Everard, M. (2015). Investing in Our rivers. *Waterlog*, **93 (Autumn 2015)**, pp.29-33.

Investing in our rivers

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I have the financial acumen of a ferret. However, even I understand that, if I keep draining money from my bank account without paying attention to the state of my capital, bad things will happen.

The analogy with our precious rivers, still water and seas is direct.

We enjoy fishing them and spending time with their other wildlife and enriching qualities. But do we invest adequately to maintain their capital? Or do we assume it is inexhaustible?

The population of the world has virtually tripled in my lifetime, that of the UK increasing by around 20% also including a greater proportion of ageing people (like me and, I suspect, many other *Waterlog* readers). That means many additional feet treading common landscapes, extra housing and infrastructure, more employment and places to do it, greater extraction of water and other resources, increasing habitat conversion for the production of food and other commodities, and proportionate generation of liquid, solid and gaseous wastes. I could go on and on, even substantiating these trends with statistics, but the point is made that nature is under intensifying pressure.

Our waters and the catchments that influence them are shaped profoundly by what we teeming, pervasive and acquisitive bipeds do; reciprocally, they are also amongst the most important assets within the wealth of irreplaceable natural capital supporting human needs ranging from life-affirming and economic activities to our most basic biophysical requirements. Nature is ultimately the foundational capital we depend upon to underwrite our potential to enjoy a secure future and fulfilled lives.

The natural world is also a capital in which we have serially failed to invest and to adequately monitor, too often implicitly assuming that it can't be depleted or even run dry. We may feel acute consequences where fish become less abundant and the surroundings in which we pursue them become less rich and relaxing. But how often do we question exactly why the returns we draw from undervalued natural capital are in apparent decline?

In the face of the rising demands of a booming human population and an increasing global proportion of middle class lifestyles, compounded by climatic instability, this economic analogy of the declining supportive capacities of natural capital extrapolates to a frightening prognosis for humanity. I could point to major international and national studies substantiating this reality, and also to a swathe of high-level agreements and commitments to take proportionate and urgent action. I could also highlight inspiring examples of successes achieved in reversing cycles of linked social and environmental degradation, such as in one of my research areas in the desert edge of Rajasthan, India, where people have taken a positive approach to management of the natural systems that support them as a means to secure a future that is more dependable and richer in opportunities, and where fish have naturally repopulated formerly dry but now regenerated water bodies. Regrettably, I could highlight very many more examples of serial political failings to honour

bold rhetoric with anything like meaningful action or challenges to the myopic status quo, whilst all the while the world around us shrinks in capacity to provide a safe and enriching future for burgeoning humanity. In the face of these steep declines, we could wail and gnash our teeth, but this is no substitute for getting off our backsides and doing what is within our personal spheres of influence. So let's concentrate on results we can practically achieve.

Let's, in fact, start by looking a little closer to home: to the rivers, pools, lakes, coasts, estuaries, duck ponds and streams that add so much to our lives. They undoubtedly need our help, and will in return be better able to enrich us if we do what is right by them.

Some of the pressures facing our beloved waters – pollution, excessive abstraction, direct damage from major developments and so forth – are things that anglers can and have been able to spot and elevate to public attention through our role as 'eyes and ears on the bank', and also via organisations such as Fish Legal acting on our collective behalf. We also have influence on other pressures, such as controlling the spread of invasive species and diseases through basic biosecurity measures. But sympathetic management of river habitat is a factor over which we potentially have much more direct control. So it is important that we understand how fish use rivers, and what we can do to help them. Without that basic knowledge, it is all too easy for angling working parties, with all the best intentions and no little enthusiasm, to do rather more harm than good to a fishery. Regrettably, I have over several decades seen too many well-intentioned working parties focus almost exclusively on angler access rather than the needs of fish; sure, you can get a float, fly or lure to travel without impedance down a swim, but there just may not be any fish there to intercept it!

Fish use rivers in a diversity of ways to support their needs from egg to juvenile to adult. These break down into three principal biological areas: reproduction, refuge and feeding.

Reproductive habitat includes that supporting spawning and nursery needs. Some fish species, such as barbel, chub, grayling, trout and dace, spawn at different times of the year on or in gravels with an open structure. Their eggs are buried or fall into open spaces in the gravel, affording them some protection. However, all are vulnerable to excessive silt which can block pores in the gravel bed robbing it of oxygen to the detriment of the eggs. Other fish such as roach, common and silver bream, and pike spawn on vegetation, which can include submerged water plants as well as the underwater shoots of emergent plants or tree roots, and they are likely to do so preferentially adjacent to rapidly warming, shallow waters. Other species, such as perch and zander, lay sticky eggs on hard submerged surfaces that may include tree boughs or roots, rocks or woody debris. Sufficient spawning habitat to meet the requirements of all species in the fishery is essential, but so too is adjacent nursery habitat for emerging juveniles. In general, fish fry in their first free-swimming stage are barely the size of a human eyelash, so these tiny fish need to be able to passively drift from spawning areas into slack margins rich in microscopic food items. The ideal nursery area is shallow, rich in small food items and warms rapidly during summer days enabling juvenile fish to grow rapidly such that they are equipped to withstand autumnal and winter spates. Where nursery habitat is sparse, as also after cold summers where insufficient warmth and food items are available throughout the first growing season, whole year classes of fish can be lost to the population.

Adequate refuge habitat is also essential not only enabling all life stages of fish, from fry to adult, to evade their predators but also to seek shelter from strong flows and other threats. This is critical for

early life stages, as even gentle flows can sweep tiny larval fish with undeveloped muscles and fins out of the river. But, right throughout life, the need to evade spates and also predatory fish, birds and mammals can be met by tangles of tree branches, roots and other plants in river margins, woody debris and vegetation in the channel, and drop-offs in bed depth. Marginal slacks, tributary streams and drains, backwaters or other off-stream refuges can also service the refuge needs of fish. Where a diversity of refuge habitat is lacking this can, and often does in over-managed river channels or those with margins damaged by intensive farming, present a significant bottleneck to the regeneration, health and balance of fish populations.

Habitat diversity is also important for providing adequate food for various species in a mixed fishery, the diets of which can range from predation to herbivory and omnivory between species, across life stages and even in different seasons. A variety of habitats providing a range of food items appropriate to the diet and sizes of all fish species, from newly free-swimming fry to adult specimens and all sizes between, is essential for a balanced and healthy fishery.

Armed with this knowledge, we can redirect our efforts to not only enhance the prospects of fish, but also the wider ecosystems of which they are integral. But first we have to translate it to the specifics of the places we fish and manage. So the first thing that any working party should do is to walk the banks, leaving the saws and secateurs behind, looking and recording the wealth of habitats and other natural assets that characterise the water and which are essential for the life cycles of all of the species of fish that are not merely desirable angling targets but also part of the ecosystems that support them.

What do we have in our reach of river that is good and should be protected? For example, branches dipping into the surface or the roots of trees growing out underwater may inhibit the passage of a float. However, these habitats can serve as important habitats for spawning, refuge and feeding. They may also create eddies in their lee, the slacker flows serving additional protective and supportive functions. Taking a step back to look at the river with different eyes, focusing on what the diverse life stages of the different fish species present in the stretch require to thrive, will identify important elements of the natural capital of river habitat.

This observant and reflective approach, best done with a team of people who will see different things and can better interact to recognise the disparate needs of fishes throughout life, is also invaluable for identifying potential bottlenecks to the survival and growth of all of the fish species that contribute to a balanced and healthy fishery. From this perspective, you are then best informed about can be done to address what is lacking, for example in a cattle-trampled reach that may be deficient in well-flushed spawning gravels and refuge from predation.

Amongst the most useful and immediately effective tools in the armoury of the fishery or river ecosystem manager is the buffer zone. A buffer zone is basically either a fence separating stock from the bank, be that simple barbed wire or a more elaborate and attractive fence with gates for management and angler access, or an untilled zone between an arable crop and the water's edge. In the absence of stock trampling, riparian and marginal river habitat naturally regenerates rapidly as recovering vegetation offers spawning, nursery, feeding and refuge habitat. As vegetation encroaches, it also narrows the channel width to create a mosaic of fast and slow flows that can scour river beds exposing spawning and feeding gravels whilst also offering adjacent slacks that warm rapidly as ideal fish nurseries and refuges. Fencing and untilled marginal strips also stabilise

banks, reduce diffuse pollution from adjacent farmland and roads, and allow habitat naturally to diversify for the good of fish, other wildlife and the beauty of the water. They can also offer easier, safer and cleaner access as anglers no longer have to wade through or stand in sticky marginal mud to reach the water.

Another useful river enhancement technique is the flow deflector. Ideally, these are formed from freshly-cut live willow that will root down and continue to grow. There therefore stabilise over time, putting out new roots and shoots to further diversify habitat that provides for the needs of all fish life stages and that of a great deal of other wildlife whilst also protecting river banks from erosion. Live deflectors can range in complexity from simply cutting part-way through the trunks of river-edge willows or alders close to ground level to 'hinge' or 'kneel' the still-living trees into the river edge, where they continue to grow putting down roots and trapping silt, to more elaborate structures dug and/or staked into the bank. Live woody deflectors serve to protect banks, trap silt, accelerate flows and scour at their tips whilst providing slacker and generally shallower marginal habitat within their boughs and roots and downstream in their lee.

There are many more simple techniques to enhance fish habitat. However, the important factor is that they are applied thoughtfully, and that they are targeted to bolster the breeding, feeding and refuge needs of fish. Importantly, it isn't about 'gardening' in and around the river to make it look neat and tidy or to maximise access; that's generally no good for the fish, nor the plants and animals on which they rely. It is about investing in the 'natural capital' of the fishery, in ways that can reward you richly through the 'interest repayments' of fish and fishing, wildlife encounters and wider enjoyment of the waterside.

An ecosystem-based approach to management of river habitat is not only good for fish. It is also generally excellent for the diversity of river and riparian life that makes for a healthy, resilient and attractive fishery. Furthermore, a focus on functional habitat can also help us make links, possibly even combining management efforts and levering in additional funds, from a wider network of interests such as nature conservation bodies and local councils. Even farming interests, often a major cause of problems due to trampling of river banks by cattle and tillage up to the river edge, can become keen partners in river improvements as management measures such as buffer zones can have major co-benefits for them in terms of decreasing hoof rot and other stock diseases with their associated veterinary bills, reducing stock 'straying' and drowning risk, substantially suppressing soil loss, and diminishing risks of losing subsidy payments through failure to adhere to good agricultural management practices. Importantly, a river system with regenerated habitat for reproduction, nursery, feeding and refuge will also be more resilient, better enabling fish populations to weather 'shocks' and stresses such as unseasonal spates and severe winters, over-abstraction and pollution, and the attentions of predators and invasive species.

My book, *River Habitats for Coarse Fish: How Fish Use Rivers and How we can Help Them* (Old Pond Publishing) provides an overview of how fish use rivers, habitat bottlenecks created in river systems changed radically relative to their natural condition by human development, and practical guidance about some things we can do to overcome limitations on thriving fish populations. I wrote the book in recognition of the need for this information, as I was constantly being asked if there was such a guide for coarse fish that are so often the 'Cinderella' as a focus for fishery and conservation management. I did so with two principal aims. Firstly, it is a practical guide offering knowledge and

advice in an accessible form for work parties and fishery owners about taking an ecosystem-based approach. Secondly, what is good for fish ecology has a wide range of co-benefits for nature conservation, aquatic ecology and the aesthetics of rivers as a whole, not to mention retaining floodwater to avert risks downstream, nutrient cycling and many more benefits besides arising from a more naturally functioning river. So I was keen to bring together different organisations, ten of whom have their logos on the publication: the Angling Trust/Fish Legal; the Rivers Trust; the Barbel Society; the Avon Roach Project; the Freshwater Biological Association; the Institute of Fisheries Management; the River Restoration Centre; the Wild Trout Trust; the Salmon and Trout Association; and the Wiltshire Wildlife Trust.

Notwithstanding my mustelid-like financial acumen, even I understand the need to invest in the rich natural capital of the fisheries I enjoy such that they will not become overdrawn, and can better reward us all through the interest payments of better and more enjoyable fishing. There are very big, epoch-defining battles to be fought to safeguard ecosystems right up to planetary scale if we are to secure decent continuing prospects for humanity. But in the everyday worlds we mainly inhabit and love, and over which we have at least some power, there is much we can do to protect and improve the prospects for the fisheries that add so richly to our life experiences.

Mark's book *River Habitats for Coarse Fish: How Fish Use Rivers and How We Can Help Them* is available from Old Pond Publishing

End of 'Investing in our rivers'