscape, weather and wildlife] but a participant in it.'[19]

As a poem, I do not feel that the ecological information overwhelms it, nor does it lessen its sense of self. However, there is more than jizz here, there is solid scientific information, not hidden away in metaphor. The fertilizer is referred to by brand name and ratio, without any enlightenment for the reader. But this is clearly a poem, not a scientific article. This is a poet trying to get you, the reader, to think a little more about your environment – to look at the river with a greater understanding when you are out walking beside it.

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[18] Ed Douglas, 'The Observer', Sunday 4 November 2007 www.guardian.co.uk/books/2007/nov/04/poetry.tedhughes/print accessed 22 Nov 2011.
[19] Terry Gifford, 'The Social Construct of Nature' in *ISLE (Interdisciplinary Studies in Literature and Environment)* (Oxford: Oxford Journals 3.2 1996) (p. 127).

Freshwater pearl mussels – after Ted Hughes' poem

Inspiration for the essay.

In the poem '*On the Tarka Trail'* I was struck by the focus on the freshwater pearl mussel, rather than the more obvious Atlantic salmon. I knew from my work that the freshwater pearl mussel population has declined so much that it is now almost extinct in my local area; potentially only a single population remaining. I tried to find examples of extant populations and came across the inclusion of pearl shells and costume jewellery in Kirkcudbright museum.

Freshwater pearl mussels are sensitive to pollution, vulnerable to exploitation by man and dependant on salmon for their survival. It is easy to see why Hughes uses them to represent the death of the river. Skinner et al describes the habitat they require as 'coarse sand and gravels in clean, oligotrophic, fast flowing and unpolluted rivers and streams.[20]' This should describe the condition of the Torridge and Taw, but, as the poem shows us, the situation is very different. It is slow-moving and eutrophic; sands and gravels covered with silt.

Freshwater pearl mussels are creatures that 'inhale water' as you and I inhale air, the difference is that they also purify the water by removing algae and other suspended matter making the water less turbid. Killeen

[20] Skinner, A., Young, M., and Hastie, L, *Ecology of the Freshwater Pearl Mussel: Conserving Natura 2000 Rivers Ecology Series No 2*. (Peterborough: English Nature, 2003), (p. 4).

reports that ‘a single freshwater mussel can filter approximately 40 litres in just one day.’ [21] This is what makes the adult creature vulnerable to pollution, including excess nutrients such as phosphorus.

Freshwater pearl mussels have a complicated life cycle, with an early stage in their development spent attached to the gills of juvenile salmon, brown or sea trout. Their chances of finding a fish are slim, but it is at the point when they leave the host fish and take up residence in the sands and gravels that they are most vulnerable to pollution and death is likely if, according to Skinner, ‘even a slight degree of pollution is present (Skinner, p8).’ Not only must the water quality be good, the river bed must also be in a near natural condition. The sediment should have an open structure that allows a high rate of exchange between the free water body and the interstitial water. Silt or compaction (due to changes in flow pattern) or changes in water quantity can all reduce the likelihood of suitable habitat being present.

Of course, no salmon or trout means no host animal for the young pearl mussels (known as Glochidium) to attach to.

Livelihoods were made collecting the pearls and this certainly contributed to the catastrophic loss of mussel populations. Killeen described their original distribution as ‘found in most oligotrophic fast flowing streams and rivers throughout Scotland, (p.1).’

[21] Ed. I. Killeen, D. Aldridge, and G. Oliver, *Freshwater Bivalves of Britain and Ireland*, (Shrewsbury: FSC Publications, 2004) (p1)

Now it is only a handful, mostly in the Highlands. Where once they occurred in ‘vast beds’ now they are down to ‘a few thousand individuals, or in a number of cases, less than 100’ (p.1).

The remaining populations are protected by law, but their survival is still not guaranteed. Most are made up of aging individuals (and for freshwater pearl mussels aging can mean anything up to 100 years old). Old age is not necessarily a problem. Skinner et al suggest that ‘the age structures in a viable population should reflect both active recruitment and longevity’ (Skinner, p 6). The issue seems to be that recruitment of young mussels (at the point where they leave the host fish) is being prevented by pollution and the river morphology being too modified for them to find a suitable site.

It is nearly thirty years since Hughes wrote his poem and very little has changed since then. Despite everything we know about freshwater pearl mussels, despite the impact of Hughes’ poem, despite his campaigning, the freshwater pearl mussel is still hanging on in rivers with increased nutrient status and poor morphology with little or no juvenile recruitment as a result. I know this because in Dumfries and Galloway there is one population remaining and monitoring of the river shows that it is impacted by increased levels of nutrients and silt run off. As a consequence there is little, if any, juvenile recruitment. It is only a matter of time.

There were other populations: the Dumfries and Galloway Natural History and Antiquarian Society reported at their meeting on 5th Jan 1864 that Dr Aitken exhibited specimens of shells and pearls taken from the Cluden, and I know that the Stewartry Museum holds a collection of pearls taken from mussels in the River Dee. I try to find the Cluden examples, but the specimens held by Dumfries Museum are unattributed to finder, location or date. Instead, I drive across to Kirkcudbright, to see the River Dee examples.

My appointment is scheduled for a half hour before the museum opens and I am let in a side door by the curator. By coincidence, I had spoken on the phone that morning to a local naturalist, who admitted that, many years ago, their uncle had been involved in poaching the Dee pearl mussels. The uncle had passed on the following advice on how to collect them: 'you need a glass bottomed bucket and a stick.'

The Stewartry Museum is full of objects. This is Victorian obsessive collecting at its best and worst. This building, I find out later, was purpose built and opened in 1892 to house the museum, but the call for objects to fill it had gone out in 1880. I saw the accession log for that year. The people of Kirkcudbright were generous, they donated stuffed birds, taxidermy specimens of a tiger cub and a lion cub, collections of sermons, back copies of the Dumfries periodical, curiosities such as a strangely shaped branch, ancient artefacts found at historic sites, such

as carved stones and, item number six hundred and eighty five: pearls from the river Dee, numerous specimens.

I weave through the narrow spaces between display cases, following the curator. She takes me upstairs to the balcony, brings out her keys to open the case. Amongst items that a lady might have on her dressing table I spot a single shell and within its concave mother of pearl belly lie the pearls. I am struck immediately by their size: small, the largest no bigger than a pea, most much smaller. And their colour: browns, fawns, the occasional lustred one. I guess there must be about twenty. I ask to see the shell and the curator carefully tips the pearls into her hand and turns the shell over. There are the ridges, growth rings, to show its age, about fifty we estimate. I desperately want to hold the shell, trace my fingers down its rough surface, roll the pearls around in my hand, but protocol is against me. And that is it. A dry shell, its blue hue chipped away at the edge, where the original finder prised it open. A collection of pearls, dull and often misshapen. This is the closest I have ever been to a fresh water pearl mussel. If pollution and siltation continues to impact the rivers of Scotland, I may never see them in the water.

I ask about accession details, which is how I got to see the log book from 1880. I assume that a naturalist from that time contributed them and I would also find a location where they were found, a bit more specific than *River Dee*. I am wrong, the pearls were donated by James

McSkimming, Watchmaker, Jeweller, Silversmith and Optician (established 1859). Which explains why only the miscoloured and misshapen ones were donated: profit has always had a profound effect on the British countryside.

Low flows

It is difficult to believe, after this winter
it will ever be dry again,
that the winds will create dust devils
in the ploughed fields
and the hens will find soil baths
in the flower border.
That the linear ponds in the tractor tracks
will shrink to sump holes
filled with tadpoles.
ink-black and barely moving.

It's evening and I can hear
Bruce Springsteen singing inside my head:

'we'd go down to the river
and into the river we'd dive
oh-oh down to the riv-er we'd drive'

The reservoir has a tide line
like a dirty bath.
I look down the edges
of mud tesserae
as if the underworld
still held answers.

He’s right, it all goes down to the river

beginning here, in this ditch.

Choked, stems knitted together,

brooklime, water starwort,

Underneath, slow shallow gradient flow

We can cross it, she tells me

but I look at the divide

the far bank as distant

as my hesitation

but she is confident

and the water weed

lowers in gentle curtsey

beneath her.

Cleaning the yard

We brush the yard,

stiff bristles scratching the concrete

and me following on with a softer brush.

Shovel-fulls of dirt

thrown back across the fence.

Then, the packing shed

damp the floor first

to settle the dust,

Granddad flicking his wet fingers

as if he had dipped them into the Holy water

and he making the first stroke of the sign of the cross.

Dust

Dust lying across the stream,
so light, it doesn't sink for ages,
not till the wind has shifted the ripples around.
There is an urban myth
that dirt is clean
but I know, even though I cannot see,
there is dirt attached to the dirt,
phosphorus caught by the soil,
left over residues of pesticides,
NPK stalking the fields.

Calibrations

It happens.
The calibration not checked,
the scatter pattern not perfect,
there is always some wastage
    like the stale end of a loaf of bread.

In this field the corners are supposed to be cut
margins are slim,
adhere to the regulation for buffer strips
as best you can.
Spread the hail-hard-white fertiliser
for maximum yield.

Soil pits

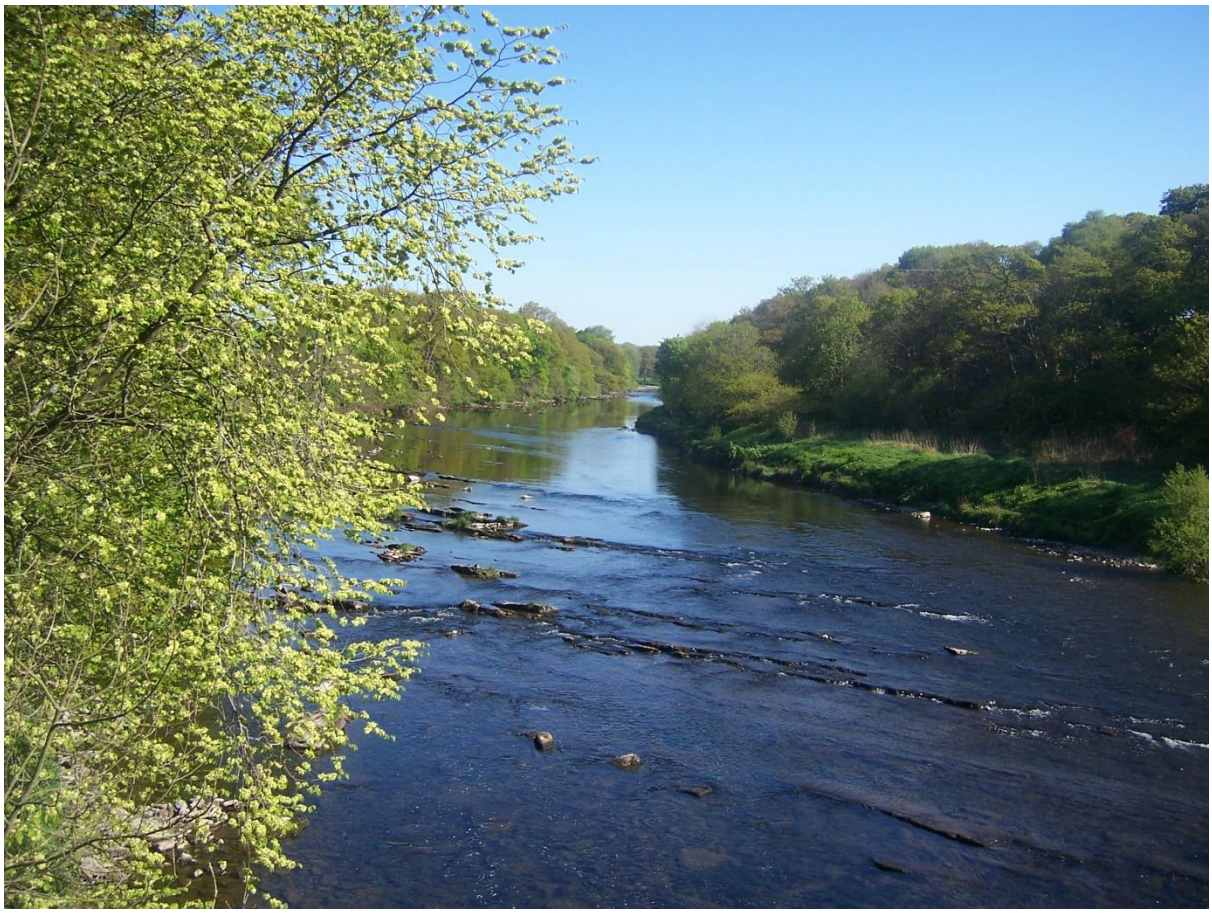
At some point, in my training
I dug soil pits
to look at the horizons
only a few feet from my face.
Interstitial spaces,
percolation rates.
earthworm tunnels
less than a matchstick wide,

Smaller, the pinprick pellets
(hail-hard-white)
slip down through the soil,
like sheep escaping through a gappy fence.

Plough the fields

An exhaust plume of gulls
follows the plough.
Again and again
the earth rolls open
in long intestinal threads,
exposing a few thin worms
cast up for the birds.

Section 7: Point source pollution in ‘Milk’ by Brendan Kennelly



Milk

Brendan Kennelly

(without analysis)

I

Three men

On a morning in early summer

Tipped a lorryload of poisoned whey

Into the Line river.

The water opened

And gulped it down.

It was a white poison.

The river swelled with the

Evil milk,

A snowy vein of death

Piercing the land's body.

All through the land

Seeped the scum in a murderous rut,

Through fields and

Meadows waiting to be cut,

Past villages and townlands

Into the sea.

II

Everything died in the milky river.

Brown trout, eels, fluke, young salmon

Perished, every one.

White bellies to the light

Fish floated down the river

Corpses jostling in the tide.

In the summer morning

Poison entered the sun,

Riddled the light

On land and sea,

Possessed the invisible stars

Turned to dust in the air

Dropped like a gentle malignant shiver of snow

Into the hearts of three men

Standing on a bank

Of the Line river.

III

Men working in the fields

Saw white bellies of fish.

Pain jabbed in the hearts of some.

They waded in as far as they could go

Collected the bodies in bags
Returned to the banks
Spread the fish in the fields –
Row after glittering row.

Strange to see
Fishbodies
In the rivery grass,
Men bending over them
Incomprehension in their eyes.

Looking back at the river
They saw countless trout
Try to leap from the water
As if wanting to be alone,
preferring to die
In an alien element
Than in their poisoned own.

A few fish reached the grass, graved, stones
The air pressing on every side,
They stirred, leaped, flickered in the sun
And died.

IV

Milk of peace, milk of human kindness, sign of the fish –

The fields were strewn with dead metaphors.

Language had fought a pitch battle and lost

And now the choicest of its soldiers

Lay corpsed in the sun,

Their hearts yanked out and flung at random on the grass,

What grass would grow from these abandoned hearts

Would be sour as the words of a man

Whose days were black pits

Of disappointment.

Light that might have been a light of love

Circled like a bird of prey

Above the fields

Where nothing could be done or said

To halt the carrion light

From ravaging the dead.

V

The men who poisoned the river

Seemed hardly to know what was done.

Would they know what they did

If they poisoned the sun?

When they dumped death into the water

What did they do or say?

They turned their backs on a job well-done

And walked away.

VI

Later,

People walking through or near the fields

Were forced to drink the stench.

Implacable as cancer

It pierced their clothes and skin

Lived there

White and vile as leprosy.

The whiter, the viler.

It seemed to many women and men

That God's air

Would never be clean again.

VII

In time

Fish bodies would be clay and grass,

Pain in the men's eyes

Lessen

But the river will never

Recover

Its own creatures rotting in light.

The river

And the land it flows for

Will not forget

The summer of the poisoned white.

Brendan Kennelly

Milk

I

Three men

On a morning in early summer

Tipped a lorryload of poisoned whey

Into the Line river.

The water opened

And gulped it down.

It was a white poison.

The river swelled with the

Evil milk,

A snowy vein of death

Piercing the land's body.

All through the land

Seeped the scum in a murderous rut,

Through fields and

Meadows waiting to be cut,

Past villages and townlands

Into the sea.

II

Everything died in the milky river.

Brown trout, eels, fluke, young salmon

Comment [JG1]: Temperature and light will influence any polluting effect. The fact that it is summer may influence the speed at which the impact of the consequences of milk pollution happen.

Comment [JG2]: The milk has mostly likely been condemned as not fit for human consumption due to an contaminant

Comment [JG3]: What is described in the rest of the poem is the polluting impact of milk rather than a specific poison within milk

Comment [JG4]: Imagery linked to drinking

Comment [JG5]: Milk contains a high proportion of fats that provide food from the microbes in the river – the impact of milk is to increase the amount of bacteria/algae etc in the river which use up all of the oxygen

Comment [JG6]: The impact of the milk will travel downstream with the water

Comment [JG7]: The poem emphasises the people on the banks who witness the pollution, often a distance from the original pollution loci. It also highlights the wide catchment that many rivers have.

Comment [JG8]: From the source to sea is a common concept when considering rivers in the environment and emphasises again the way pollution can move through a catchment and affect a large area.

Comment [JG9]: The cause of death is most likely to be oxygen starvation. In the longer term, if the river remains opaque because of algal growth, plant growth will be effected

Comment [JG10]: Fluke is another name for flatfish, suggesting this site is close to the estuary

Comment [JG11]: Typical combination of a river that is open to the sea to allow for migratory fish to pass

Perished, every one.

White bellies to the light

Fish floated down the river

Corpses jostling in the tide.

In the summer morning

Poison entered the sun,

Riddled the light

On land and sea,

Possessed the invisible stars

Turned to dust in the air

Dropped like a gentle malignant shiver of snow

Into the hearts of three men

Standing on a bank

Of the Line river.

III

Men working in the fields

Saw white bellies of fish.

Pain jabbed in the hearts of some.

They waded in as far as they could go

Collected the bodies in bags

Returned to the banks

Spread the fish in the fields –

Row after glittering row.

Strange to see

Fishbodies

Comment [JG12]: This is highly likely for oxygen starvation or for other forms of poison

Comment [JG13]: Confirmation that we are at the mouth of the river, but again emphasising the whole catchment as these corpses have floated down the tide.

Comment [JG14]: Emphasising the connection between warmth and light providing the conditions for the growth of algal which leads to the oxygen starvation.

Comment [JG15]: The poem now begins to describe the response of those on the river bank to the sudden death of all of the fish – this is often how pollution events are identified, not by the act of pollution, but by the consequences. This river has a healthy fish population and the death of these fish provides a sudden, dramatic event, but the pollution can then be tracked through the changes to the river invertebrates – even after the pollution has 'flushed through' the river system.

In the rivery grass,

Men bending over them

Incomprehension in their eyes.

Looking back at the river

They saw countless trout

Try to leap from the water

As if wanting to be alone,

preferring to die

In an alien element

Than in their poisoned own.

A few fish reached the grass, graved, stones

The air pressing on every side,

They stirred, leaped, flickered in the sun

And died.

IV

Milk of peace, milk of human kindness, sign of the fish –

The fields were strewn with dead metaphors.

Language had fought a pitch battle and lost

And now the choicest of its soldiers

Lay corpsed in the sun,

Their hearts yanked out and flung at random on the grass,

What grass would grow from these abandoned hearts

Would be sour as the words of a man

Whose days were black pits

Of disappointment.

Comment [JG16]: This is another typical symptom of oxygen depletion, fish are known to jump out of the water or come to the surface appearing to gulp air

Light that might have been a light of love

Circled like a bird of prey

Above the fields

Where nothing could be done or said

To halt the carrion light

From ravaging the dead.

V

The men who poisoned the river

Seemed hardly to know what was done.

Would they know what they did

If they poisoned the sun?

When they dumped death into the water

What did they do or say?

They turned their backs on a job well-done

And walked away.

VI

Later,

People walking through or near the fields

Were forced to drink the stench.

Implacable as cancer

It pierced their clothes and skin

Lived there

White and vile as leprosy.

The whiter, the viler.

Comment [JG17]: Milk is one of the most polluting substances that can enter a water course, this fact is not understood or appreciated by many.

It seemed to many women and men

That God's air

Would never be clean again.

VII

In time

Fish bodies would be clay and grass,

Pain in the men's eyes

Lessen

But the river will never

Recover

Its own creatures rotting in light.

The river

And the land it flows for

Will not forget

The summer of the poisoned white.

Comment [JG18]: Interesting description of the relationship between land and water, typically water flows through or from.

Anaylsis

When we walk, or work, beside a river we see its surface, its size and get a feel for the movement of the water, in spate or low flows. But we rarely see what lives within this habitat. Only when some disaster happens to a healthy river system and the water is polluted do we get a feel for the biomass that the river supports. In death, the range of species and quantity of each type is revealed. Brendan Kennelly sets his poem 'Milk' at the very instance that a pollutant is introduced to the river and follows its consequences downstream as 'A snowy vein of death'. He describes the outcome like this:

> Everything died in the milky river.
>
> Brown trout, eels, fluke, young salmon
>
> Perished, every one.
>
> White bellies to the light
>
> Fish floated down the river
>
> Corpses jostling in the tide. (Lines 18 – 23)

This is a vivid and disturbing image of death within a river system, which is also accurate – dead fish do appear to swim belly-up, moving with the currents and congregating where the flow drops and the rivers appears to be still.

The poem begins with the incident that caused the pollution. In a very matter of fact way Kennelly tells us in the first stanza:

Three men

On a morning in early summer

Tipped a lorryload of poisoned whey

Into the Line river (lines 1 - 4).

There is no poetic imagery in this opening verse, or emotional language. He presents the facts and by doing so he hints at the careless way that this act was carried out – without thought or understanding of its impact. But these men should have anticipated some consequence, because we know that this is 'poisoned whey' unfit for human or animal consumption. Anything else would have been sold on, but this batch was not allowed into the food chain.

Nevertheless, the men emptied their load of poisoned whey into the river and 'The water opened/And gulped it down.' (Line 5/6). And this gulping mirrors our own typical response to milk, it is advertised as healthy, natural and nourishing. It is something you should feed your children to make them grow fit and strong. However, once in the water the milk becomes a poison and the poem graphically describes the outcome:

Men working in the fields

Saw white bellies of fish.

Pain jabbed the hearts of some.

They waded in as far as they could go

Collected bodies in bags

Returned to the banks

Spread the fish in the fields –

Row after glittering row (lines 34 - 41).

In contrast to the factual reporting style of the initial incident, the poem uses poetic imagery and metaphors to describe the outcome and people's reactions. The writer uses the theme of white as a symbol of goodness, purity and godliness corrupted by this pollution, so white becomes 'white poison' (line 7), 'a snowy vein of death' (line 10), 'white bellies to the light' (line 21), 'white bellies of fish' (line 35), white and vile as leprosy./The whiter, the viler' (line 88 and 89) and the final line of the poem 'The summer of the poisoned white.' (line 103). He also plays on the notion of the goodness of milk. Lines 58 and 59 explain 'Milk of peace, milk of human kindness, sign of the fish - / The fields were strewn with dead metaphors.'

The poet also plays on the imagery of light. We are told in the opening stanza that this incident happens one morning in early summer and the

sun and light are again contrasted with death and darkness. For example lines 94 to 99 use the image of the sunshine falling on the fish corpses lying in the fields as a corrupting force – of a source of death:

Light that might have been a light of love

Circled like a bird of prey

Above the fields

Where nothing could be said or done

To halt the carrion light

From ravaging the dead.

As an ecologist I also know that temperature can play a part in the severity of the pollution, the bacteria that are eating the milk work more efficiently in warm water – the fact that this is a summer day potentially increased the severity of this incident.

Brendan Kennelly puts people's reactions at the centre of his poem, they witness and respond to the incident, they see the dead fish, they smell the stench of sour milk and death – 'It seemed to many women and men/That God's air/would never been clean again' (Lines 90 – 92). With these lines Kennelly takes the impacts of the poison out of the river and puts it in our bodies, through the air that we breathe. We all become contaminated with poison, and we are all at risk of suffocation.

He links the incidental act of three men with the potential wider risk to everyone. This is the warning: ignorance and a lack of care can have devastating effects on our environment.

Discussion

Right at the start of this poem there is an ambiguity as to the cause of all the deaths and damage to the river community. As readers we have been told that it is poisoned whey that entered the water course and the inference is that it is the poison in the whey that causes the environmental damage. But as an ecologist I suspect that the cause of the pollution was the whey itself, rather than the contaminant. This is because milk is one of the most damaging environmental pollutants when it enters the water environment, contrasting with its apparent health giving properties when drunk. The Pollution Prevention Guidelines issued jointly by SEPA, Environment Agency and Environment and Heritage Services on dairy and other milk handling operations state:

> It is not often recognised that milk can have a significant polluting effect on water if allowed to reach rivers and streams. It can be as much as 400 times more polluting than untreated domestic sewage. Naturally occurring bacteria break down milk entering a watercourse, using up oxygen in the water more quickly than it can be replaced.

As a result of falling oxygen levels, fish and other creatures can suffocate.[22]

The ambiguity – whether it is the poisoned whey or the poisonous properties of whey that causes the fish kill – reflects the lack of understanding of the polluting properties of milk generally, but also specifically within the context of the poem, by the men who let the milk enter the water course: 'The men who poisoned the river/seemed hardly to know what was done' (Line 74/75).

Never the less, this poem works as an ecopoem. It vividly describes what happens when milk (either contaminated or otherwise) enters the watercourse. If this poem is aiming to be active and bring about change, then it has been successful in the first step, to increase knowledge of the fragility of the water ecosystem. If the ecopoem triggers more interest in the reader, then the niceties of the distinction between poisoned whey and poisonous whey will become clear.

This poem also carries a second, less obvious, ecological observation. It reminds us that when we walk beside a river we only see the surface, shape, size and colour, like an overcoat, rather than the rich wildlife within it - the biodiversity of plants, fish, insects, amphibians and animals that all live within unpolluted water. We admire its form and

[22] See PPG 17 Dairies and other Milk Handling Operations and Sector Guidance Note IPPC 13 General Guidance for the Dairy and Milk Processing Sector, www.netregs. Accessed 1/6/12.

its place in the landscape, but are often ignorant of its contents – including the waste that we tip into it.

Airds Point – after Brendan Connelly

When thinking about discharges into water there is an obvious place to visit. The two holding tanks at Airds Point, near to New Abbey, sit like huge grey dustbins on the edge of a beautiful stretch of the Solway estuary. There are no other man-made features obvious, no houses, telegraph poles or cables. Against a backdrop of coastal woodland and farmland, the storage tanks give no hint of what man-made pollution they contain.

I decided to visit Airds Point. A landmark place. Drive down the coast road to Glencaple and you cannot miss it. Changing my usual routine, I planned to approach it from the opposite direction to the way I normally go. I thought I would be able to park closer, and time – or rather timing, is important. But I missed my turning, abandoned the car and tried to take a short cut; ended up wasting half an hour before accepting that it would just be easier to go the way I always go. The route I knew. So, I went back to my car, drove around to New Abbey, parked behind Sweetheart Abbey, and made my way across fields and through woods on a well-marked path, if a slightly muddy one. This is a path with a past. It follows the high enclosure walls built by Cistercian monks and the burn that bloats up on the tide so full that it was able to take ships right

into the village. But this is called the Airds Point walk, so the emphasis is on the end point, the destination, not the places you pass.

I had to be there at high tide, so that I could wait for the turn, the ebb, because that is when I would see the spectacle I want to witness.

The weather had been poor when I started out, but now the wind had picked up and the rain was strobing across the field in light grey pulses. At this rate I would be walking back in the dark. It would take me 40 minutes, I anticipated, and it was now cutting it fine. Airds Point is at the end of the Nith, on its west bank, where the river gives way to the estuary. It has never seemed to me to be a point, which implies an end, but more of a change in direction, an angle, where the narrow funnel of the river opens out to the wide Solway.

For something so large and ignominious when seen from the opposite bank, the twin tanks were hidden from view until I was right beside them, when I looked up from my feet there was the first one. A white, broad cylinder with a metal rim. The second one was next to it, both inside a green plastic chain link fence and sitting in a concrete yard, shored up with gabion baskets against the river bank. Each tank as high and as wide as a house.

The tide was still coming in, with the wind roughing up its surface and creating white horses that I watched moving upstream. The channel of the Nith was right beside the tanks, the freshwater was forcing its way

downstream while the saltwater ran to meet it, and together they spilled out across the mud flats towards the east shore, a couple of hundred metres away.

As if I were waiting for a show to begin, I settled myself down on the rough gabion baskets, pulled out my flask and poured myself a cup of tea. It was still raining. I did not really know what to expect, but hoped for some ominous clanking noises and then lots of gurgling, as if a giant's stomach was rumbling. For the tanks hold the industrial waste from the ICI works at Cargenbridge. They make plastics – crisp packets, for example. The tanks hold this waste until there is enough volume of water and the tide is ebbing, then they discharge. I took my cup of tea and walked along the concrete casement of the discharge pipe to the valve at the end. The concrete was slippy and there were small tufts of seaweed attached to it. I had spotted two life belts, but they were inside the chain link fence. I didn't rate my chances very high if I went into the water.

There were no extra sounds above the wind, waves and birds. I walked back and waited.

By now it was getting towards late afternoon and the winter light was fading, the rain hung as mist around the woodland strip on the opposite bank. Streams of gulls flew past me and disappeared into the nothingness of the Solway. On a clear day I know you can see the Lake

District, this afternoon the rough sea, grey sky and drizzle combined to create an end wall to the world. Opposite me, the lights of Kenneth Bank came on – a short line of Victorian houses, built at a time when property developers thought that the North Solway coast might become the next Blackpool.

The discharge must have begun by now. I had seen and heard nothing, but these were not ideal conditions, anything coming out of the pipe would be well mixed in the choppy estuary and the lack of light and natural turbidity of the water meant that I could not see anything. Nor could I smell anything.

"How does it know when to discharge?" I asked one of my colleagues before my walk. This small matter had been worrying me, because the river is tidal. The kind of waste sitting in those tanks could be very polluting if released into too little a volume of water. And it seemed to me that the pressure of water on the valve would keep the flap shut. And how did it know when the tide was ebbing and so avoid sending the factory its waste back up the river? And the tides are not at the same time each day, the timing changes and the depth changes; it felt a very complicated process and therefore vulnerable to error.

"There is a lunar clock," she said, "controlling the discharge."

I had visions of cogs and wheels, cast in bronze and inscribed with the signs of the zodiac. A single hand moving across a dial, the soft, regular

click of the mechanism. Of course, it had to be lunar if it is linked to tides. It would be inside the office and storehouse sitting beside the tanks. I wondered if I could pull some strings and organise a formal visit, then decided against it, it will be all computer programmed now. There would be nothing to see. It also explained the size of the tanks, they may have to store the effluent for days, if the tides were too low to safely take the discharge away.

I would have to walk home in the dark, if I didn't leave now. I must have spent too long taking my aborted short cut. Reading between the lines, I should have detected a 'pungent' odour when the fluid is released. I have smelt nothing but seaweed, ozone and dampness. I packed away my flask, collected up my used teabag. I leave the gulls, leave Barnacle geese chattering away somewhere in the distance, leave the exposed wind-thrown coastline where trees lean backwards like bent nails. And leave the slight, but determined rain. If I really wanted to check out the discharge I could come back in twelve hours, daylight and gulls flying back in land. And every twelve hours after that because the discharge happens every twelve hours, like lunar clockwork. I don't know what it is in the discharge. Industrial chemicals, some human sewage from the site toilets, rainwater from building roofs, anything else that can be slipped down a drain. The tide comes in, the tide goes out and catching a lift, is the effluent.

Trust me, it is not the only discharge into this river. You have just never noticed them.

Poachers

In his hesitation

I thought

he was not going to share with me

the secret, how knowing fingers could find

the rough line along the fish's side

to tell its kind.

It seemed shabby to use

this reluctantly released craft

on the carcass, when it was meant only for the living.

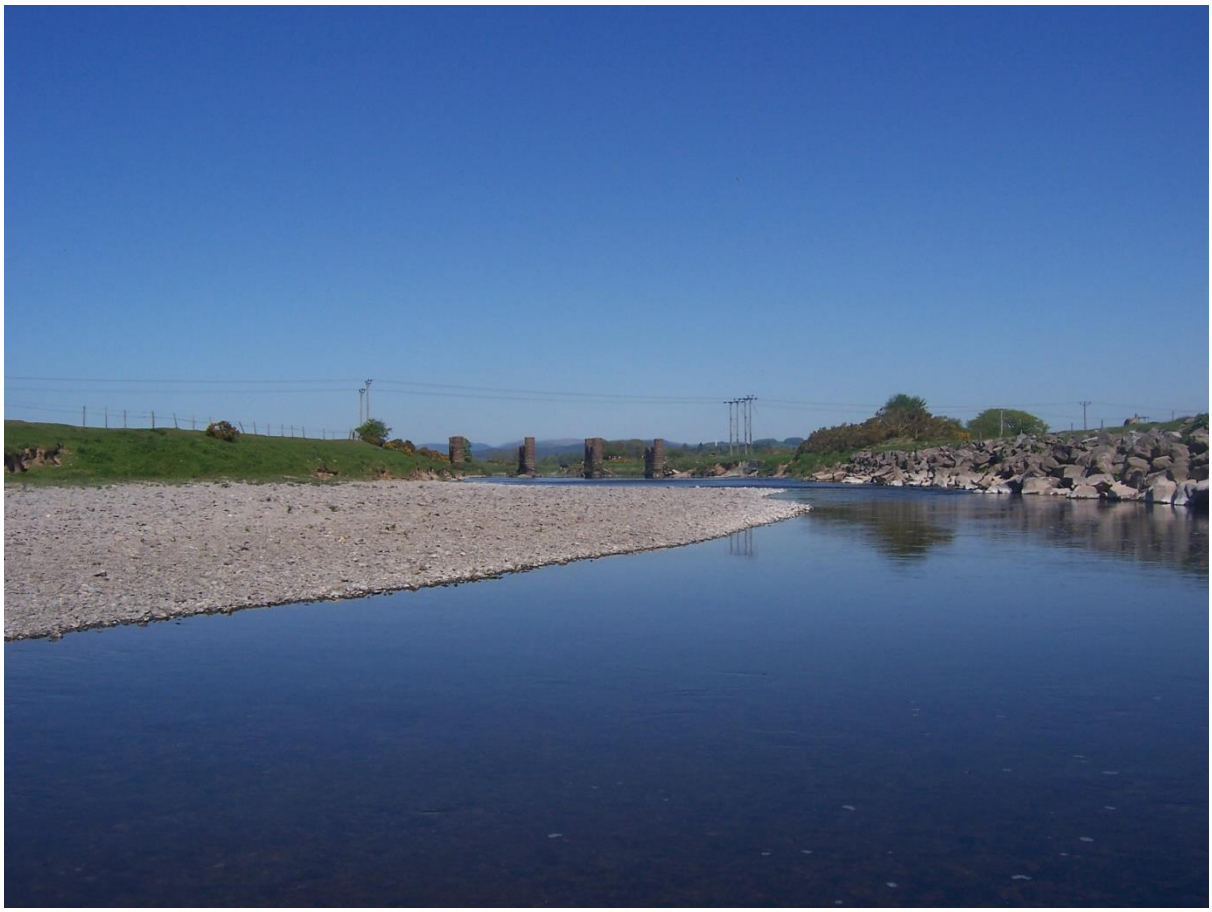
My own hesitation misunderstood

by the watchers. They slip cyanide

in the river as easily as my hand

slips over rotting flesh.

Section 8: Morphological change in ‘Now that the rivers…’ by Colin Simms



Now that the rivers are bringing down some loam

Colin Simms

(without analysis)

Now that the rivers are bringing down some loam
of husbandman's love off these enlarged winter fields
not merely silt, which would quicken water meadows,
they've cleared the willows to speed the water's flow.
lngs, otters' homes, all else of alder-carr goes
a balance of centuries to the balance-sheet yields.

Floods will increase, and still they gripp
uplands, deep-plough for the new forests, let rip
earth-movers to straighten courses in places
they curse as stagnant, and drain out the bogs
had held the rain in, sphagnum, let it go slowly.
Nature reasserts with storms and man's span
is merely money washed out with dead moles and voles
more for the crows. Lost less slowly; frogs and otters'
graces.

Vale of York floods 1968 for C.M.R. and M.E.B.

Now that the rivers are bringing down some loam

Now that the rivers are bringing down some loam
of husbandman's love off these enlarged winter fields
not merely silt, which would quicken water meadows,
they've cleared the willows to speed the water's flow.

lngs, otters' homes, all else of alder-carr goes
a balance of centuries to the balance-sheet yields.

Comment [JG1]: Loam implies soil, good growing earth, more typically you would refer to this as silt when it is in the river system, but using the term loam gives us a clear indication of where this material has come from – off the fields. Line 3 goes on to refer to this as 'not merely silt'.

Comment [JG2]: The term 'husband' is used to imply careful agricultural management. The phrasing here 'husbandman's love' is to imply the careful and loving management by the farmer (usually a man) and gives us the image of the farmer as custodian and guardian of the countryside

Comment [JG3]: Enlarged, as the boundaries – hedges, walls have been removed. These would have provided a degree of shelter from winter weather and helped to prevent the stripping off of top soil when the land is bare, which is one way for it to reach the river.

Comment [JG4]: As above, silt is carried in the water and as part of flooding processes would be left on the land after flooding and act as a natural fertiliser

Comment [JG5]: Willows are typical trees of the river bank, where they help stabilise the banks, preventing erosion (and loss of soil), provide cover for otter and other species, provide shade to prevent the water heating up and insects etc from the trees fall into the river and are a source of food. Like the boundaries around the fields, these have been cleared

Comment [JG6]: One of the consequences of removing trees and bankside vegetation is that it removes roughness from the channel, the water course is often straighter and the water flows more quickly through that stretch. While this may move water away from this area quicker, it can cause problems downstream, increasing the possibility of flooding.

Comment [JG7]: An ing is local dialect for a wet place, typically a water meadow next to a river.

Comment [JG8]: Alder carr is a wet woodland able to tolerate high winter water levels and flooding. It has a typical, but unique mix of species present including more unusual sedges, such as tussock sedges.

Comment [JG9]: goes – this woodland has been cleared too, with the potential loss of the otter holts and other breeding/feeding places for wildlife.

Comment [JG10]: The repetition of the word balance emphasises that these habitats and boundaries found alongside the river were part of the natural process that enabled the catchment to function by reducing peak flow times, acting as a filter system for silt, providing a greater stability for the system (ie reducing erosion) and increasing biodiversity, ie it was in balance

Comment [JG11]: The driver for the change from the relatively stable system with the carr and bankside vegetation to the removal of these features is the balance-sheet – ie agricultural profit

Floods will increase, and still they gripp
uplands, deep-plough for the new forests, let rip
earth-movers to straighten courses in places
they curse as stagnant, and drain out the bogs
had held the rain in, sphagnum, let it go slowly.

Comment [JG12]: This is a stark warning, but there is research to show that ditching and over grazing in the uplands, which began in the 1940's, contributed to flooding lower down in the catchment, (details of relevant studies given below)

Comment [JG13]: Gripp. This is the draining of the land, typically applied to moorland, where narrow drains are cut below turf level. These shallow drains are considered useful where there the soil is less deep, such as in the uplands.

Comment [JG14]: Modern machinery and planting practice for new forestry often involves deep ploughing, with furrows cut for quick planting (rather than individual planting pockets)

Comment [JG15]: ground preparation and introduction of new drainage for upland conifer plantations is associated with quicker discharge times for water off the upper sections of the river catchment. At its simplest, new forestry plantations, in their early growth stages, introduces a greater length of drainage channel than was found previously in these areas.

Comment [JG16]: Rip has several meanings here – it is implying speed, doing a poetic role in rhyming with gripp – but it is also reminding us of another type of ploughing – rip-ploughing

Comment [JG17]: The ultimate change in management practice has been the introduction of earth movers, which have altered the scale, speed and extent that drainage can take place.

Comment [JG18]: Straightening a water course reduces the amount of space it occupies within the field setting, increasing potential profit, but has negative consequences for flooding because water moves more quickly through this stretch.

Comment [JG19]: 'They' is not defined, but it is taken to mean the farmer, but it could also apply to the machinery operator and agricultural/forestry advisor.

Comment [JG20]: stagnant – this will be areas of water that become isolated within the channel or landscape as the flow rate change. Stagnant tends to be associated with areas of poor water quality – but this is not the case, stagnant does not mean polluted, it means less oxygen, low or little flow and often an increase in plants such as *Lemna* – duck weed.

Comment [JG21]: drain out the bogs links back to all the drainage mechanisms mentioned in the earlier lines.

Comment [JG22]: Bogs are important 'sponges' for catchments, able to hold on to large amounts of water due to the presence of peat and its main component part (both alive and dead) sphagnum

Comment [JG23]: Sphagnum or bog moss has the capacity to hold on to water in hyaline cells. These cells persist in the dead sphagnum within the peat. In the live plants they allow it to manage its water uptake as it relies entirely on water from precipitation, having no roots. This storage capacity is potentially significant within a catchment as it can hold back water, reducing the amount that reaches the river or, if in a flood plain, can absorb the water better than other soil-based habitats.

Comment [JG24]: Lets it go slowly because there is a capacity above which it cannot hold water, but this water will percolate more slowly through the peat structure to reach the water table or river system.

Analysis

The poem 'Now that the rivers…' has the feel of a pastoral narrative of the land, its landscape of fields and the people and creatures that live there; but it contains a darker message about the links between the river and the land and the consequence of our management.

Colin Simms's poem begins by describing soil erosion, a serious issue. Simms appears to be blaming the river as the carrier of the soil and uses a description that links back to the role of the farmer as the carer of, and for, the land:

> Now that the rivers are bringing down some loam
> of husbandman's love off these enlarged winter fields' (line 1 and 2).

Large, bare fields are at risk of losing top soil because of the lack of boundaries to break up the wind, or riverside vegetation to act as a filter to any run-off. The large field size also emphasises the change in management that has taken place to accommodate the larger machinery now used by the farming community.

Soil erosion is an issue for farmers and land managers. Merrington explains:

> Erosion and sediment transfer is a natural process that progressively transforms landscapes at a rate dependent primarily upon climate and geology. Unmanaged landscapes change imperceptibly in human terms. Removal of the natural vegetation cover leads to accelerated erosion…. Accelerated erosion induced by cultivation can lead to soil losses up to 20 t ha/year or greater. These losses are often very

localised, and can therefore have a major impact on adjacent habitats, such as streams and rivers.' [23]

Reading the poem with this knowledge, we see that the river is the final bearer of the soil, not necessarily the cause.

We are told that this is 'not merely silt, which would quicken the water meadow' (p 3). Again, this harks back to a more pastoral time, when flooding of water meadows allowed for the deposition of fertile silt, to act as a natural fertiliser. The flooding was seen as a positive and welcome process, under the safe management of the farmer.

But there is also a second meaning in this line – 'not merely silt' shows, as with the Ted Hughes' poem, an awareness of the route that pollution may take to enter a water course. Soil particles tend to carry with them pesticides, herbicides, fertilisers and slurry residues and pathogens. Merrington et al (2002) explain:

> The main chemical pollutant impact of sediment derived from erosion of agricultural land relates to those materials bound to the soil particles that desorb in receiving freshwaters. These chemical species include macronutrients, notably phosphorus, that contribute to eutrophication, and pesticides (p82).

Line four of the poem refers again to the river – although still indirectly, 'they've cleared the willows to speed the water's flow'. The poet knows, and the science tends to agree with him, that clearing the willows and the subsequent loss of habitat will only have a negative impact on the natural environment by increasing erosion and channel instability and increase the risk of flooding. Schumm (2005) states:

[23] Ed. G Merrington, L Winder, R Parkinson and M Redman, *Agricultural Pollution, Environmental Problems and Practical Solutions*, (London: Spon Press, 2002) (page 74)

> It appears intuitive that any vegetation on the banks of a river will protect that bank from erosion. Numerous field studies support this contention. Bends that encountered farmland migrated 30 percent faster than bends that encountered forest land and cultivated and fallow fields yield channels with larger cross-sections than forested areas. [24]

From line four onwards, the poem begins to list the damaging agricultural practices. The poet explains what the farmers and land owners do, in the name of agricultural improvement and the damage and risk that this presents to the catchment. They gripp the uplands, straighten the water courses, drain the bogs and this is 'merely money washed out…' (line 13) as 'nature reasserts with storms' (line 12).

The relationship between the water course, its catchment and flooding events is complex, but Simms' poem highlights several issues, such as the clearing of watercourse, drainage of upland and changes in farming practices. He mentions the clearing of the willows to speed the water's flow. Schumm states that 'during flooding, erosion dominates where velocity and stream power are greatest' (p. 127). Thus, creating a faster flowing river may result in more damage to the river channel and flood plain, rather than speed the water quickly and harmlessly away.

The ability of bogs, and sphagnum moss in particular, to hold water or as Simms puts it 'the bogs/held the rain in, sphagnum, let it go slowly' (line 10 and 11) enables such places to act as sponges, holding water back so that it does not contribute to the potential flooding event or does not arrive at a peak time. Draining the bogs and clearing the

[24] Stanley A Schumm, *River Variability and Complexity* (Cambridge: Cambridge University Press, 2005) (page 133)

willows to make the water flow faster will, most likely, increase the risk of flooding downstream because the water will all arrive within a shorter timeframe, rather than percolating through the catchments at different rates.

To the poet's despair, the land owners never learn:

> Floods will increase, and still they gripp
> uplands, deep plough for the new forests, let rip
> earth-movers to straighten courses in places
> they curse as stagnant…(lines 7 – 10)

Simms's focuses then on the consequences to the 'otters' homes, all else of alder carr goes' (line 5). The farmer is doing this to better manage his land and balance sheets. But Colin Simms warns us:

> Nature reasserts with storms and man's span
> is merely money washed out with dead moles and voles
> more for the crows. Lost less slowly; frogs and otters'
> graces. (lines 12 – 15)

This is a short poem (only 15 lines compared to the *The Tarka Trail*, which has 74*)* that builds in tempo and emotion. Each line is steeped in meaning. It shows that we never learn from the experience as we tend to think only in time-spans of our working lives. It is a poem that begin with a tone of sarcasm and anger and ends in sadness

Simms' uses the poetic skills carefully, using true rhymes sparingly and for emphasis. He sets some phrases off against each other but still links them through the choice of images, so the old style of management to flood fields to 'quicken water meadows,' (line 3) meaning to bring them on earlier, is set against 'to speed the water's flow' (line 4) in the next line, which we, as knowledgeable readers know, will have a negative

impact. There is no direct speech or real people in this poem, only the consequence of their actions and although the land does not have a direct voice, the last word goes to the animals: moles, voles, crows, frogs and otters. The constant use of enjambment in the second stanza, speeds up the pace of this poem to its inevitable and negative conclusion and we finish with a warning about what will happen quickest of all – to the loss of frogs and otters' graces.

Discussion

I read this as a strong ecological poem, accurate in its observations and the consequences on the morphology, hydrology and biodiversity of this catchment. It describes the impact of human influence on the river's hydromorphology and our constant attempts to dictate the rate at which water moves through the catchment. It was influenced by a real event; there is a post script that states:

Vale of York floods 1968 (for C.M.R. and M.E.B.).

Colin Simms' poem contains within it an explanation of how management practices can alter the hydrology of an area, have a negative impact on the local environment and ecology and increase the risk of flooding downstream. A lack of management to remove silt from rivers is often cited as a cause of flooding. This poem refutes this, it starts by looking at how the loam gets into the river – the enlarged fields and removal of bankside vegetation. The title of the poem is also the first line emphasising the presence of loam in the river, while the dedication (*Vale of York floods 1968 for C.M.R. and M.E.B.)* at the very end of the poem shows us the consequences. The poem details the changes in land management that allows the soil to enter the river and

the actions of the farmers to speed the water on its way to the lower catchment, the vale, where the flooding will occur.

The poem is scientifically accurate and this is achieved without explicit use of scientific language and concepts – it is there in the descriptions. It is emotionally connected with the land and its wildlife. It is rich with language and voices. It uses terminology that a farmer would employ – such as gripping, even though such words are not in common usage and the reader may not have seen them before. It uses local dialect words, such as Ings, emphasising the specific location for this poem. At the same time, this poem is highlighting a much wider issue than is found in this one catchment. It is a poem that speaks for many catchments. It is a poem that still needs to be heard today, as the issues that it considered have not been fully resolved.

The presence of silt within the river system is very topical. The lack of management to remove it was often mentioned by local people during the flooding of the Somerset Levels during January 2014. The Flooding on the Levels Action Group (FLAG) has one simple message on its homepage (in May 2014):

> STOP THE FLOODING.
> DREDGE THE RIVERS!
> THEN MAINTAIN. [25]

An article in the Guardian on 31st March 20014, as dredging of the Parrett in Somerset began, quoted local farmer Geoff Millar: 'We've

[25] see: www.flagsomerset.org.uk/ accessed on 1/06/14

been farming here for generations and know what needs to be done, but we weren't heard and catastrophe followed.' [26]

Against such support for dredging, the Chartered Institute of Water and Environmental Management (CIWEM) produced a report entitled 'Floods and Dredging – a reality check'. A section of this report looked specifically at the Somerset Levels flooding and asked the question: 'Would dredging have helped to reduce the extent or the duration of flooding?' [27] It reached two conclusions:

- It is highly unlikely that dredging of the Parrett and Tone prior to the January 2014 floods would have led to a significant drop in the flood levels experienced.
- It is highly likely that dredging the Parrett and Tone prior to the January 2014 floods would have led to a reduction in the flood duration experienced.(CIWEM, p.16)

Its conclusion is that, even with dredging, the floods would have been just as extensive and just as deep, but they would have drained away sooner. It also added the caution that there is the possibility of 'an increase in tidal flood risk to the Levels from dredging, although flooding associated with these types of events is usually much shorter lived' (CIWEM, p.17).

The CIWEM report puts forward a more measured response to the flooding than simply going in with the diggers; it asks for a balanced approach, also taking in account the high wildlife value of the area and the financial cost of dredging operations. They are recommending a

[26] Stephen Morris, Somerset Level dredging begins after flood-hit winter, article, see: http://www.theguardian.com/environment/2014/mar/31/somerset-levels-river-dredging-begins-floods, accessed on 1/06/14
[27] www.ciwem.org/media/.../floods_and_dredging_-_a_reality_check.pdf (page 16), accessed on 1/06/14

whole catchment approach, looking at the pros and cons over the whole river system. This will allow managers to consider where and how the silt is getting into the river and whether anything can be done to change this. It is a quiet voice against loud local demands. It is giving out much the same message as Colin Simms' poem. One of the key issues in the flooding in the Levels is the amount of silt within the river system. The title of Colin Simms' poem, 'now that the rivers are bringing down some loam' is still pertinent and requires serious consideration.

Tongland Dam – after Colin Simms

Inspiration for the essay

Colin Simms describes mostly agricultural changes to the landscape, but in Dumfries and Galloway (where I live and work) there are also many other causes of morphological change to the landscape and river systems. Agricultural change (and a persistent attitude towards the need to dredge) continues, but hydropower and flood management have also significantly altered local river systems. In this essay I visited three examples of morphological change of various extent, one current and on-going and two others that were instigated during the 1930's.

Dams make me nervous. They are impressive structures, but all I can see is the height and weight of water pressing against the concrete and the trickle of river, like slobber, flowing over the spill way. We are crowded into the superintendent's room, which was used when there was such a person. It is a small room, but with a view back to the dam and, from another window, down into the main channel below. There is an exhibition of photographs here, from when the hydro scheme was under construction. Old fashioned cars, men in Trilby hats and caps, gangs of workers, and photographs of snow and ice, wrapped like insulation around the telephone and electricity cables.

This dam is right at the bottom of the catchment. I am here mostly to talk about fish ladders and whether this one can be improved for eels. They have to carry them in a bucket past the dam and release them again up stream. There is a possibility of adding a material that will help the eels wriggle up the sides (they cannot leap like salmon) but longer term the pass may require some expensive redesigning. I have a soft spot for eels and am keen that we improve this river system to keep

them here. Surely by now there must be very small numbers of eels left with residual memories of this place as home.

The conversation moves on to compensation flows and freshets, all terms to describe a specific amount of water released under controlled conditions. The eels have travelled from their breeding grounds in the Sargasso Sea and now they needed an engineer to turn on a tap and a piece of rough fabric to help them cover the last few miles. Outside, at the fish pass, I can hear the dam growling, like the brown bear waiting for salmon. Below the outfall the river channel is slack and empty, small rock pools holding on to the last of the flow. Gulls watch for trapped fish.

The superintendent's successors are waiting for the *demand*, like a ransom note, to let the water through and generate power. Eels congregate in the estuary waiting for the flood.

And, once past the dam, the eel's chances are slim. This is a very damaged catchment, with the hydropower dam the most extreme example of change to the river system. Beyond here the eel has to cope with more dams, American signal crayfish, acidified waters, forestry drainage and agricultural pollution. The natural transport of material through the river system is interrupted by the hydropower infrastructure and the soft, silty bed the eel prefers as a habitat is at constant risk of being dredged. It is not all bad news though, there are some winners in this river system. Pillwort (*Pilularia globulifera)* seems to be happy in muddy margins that occasionally flood or dry out. We also benefit from the electricity. It is a trade-off, but the scales seem to weigh heavily on the side of environmental damage.

Hydropower dams are example of extensive changes, but smaller scale alterations can cause local damage. I was once asked to monitor the dredging of a 'water' -halfway between a burn and a river. The digger

driver scooped out buckets of slit and very quickly I realised that the machine was pulling out other things too. As the silt slopped on to the grass it would occasionally shimmer and slide. This water had both eels and lamprey. I began to collect them up, I had handfuls of all sizes. Like all watery things they did not appreciate the sun or my dry hands. I used my plastic binocular case to make a temporary bucket and carried them downstream, past the dredger working his way upstream, to give them back to the river.

The digger driver hung out of his cab, "What've you got?" he shouted.

"Eels," I shouted back at him over the noise from the machinery.

"Well, you're not afraid of them," he said, and only then did I realise that clutching a bag of eels to my chest was probably not the most feminine behaviour he had ever seen. I suspect I was supposed to scream. I suddenly wondered if I should be afraid of them – did they bite? I had never needed to ask that question before, so I was not entirely sure of their jaw strength. I decided that most of these were too small to give me a serious nip, and the easiest way to tell a lamprey from an eel is to see if it sucks at your hand. I knew I had lamprey this way, as one or two were reluctant to let go.

The digger driver went back to his task, crawling on caterpillar tracks a bit further along the bank and swinging the huge bucket back into the water, pulling out more mud and eels.

The farmer, having first lectured me on land drainage, then admitted that this stretch of the water used to be obstructed by a rock outcrop, until his father and grandfather used dynamite on it.

'Those were the days,' I said, non-committally.

I can list for you the places in this region where man has not interfered with the water courses. They are so few in number and short in length. Coshogle Water, for example, a tributary of the Nith in a narrow, rocky gorge that has not been altered other than by natural processes over a geological timescale; although, in places, the burnside vegetation is at the mercy of sheep.

Lower down in the Nith catchment there are large embankments, I saw the plans for these earth walls once, when in the Ministry of Agriculture offices. They were put in place during the war, so I was told, built by Italian Prisoners of War. The banks are impressive. The river is not completely confined to its channel – there is room for it to shrug a little. The embankments are there to prevent the adjacent farmland from flooding. They stretch from the town upstream for a few miles, only to stop suddenly and I wonder if this was because the war ended and the captive labour disappeared. It is one of my favourite walking places, close enough to town to visit in a lunch hour. Behind the banks the fields are neatly aligned like back gardens. Today, the grass is as short as a lawn, the first silage crop gone and a band of starlings picking through the scalped turf.

Where the embankment ends and the river begins to meander again, the fields have random shapes, their surface uneven, like a rucked blanket. There are wet places and shallow ponds left in ox-bows. There are slumps and hummocks of the desiccated river, previous skins sloughed and left lying, dry, but almost perfect in form, the new shape easy to find a little further on.

It's hot and the standing waves in the river bubble like a Jacuzzis. On the shingle bar I find a stonefly exuviae, cast off perfectly, now dry and crisp and a little further on the insect, almost as long as my pinkie. It is reluctant to fly and scuttles over my hands like a spider, wings lying

neatly along its back, unused. I hear skylarks, lapwing and oystercatchers. Tall stems of bright yellow buttercups edge the wetter areas, sods of grass hang in heavy fringes over the eroding banks as the river swings round another corner, responding to hydrological dynamics and geological resistance. So many variables, so much variation.

When the river is running high, it floods this area, lifting itself out from the river channel and running across the fields. Then, the productive fields lower down also flood as the river fills ditches and slips behind the embankments. A little bit more rain and it finds low lying areas near to roads and houses and lies ominous and heavy at the boundary to our homes. We worry that one more downpour and it will be inside our front door.

Rain, the river's co-conspirator. As yet, we have not found a way to control the rainfall, but we think we can control the river. This river needs more, higher, embankments to stop the flooding. But I always think about the dams, the power and weight of water behind the physical structures we create. Smaller in scale, embankments do the same role, they hold back the river.

They will probably never be breached. Almost certainly, never. But like a prisoner of war, the river will never stop trying to escape its confines.

Nith embankment

Here the sun is unfettered,
shadows are small shapes,
the only harsh line is ourselves walking
towards the button of engineers,
each with a roll of plans
and confidence.

Our jackets folded neatly and placed
to the side, sweat held out to the drying wind.
The slap of spade tampering down
loose earth.

I see the hinge in the land
where the river swings out,
where fields wade each winter.

If this were the Tiber or Danube
I could understand the barricade.
But I can stretch my fingers
through gravel mesh to the
other side. My own arms
make enough of a bridge.

A chain gang, we pile soil

high along the blockade.

The river wets the feet of the embankment.

The Lore Burn

It begins beneath the library
where readers pause,
unsure if they can hear
the sound of water,
after a sudden storm.
It runs below the square
and the paving stones,
newly laid, still capture the rain
in an unplanned swale
to mark the route.
And at the road,
where the pedestrians hesitate,
pet owners note how their dogs
dip their heads like dowsing rods
before they will cross.
The neon sign of the shopping centre
commemorates its presence
as if it was extinct. Except that
at the storm flap
the Lore Burn sheds
its concrete chrysalis.

Section 9: Water monitoring in ‘Ephemeroptera’ by Allison Funk

Ephemeroptera

for my brother David

Allison Funk

(without analysis)

Blizzard. Smoke. Interstellar

dust. Even you, an entomologist,

turn to metaphor,

awed by their emergence

over water. So thick

at times you cover your face

to keep from breathing them in.

Pale evening spinner,

morning spinner.

How many dawns ago,

numberless dusks?

Call it

what astronomers do –

that past whose light

is just reaching us now:

look-back time. Yours

and mine – our own becoming,

born of the milky ways

of love. Fragile once

as the earliest larva,

brother, instar.

And later – in a house looking out

into a woods of tulip poplar,

rhododendron, down over train tracks

to a creek named Red Clay

where, in another eon,

fish swam before men

put out the lights of mayflies

smaller than the thumb

of the boy with a net

you were then.

Twenty-nine-o-one,

our address as children blurring

with the thousand-some species

of *Ephemeroptera,*

with prehistory, fossil time,

the millions of years mayflies

thrived in Permian streams,

Triassic, Jurassic,

feeding on infinitesimal diatoms

before vanishing

from our fouled creek.

It’s another century

and we’ve been gone

from home as long as it’s taken

them to return one by one

to their underworld

of silt and mud.

Some clinging to stones

in swift currents, others

hiding in gaps. With oar-like gills

the unbleached nymph

rows for dear oxygen,

spending years in between-time

molting over and over

again, as often as we’ve left

a self behind –

all for as much

as a single evening

when this wisp

growing not towards death

but into something

like the passions that consume us,

filamentous, breaks the water's surface

with crumpled wings

and, fast as sleight of hand,

changes shape a final time

to become the luminous, meteoric

imago,

in whose likeness

may I recognise in what passes

what lasts.

Ephemeroptera

for my brother David

Allison Funk

Blizzard. Smoke. Interstellar

dust. Even you, an entomologist,

turn to metaphor,

awed by their emergence

over water. So thick

at times you cover your face

to keep from breathing them in.

Pale evening spinner,

morning spinner.

Comment [JG1]: Common names of different mayflies

How many dawns ago,

numberless dusks?

Call it

what astronomers do –

that past whose light

is just reaching us now:

look-back time. Yours

and mine – our own becoming,

born of the milky ways

of love. Fragile once

as the earliest larva,

brother, instar.

And later – in a house looking out

into a woods of tulip poplar,

rhododendron, down over train tracks

to a creek named Red Clay

where, in another eon,

fish swam before men

put out the lights of mayflies

smaller than the thumb

of the boy with a net

you were then.

Twenty-nine-o-one,

our address as children blurring

Comment [JG2]: reference to an early aquatic stage in the development of the mayfly.

Comment [JG3]: Stages (between molts) of the development of the nymph

Comment [JG4]: Direct reference to the loss of mayflies due to the negative influence of man.

with the thousand-some species

of *Ephemeroptera,*

with prehistory, fossil time,

the millions of years mayflies

thrived in Permian streams,

Triassic, Jurassic,

feeding on infinitesimal diatoms

before vanishing

from our fouled creek.

It's another century

and we've been gone

from home as long as it's taken

them to return one by one

to their underworld

of silt and mud.

Some clinging to stones

in swift currents, others

hiding in gaps. With oar-like gills

Comment [JG5]: Small bottom feeding micro-organisms – also used to assess water quality

Comment [JG6]: Further reference to pollution.

Comment [JG7]: Biological recovery can take considerable time – water quality must be improved before recruitment can take place.

the unbleached nymph

rows for dear oxygen,

spending years in between-time

molting over and over

again, as often as we've left

a self behind –

all for as much

as a single evening

when this wisp

growing not towards death

but into something

like the passions that consume us,

filamentous, breaks the water's surface

with crumpled wings

and, fast as sleight of hand,

changes shape a final time

to become the luminous, meteoric

imago,

Comment [JG8]: the aquatic stage of the mayfly

Comment [JG9]: adult mayfly – the final life stage

in whose likeness

may I recognise in what passes

what lasts.

Analysis

This poem effectively uses the lifecycle and requirements of the mayfly to describe the relationship between brother and sister. We read how they grew up in a 'house looking out/into a woods of tulip poplar/rhododendron' (lines 22, 23 and 24), and that the early interest in the wildlife found in a creek named 'red clay' (line 25) developed into a career as an entomologist.

We learn that the aquatic insects vanished 'from our fouled creek' (line 42) and the poet tells us that she and her brother have 'been gone/ from home as long as it's taken/ them to return one by one' (lines 44, 45 and 46). This is the time taken for the water to be sufficiently improved in quality for the aquatic insects to also return and survive.

The numerous molts that the mayfly undertakes become the metaphor for the stages that the young children go through as they develop into adults, but these changes are described as 'growing not towards death/but into something/like the passions that consume us (lines 61, 62 and 63). The final emergence of the fully formed adult is celebrated as a 'luminous, meteoric/imago' (lines 68 and 69).

Ephemeroptera is one of seventeen poems commissioned by the authors of the *Wild Reckoning* anthology as collaborative works between scientists and poets. Allison Funk reveals that she could not see her poem until her scientist brother had used phrases such as snowstorm and smoke to describe the emergence of mayflies (p244).

Her brother provides her with a way into his specialism by using metaphor, a concept that the poet is familiar with, and in return she repays the compliment by infusing her poem with descriptions that he

can relate to. This becomes a code between them, but it is not exclusive, the shared memories are vivid to us, the reader, too. We get a feel for their childhood and the creek that is polluted.

It also demonstrates what can happen if you follow the advice of John Burnside and get out into your local environment. It demonstrates the outcome of what ecology as poetry can produce:

A fully emerged scientist.

A sister who realises what is precious.

Discussion

Mayflies are a vital part of the stream biota, but for an ecologist there is another interesting aspect about mayflies – they are used as indicator species to help determine the quality of the water environment. They are used as indicators because they are ubiquitous, not especially mobile and intolerant of water pollution. This combination makes them particularly useful as the authors of *Mayfly larva (Ephemeroptera) of Britain and Ireland: keys and a review of their ecology* explain:

> As many species of Ephemeroptera occurring in running water are sensitive to various forms of pollution, their presence and diversity can be used to indicate water quality…Chemical analysis can provide valuable information on water quality but, unless the chemical monitoring is continuous, it is easy to miss a sudden, short change in water quality. The most useful, and probably the cheapest, continuous recorders are therefore the living organisms…The advantage of Ephemeroptera are that they can be identified to

species, they are relatively easy to sample, and most species are present throughout the year[28].

However, it is not just the mayfly that is used in this way. 'The River InVertebrate Prediction And Classification System' (RIVPACS) includes all of the water invertebrates found at nearly 800 reference sites, including Plecoptera (stoneflies), Megaloptera (Alderflies), Trichoptera (caddisflies) and other Diptera or common flies. In ecological terms, I am as likely to talk about caddisflies as mayflies.

The presence of all four taxa (Ephemeroptera, Plecoptera, Megaloptera and Trichoptera) indicate a high quality water environment, but as the anthropological influence increases, either by organic enrichment, morphological modification or acidification, the diversity of species decreases till only the Trichoptera (caddisflies) remain, as these are most tolerant of poor water quality and conditions.

Invertebrates often also provide their own control site, immediately above any pollution. This allows for a direct comparison of a polluted stretch and an un-polluted stretch of river, without the need for previous monitoring records.

Initially, I found this poem a little unsatisfactory. I read the title and with my knowledge about the role of Empheroptera in water monitoring, I expected the poem to have a more obvious link to water pollution. Some things are obvious, the use of scientific terms, for example, but this poem makes the reader work a little harder to understand the deeper ecological meaning.

The central ecological message within this poem is about our ties to the place we live/lived in. I am reminded of the comments made by Ted Hughes about how the images of the polluted river he grew up beside

[28] J. M. Elliott and U. H. Humpesch, *Mayfly larva (Ephemeroptera) of Britain and Ireland: keys and a review of their ecology* (Windermere: Freshwater Biological Association, 2010) (p.123)

remained with him – and became a motivation for him to campaign against river pollution. This poem approaches the same subject matter, but in a more oblique way – focusing on what passion can achieve, eventually. The passion that made Ted Hughes set up the first Rivers Trust, the same kind of passion that turned the boy into an entomologist.

The poem has none of the explicit, polemic references to the cause of water pollution contained within '*On the Tarka Trail.*' We are told the creek is polluted, but nothing more. It is the awe felt by the watcher, seeing the clouds of mayflies emerge, that is communicated to us, so that we also are changed by the experience. In this poem the Latin names and scientific terms are used to help us see a little way into the different world of the brother, through his studies of water insects.

What is hinted at is that without the safe, clean environment for the mayfly we may never have that direct experience ourselves.

Little Water of Fleet – after Allison Funk

Aquatic invertebrates are among the ecologist's best pollution indicators. Locally, a key use of aquatic invertebrates is to monitor acid rain, using recognised acid-sensitive taxa. In contrast to milk, acidic waters are crystal clear and have no smell. Only when you carry out the detailed study of the river biota do you get an indication of the scale and extent of the damage to the water ecosystem.

I turn in at the Big Water of Fleet viaduct car park and I am disappointed to see two cars, some mountain bikers and a family playing and picnicking beside the river. Selfishly, I wanted this place to myself. But it is a beautiful day; autumn temporarily forgotten and I know I will lose contact with the other visitors quickly.

I think, technically, you are not supposed to walk across the viaduct, but I do and I am not the first, although from the narrow, almost absent, path on the other side, I suspect not many people carry on tracing the old railway route onwards from here. A raven walks along the parapet ahead of me, then takes off. The viaduct, the granite Clints of Dromore, the river below, everything feels spacious, I am reminded of the John Lennon lyric, 'above us only sky'. *Imagine* begins to play in my mind. I pass a sign, pulled up and tossed to one side, warning people not to enter, by order of British Rail Transport Police.

The emptiness of the viaduct grades into a bramble and broom thicket where the old railway line used to be, then the conifers close in.

After the Second World War this landscape began to change as commercial scale conifer forests were planted across the hill land. In the 1970's and 1980's, with tax incentives available, the Galloway southern uplands became one of the most afforested places in Britain.

There were protests, action groups, and arson attacks on private forestry company premises, with little results. More land went under trees. The look of the landscape, the loss of old ways of working, these were obvious differences, but that was not the only change that was happening.

I emerge from the brambles and broom onto a cleared and carefully made up road. The railway line becomes an official track again, maintained by the Forestry Commission who use it as a haulage route. Heavy timber lorries, avoiding the viaduct, take a new low road, down off the railway and under the arches.

The conifers flank me as I walk, thirty or forty foot high? I am not sure, but so dense that I can see nothing but the way ahead. There is a forestry ride, a split in the trees, like curtains not quite pulled shut. I explore it briefly, and find a view across to Cairnsmore and Meikle Mulltaggart. But between me and their hill tops is a green sea filling what used to be Meikle Cullendoch Moss. Planting on peat moss was the final indignity for this land. Peat moss habitat was already becoming increasingly rare, due to drainage and changes to agricultural land. Forestry ate up the remaining areas. Even if the bog was not planted, the drainage was increased and the surface dried out, the peat itself beginning to decay.

Back on the track a pack of tic-tacs in my rucksack begins to rattle like a mini maraca. As there is little else to grab my attention I concentrate on walking stiffly, shoulders back, arms straight, to prevent the noise. No matter how carefully I walk, there is enough of a sway for the tic-tac's to respond. Suddenly self-conscious of my strange gait and hoping that those visitors in the car park are not around to spot me, I stop and reposition the mints.

With my maraca silent, the railway line is very quiet. I can hear the wind in the conifers, but no wildlife. This is the land of golden eagles and red deer, of grouse and hen harrier, of mountain hare turning white in winter. Since the raven I have heard and seen nothing. Conifer plantations have erased their habitat and replaced it with something much less diverse. A monoculture.

I see the forestry loader before I hear it. It is about a mile away across a cropped area and the sound that comes to me is muted, the wind is at my back and taking the noise away. Beside a bank of felled and stripped conifers a grab is lifting individual trunks onto the back of a haulage wagon. I hear the haulage wagon start up, sound its horn as it leaves the loading area, and I feel a small tremor of fear as I am reminded of a childhood terror. We lived close to an old railway line that Beeching closed, but even in the very early seventies the sleepers and rails of the old track remained. It was a favourite place for a family ramble, but as we walked I always kept a regular look out behind me, in case, despite all the reassurance, a train was coming. This unease remains with me whenever I walk along an old railway line way and even the lovely memories of my dad wafting me, upside down, through the heads of the soft and tickly wavy hair grass that grew beside the track cannot shift that unease. A couple of hundred yards back I had passed the junction of the route from the haulage area to this railway track. The wagon could go back along the way I had come and turn off and go under the viaduct, or it could come this way. I watched the articulated lorry pull out and turn its blunt, big face towards me, its unblinking eyes spotted me. I scurried along to an area where I could stand well back and waited for it to pass me. I give it plenty of time to be well of it's journey before I continue on towards the Little Water of Fleet.

The Little Water of Fleet is close by now, but the track takes a sharp bend and sweeps round to a new bridge. I continue to trace the old

railway track, but its bridge has been dismantled and I walk cautiously down the slope to the river at the bottom.

This river has no fish, but it is difficult to see why this is so. The water is crystal clear, plentiful, it flows vigorously in a long strand, mercury grey against the deep green of the conifer plantation. Large boulders divide and direct the flow, smaller boulders carry a carapace of water. An edge of purple moor grass, turning its autumn bronze colour that reminds me of irn-bru, is dripping insects in as food. If you were a fish, this must meet all of your needs.

I wanted to do this walk along the railway line from the Big Water of Fleet viaduct to the Little Water of Fleet crossing because it would allow me to visit two of the most polluted waters in Dumfries and Galloway. Polluted enough for there to be a total absence of fish. But this pollution event did not happen suddenly, like the milk entering the burn. It happened slowly and invidiously over many years in the form of acidification.

Acidification is caused by airborne pollution from fossil fuel power stations and other industrial processes, carried hundreds or even thousands of miles on the prevailing wind. Dumfries and Galloway receives pollution from the rest of Britain, Ireland and Europe, while ours goes to Scandinavia. Galloway, with its high rainfall is especially vulnerable to the pollutants being washed down through the atmosphere in the rain droplets. You cannot see it. Here in the uplands the air is not murky with soot from chimneys, there is no pea-soup smog to let you know something is wrong. You had to look down, towards the rivers and burns to understand the full scale of the problem.

I dip my hand into the bitingly cold water, nothing happens, it is not so acid as to burn, monitoring puts the pH at around five. This is toxic to the small invertebrates that live in the water, but the problem is more

than one of no insects. There are no mayflies here, they are far too sensitive. But, because of the seriousness of the pollution, most other aquatic invertebrates are absent too. As soil pH and alkalinity decline, aluminium cations are released into the run off and aluminium salts tend to be poisonous to fish eggs and young fish. The long term result is that fish populations die out. With fewer invertebrates, there is not enough food for dippers; otters do not visit as there are no fish to eat and slowly and inevitably the river becomes nothing more than a channel of water.

It's difficult not to blame the conifers. It's not their fault, but they made the situation much worse. In my scientific reports I refer the conifers as scavengers – this is an accepted scientific description to the role of these trees. Scavenger implies an active role, as if the trees hunt out the pollutant. It is more passive than that. The pollutants stick to the conifer needles as the wind, low cloud or mist is filtered through the trees and then it is washed off in the rain. Conifers are ever-green, which means that this process can continue all year round. Galloway has lots of trees and lots of weather, lots of potential acid rain and it is this combination that contributes to, and exacerbates, the acidification of water bodies.

Now, we know so much more about acidification of the water environment. We know about the link with forestry. Monitoring shows that airborne pollution is greatly reduced, so all of this is grounds for optimism. The felling provides an opportunity to redesign the next forest rotation to include mitigation, such as restocking well back from any water course and occasionally (and to my knowledge in this area it has happened only once) not replanting at all.

There is one final snag: biological recovery time. The problem appeared slowly, improvement is happening equally slowly with some water bodies predicted as taking anything up to fifty years to recover. After

pollution incidents, rivers tend to repopulate from an up stream source as fish and invertebrate drift down stream. In a healthy river system with a long, productive upstream section, recovery of the less sensitive species could happen within a couple of seasons. Acidified water bodies tend to be in the uplands, where rainfall is greatest and the land less valuable to agriculture, so has been turned over to conifers. There is little or nothing upstream of these sections to help with the repopulation. Also, some of the toxic elements may be persistent.

Standing on the new bridge over the Little Water of Fleet (and keeping an ear open for haulage wagons) none of this is apparent. It is an idyllic scene, a river, sun light, the sky above, a parapet where I can perch with my cup of tea and sandwich. A slight tiredness in my legs that proves that I have been doing some physical work, rather than sitting all afternoon at my desk. Even the conifers have a beauty as they hold out branches in delicate ballerina curves. I repack my flask, swing the rucksack onto my back and the tic-tac maraca starts up again. It would have been convenient if the trains still ran and I could take the next train back. It might also have helped with the acid rain. The air pollution from fossil fuel power stations may be reducing, but pollution from cars is increasing. We may be replacing one problem with another.

Exuviae

Inner form cast

to the air,

this is the river

dried, remembered.

Caudal filaments

tarsal claw

Gills.

Grave-goods

for the next life.

Representative sample

That slight distortion
as light shifts
between air and water.
Then, into the clear
see-through stream.
Collection
labelled.

No shape of its own
water follows the contours
of the container. Compliant.

A shallow tray
of invertebrates beneath
the magnifier
gives sudden
mythical views of hands.

Changing landscapes

1 Leaving

Can't remember the last time
he locked the door
and his hand trembled
so that the keys chattered.

Look down,
look at your feet,
watch the flag stones,
then the dirty concrete of the yard,
then the shadow of the barn,
then the car.

Except that the land will not be quiet,
even without the stock,
it whistles, the wind
through the mouth of the glen, it calls him.
Hefts him into this place.

He heaves himself into the car,
house keys sitting on the passenger seat,
engine noise and the smell of collie,
sunlight catching at mud on the windscreen.

2 Planting

A single man
with a hessian sack
carrying change on his back
and resin stains on his hands.
Where ever the hill held up the land
to dry, he planted spruce.
On the in-bye, he planted larch
and around the house he planted silence.

3 Growing

These walls always stood for something.
marking time around and over the hill,
used to the wind
and the sheep that lay
along the length
and rubbed off the lichen
into their fleece.
These walls were built strong.
Even the wreakers could not tumble
these wall are sad relics
picked bare of their meaning
by wind and time
and the slow patience growing

of the trees.

4 Closed canopy

The map promises features
I should be able to read
creases in the land
like the folds of your palm.
This is the life line of an in-bye boundary
and the desire line to the water trough.
The moraine of past landscape on our right,
the truthfulness of a burn following the contours.
Its intuitive too, this must be where hares lie still
waiting for fate to send them zig-zagging away.
This is where the shadows lie longest, snow deepest.
This is what is lost
        under a glove of green

5 Water loss

Clear water,
tempting to cure the heat
of summer caught here
inside the forest boundary.
Walking boots abandoned
and feet slipped under the surface

cold water, curved, rounded pebbles,

flow shifting downstream,

silt sifted by movement.

A few moments here

of little consequence.

Catching our breath,

then moving on.

The stream gathering in

the whispers of our conversations,

soaking up the atmosphere.

Emptiness left

when we travel on.

Section 10: Conclusions

The critical investigations in this thesis examine the robustness of the scientific content within selected ecopoems and how it aids the communication of environmental threat.

My findings reveal that these poems exhibit varying degrees of ecological knowledge which means that some of them can be challenged on their accuracy when read from a scientific point of view.

As Colin Simm's poem shows, the science does not have to be explicit, nor the poem peppered with scientific terms. His is a poem that is steeped in the language and spirit of the locality, while holding true to complex scientific processes. As a reader you may not realise it, but you have been beaten over the head with a very large stick made of hydromorphological concepts. They are all there in his observations – the clearing of the willows to speed the water on, the gripping of the uplands to drain the land, the consequential flooding.

Ted Hughes uses science much more explicitly. He does not hide it from the reader, and its inclusion does not diminish the quality of his poem. It is an example of a confident and scientifically informed poet using science as a poetic tool to achieve his aim to raise awareness in the reader.

Of the two approaches (explicit or not explicit use of science) it is the Colin Simms' poem that I admire most for the way it sets out, concisely and compassionately, the issues still present in catchment management today. It challenges the management practices, while appearing only to describe them – using phrases such as 'husbandman's love'(line 2) to give the impression that the draining of the fields is being done to care for the land, while leading the reader to the eventual consequence of

the flooding. It is a poem that demonstrates that an ecopoem can incorporate sound science without it being obvious.

The *Wild Reckoning* anthology included collaborations between poets and scientist with the aim of combining the science and the art into 'one pen of lyricism and observations' (p.20). However, the resulting poems often swerve away from the pure science concept, as demonstrated by the poem developed by Allison Funk and the comments made by Paul Farley. This strengthens the arguments set out by Thomashow (2005) and others, that the observer should see the immediate view and understand the wider setting in order to develop a more informed connection with their surroundings. The outcomes of the collaborations in *Wild Reckoning* are set by the poet – the scientist merely provides inspirational material, then steps away. The scientific information was source material, rather than being an equal partner in the creative practice within the poet's imagination.

It is the Brendan Kennelly poem 'Milk' that poses the greatest number of questions for my hypothesis. If I applied my critique criteria strictly, this poem would fail the accuracy test, due to the ambiguity around the nature of the pollution (is it poisoned or *poisonous* whey?). But, the subsequent description of the pollution is both accurate and illuminating. The poem has such heart and connection with the river and the people alongside it that to dismiss it would be counter to the underlying aim of this thesis: to explore ways of communicating complex environmental pressures acting on the water environment today.

My scientific concern is that the reader has been misinformed. This is not a criticism I can apply to the other critiqued poems. I propose that the incorrect Latin name spotted in the poem by Alastair Reid is either deliberate or a printing typo. Either way, it is not misleading.

However, I accept that the validity of Brendan Kennelly's poem remains, due to the quality of the work and the subsequent imagery.

Poetry has the final vote over science in the ecopoem analysis. Considering the science within the poem is only one way of engaging in ecocriticism. Including science is not a prerequisite for an ecopoem.

However, my conclusion is that accumulated ecological knowledge, such as that acquired by Ted Hughes and Colin Simms, gives the writer a greater repertoire to draw on in that unfathomable machine of the unconscious. The outcome is a more nuanced, informed reflection of the environmental issue.

My research of water-themed ecopoetry produced one final observation: not all the environmental pressures are considered. The selected poems all tended to respond to a clearly visual issue, dead freshwater pearl mussel, dead fish, flooding. There is a tendency to focus on the pastoral – the issues linked to the countryside of fields and moors.

There are some issues that are just as pressing, but not as obvious. Groundwater, for example, which is under threat from pollution and over-exploitation.

Another of the most significant pressures on the water environment today is access to clean water and sanitation. The World Health Organisation state that more than 3.4 million people die each year from water, sanitation and hygiene-related causes.[29] Here in Britain, we expect our water to be clean. However, this year (2014) two bathing water beaches in Scotland failed to meet the required minimum hygiene

[29] World Health Organisation, *World Water Day Report, 2001,* available at: www.who.int/water_sanitation_health/takingcharge.html (accessed 21/11/2014).

standard set by Europe, and 55% failed to meet the higher Guideline standard due to levels of bacteria relating to sewage.[30]

Sewage works are essentially an urban feature of our water-related pressures. It is not part of our natural landscape. In my wider reading, I found instances where the urban world enters the aquatic environment, such as the shopping trolley in the river, but rarely about the pollution pressures on the urban water landscape, such as the presence of oil, petrol and tyre particulates in the water from road run-off and also detergents from car washes, specific industrial chemicals and dyes, discharges from contaminated sites.

Ecopoetry is about making connections with our natural world – but that is not necessarily the source of the threats to our environment. River pollution can begin inside our homes and travel with us on our roads, before it reaches the waterside. A greater understanding of all of these links would increase the range of poetic subjects. It would bring us closer to the original meaning of 'eco' – from the Greek *oikos* – meaning house or dwelling – we should study the impact of our own homes alongside the wild dwellings.

[30] SEPA, *Bathing Waters Report* 2014, available at: www.sepa.org.uk/water/bathing_waters.aspx (accessed 21/11/2014).

Section 11: My writing practice

When I began to develop my own portfolio of writing, I wanted to weave my scientific knowledge into my writing, as a deliberate act. I could have done this by sitting at my desk, the information was already in my head, I just needed time for the creative process to work. But, I endorse the comments made by Burnside and Thomashow. It seemed entirely contrary to the ethos of this thesis not to undertake some kind of engagement with a wild place as part of the creative process. So, I went for a walk.

I walked in order to be able to feed both my imagination and my curiosity. The walk provided me with the luxury of time to allow these two key motivations to work together. I looked carefully at that day's landscape, my experience influenced by the immediacy of the weather as well as my reading of the longer term management impacts. I thought about how the site might appear to someone seeing it for the first time, what is striking about this view, what clues are there to help with its interpretation? I wrote only short, simple sentences or phrases while in the field, but these notes became vital when I began to formally construct the essays and poems.

The decision on where to walk flowed naturally from the critique of the poems. After the analysis I reflected on what interested me in that piece of writing. Unexpectedly, this became semi-autobiographical. I have lived and worked in the same area for nearly 25 years, spent a lot of that time doing field work. During the analysis of the poems I considered species I had never seen, such as the freshwater pearl mussels, and issues that had been my constant companion, such as acid rain.

The site visits became fundamental to my creative process. What was most interesting for me was that I went with a clear intention to study something, but was often led astray by the immediacy of what happened during the visit. So, I never saw the discharge from the collection towers at Airds Point due to my poor choice of route and the dismal, grey weather.

Once in a place, I could not separate myself from it. The landscape held the present and the past in each view, both ecologically and personally. I have no ownership of this land, not even origins – my beginnings are much farther south. All I have here is the accumulated layers of time, walks, reports, meetings and dreams. The lyrical essay gave me an opportunity to explore all of the versions of myself. I did not need to think about including the science, it was already there.

The poetry came after the visit so that it could 'bud off' from that writing. I expected it to be a condensed version, but more often the poems drew on small, individual ideas or images or memories so they did not necessarily cover the same territory. As a consequence, the poems became less immediate and more reflective. Inevitably, the more I drew on my experiences, the more autobiographical they became. At the same time, these autobiographical poems tended to use fewer scientific references, being more observational on my relationship to the environment. I worried that they were less rigorous ecopoems, using my own critique criteria. In the poem 'Cleaning the yard' there is no obvious scientific references, but they had been in my mind when I thought about the dust and dirt we had brushed up from the floor – it is these light dry particles that carry pollutants and they appear in the next poem I constructed: 'Dust'. The sequence of these poems is important. 'Cleaning the yard' demonstrates our ignorance of possible soil contamination.

I tried to look at the writing process as a series of experiments, using different strengths and mixtures of science and poetry. In truth, the process was more organic than the intended prescriptive methodology, responding to the immediate location and the memories in unexpected ways. The idea for the poem 'Lore Burn' came to me during the walk along the embankments of the Nith. I remembered a discussion I had with a colleague while inspecting the Combined Storm Overflow flap in the walls of the Nith. Such an unpromising beginning. One lunch time I walked the route the Lore Burn probably took before it was entirely culverted over. Its discharge point now is right next to the sewer and it is not easy to distinguish between the foul water outlet and the clean. The poem emerged quickly from that short, brisk walk. I also deliberately wrote about the embankments, but that poem (Nith embankments) felt less satisfying to construct – it felt forced, compared to the 'Lore Burn'.

Some issues were easier than others. The diffuse pollution poems: small, microexperiences that accumulate to show the impact of agricultural management, emerged quickly and easily. The long, slow development of acid rain and the loss of fish stocks fitted neatly into the longer format of the changing landscapes poem. Missing the discharge at Airds Point brought on 'writer's block' for the point source poems.

I was not trying to write better ecopoetry than the anthologised poems – I can hardly set myself up against Ted Hughes. I wanted to see how my writing developed and how my approach to writing about the environmental issue changed between formats. I found no clear distinction – the longer 'Changing Landscapes' poem has the feel of a lyrical essay, 'Above and Beneath the River Clyde' describes my work as well as any job description. The shorter, diffuse pollution poems

provided the ideal format for considering that issue. The lyrical essay gave me the opportunity for longer, discursive pieces.

I also knew that if I included a section on gaps – on important water issues that poets are not tackling, then I probably had to answer this creatively. It was tempting to leave out the discussion on gaps in the conclusion. No one would ever have known and I could have saved myself the walk described in the final section – Water into Words.

This final section is a mismatch of poems that did not fit neatly into the themes of diffuse pollution, point source, morphology and monitoring. Some of these are real experiments – how far can I push the water/science/poem theme. They all try to provide the reader with an insight into our vital and valuable water environment.

Words into Water

It is 26 degrees in the shade and the site rules state that we must wear hard hats, high vis jackets, safety boots and gloves. I don't mind, the more layers I have between me and this place the better. I am about to enter Lincluden Sewage Treatment Works, which receives the effluent from most of North West Dumfries.

We walk round the site in an anti-clockwise direction, past the coarse screening, the storm overflow, the solid separator, the anaerobic drip tanks and then to the final effluent outfall. It is revolting, not as smelly as I expected, but the oily, grey water coming into the site is flecked with toilet paper and the small skip containing the material sieved out by the coarse screening is full of unmentionable items. All the time I hold my breath, because of what I *might* smell.

There is a pleasing symmetry to the tanks taking the effluent, the boom sweeping steadily round and round, trickling the liquid over the gravel. It is a quiet place, with only slow, gentle sounds of water sinking through stones. We follow carefully manicured paths, as if we are walking in a small, local park. I half expect to see interpretation boards or signposts, but there are no identifying marks, the process hidden away. We locked the gates behind us, as we entered. We lock them again, carefully, when we leave.

It is an amazing place.

No one writes poems about sewage works.

After a visit to the place, I am not going to be the first to start.

But it is a vitally important subject – managing our waste takes up a lot of time, money and effort. It is also a huge success story. In this

country we no longer worry about cholera. We never expect to see raw sewage anywhere along our rivers, lochs or coasts.

Yet, as more houses are built, the capacity of the water to take the final effluent is challenged so either the treatment needs to improve even further or house building needs to move to sites beside better quality rivers which have the capacity to take the discharge, due to the good state of their water – they have room to absorb the discharges, for that standard to drop a little, yet still be able to support aquatic life.

As a final check, we walk around the outside of the fence to the discharge point on the river bank. All appears well. There is no visual staining to the river's colour.

It is the river's apparent continuous flow that makes us complacent. We discharge here and, within minutes it is gone, away downstream. Always, there is more water running – never-ending, we do not have to think of it as a finite resource.

That evening, after work, I walk alongside the river's edge. The flat, quiet surface is deceptive. I notice it is carrying my image, my reflection. What other wild place can show us ourselves so clearly?

From Buccleuch Street Bridge

The river's doing that dual-state thing again,
the surface stationary – my reflection lies across it,
the water running through me.
We are both solid and wave form,
moving swiftly and marking time.

I wonder if the weight of my image
in any way interferes with the flow,
displaces my own volume as if I were freight
and carries a trace of me
downstream beneath the bridge.
Mixing with the cargo
of others who pause here.

The loch

I ferry us out to the centre,
Let us drift. We trail our hands
in the cold, clear water
until they are almost not our own.

Sort through the noises,
wind and cars, waves and children,
and haul them into our boat.
Watch for fish beneath us
and speculate.

I ferry us back
to the reed-ringed edge
tie the boat to the land again
and watch for your backward glance
that slips into the loch
like an anchor.

Above and beneath the river Clyde

Each morning he prepares to submerge himself,
like water poring down the plug hole,
into the underground. He checks tickets,
watches the machine swallow and spit,
hears the distant roar, like a waterfall,
of another train going through, he feels
the plunge-push of the air that rushes, afraid,
before it, like a hot breath on his neck.

Above him, she sits and slices rivers into sections,
a surgeon's scalpel could make no cleaner cut,
such precision,
to carve a living thing without leaching a trace of blood.

He dreams all through the morning rush hour
of lost rivers, culverted, laid to rest on concrete beds.
He remembers the way the light played on the standing wave,
the sudden turn to glistening smoothness.
The bald, wet boulder splicing the meniscus.
The possibility of depth.

She uncouples the river from its name-stem

so that it once again becomes a maiden -
the burn, the beck that it once was in childhood.
And pulls its family tree into a straight, taut line.

He can reach out and touch his walls,
bound up in the booth on this station,
his banks are horseshoe shaped,
a brief tow-path of a platform,
the barge and crush of commuters,
the swallow and spit of the ticket machine.
But he knows where the rain runs
in thin rivulets down the green tiles
and pools.

She has her imaginary rivers
classified till they lie pinned out
across her page, no more than dry ink
waiting rehydration.

They walk home on opposite banks, always
the river between them,
their thoughts emerging like mayflies.

Sand Martins

This being official
we talk of Hirundine
as a collective noun.
Dipping into the language
for clarification.
Standing with our backs
to sand martins fletching the air,
tilting their wings into unseen currents.

Folding away the planning report
along regular crease lines,
words inwards, I borrow time.
Shelter under the paperwork and policies
as sand martins strafe the boundary
the developer carefully marked out in red.

Groundwater

The rain sinks,

through

cracks and gaps,

separates out

into miniature braids

spreading out into nothingness.

Finding a way through,

dropping down

level by level.

There is no base layer

but an impossibility of depth.

No reservoir,

but the weight of accumulations.

No undercurrent,

but the pull of gravity.

No sound,

but the echo over overuse.

The selkie standings

Unprecedented,
almost guaranteed,
they will emerge from long moon shadows,
water thinning to a translucent shawl around the shoulder,
willing themselves up the beach, with dolphin-like suggestion.
Ambiguity of shape changing to reveal a sharp footprint in wet sand.
And there they are, beguiling, nude,
wishbone ribcages and limpet-sharp vertebrae.
Scuffling about in the strand line.
A line of them on the pavement walking towards the bins.
The fish and chip shop has taken
to throwing out scraps, batter crumbs
lifted from the pavement, like sherbet on wet fingers.
Their flesh already salted.
The foxes give ground, the gulls concede.
Seal skins wither on sea-buckthorn branches.
The sea emptied. Everyone is leaving
disappointed.

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