

# Trout 2010 – Engaged citizens participate in brook restoration<sup>i</sup>

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## Abstract

The recent decades have seen a remarkable improvement of watercourses` water chemistry. According to this an increase in e.g. fish species numbers occurred. Nevertheless, the riverine habitats are far from a natural status with habitat structure being the main theme to be focussed. Especially the smaller rivers and brooks, which comprise about 80 % of the watercourses stretches and where many of the nowadays Red List Species used to spawn suffer from constant deterioration. In many regions only the restoration of former vast gravel and boulder areas with pools and riffles will lead to a natural status. “Trout 2010” was started to centre the view to this majority of waters: the headwaters and the small brooks and rivers. Especially in urban areas there is a good chance to re-establish not only more natural habitats by specialists but also invite the public to participate in this process. Wandse Beck within the Free and Hanseatic City of Hamburg is an example, to be transported as best practice.

## Keywords

agenda 21; public participation; river restoration; trout; urban brooks

## INTRODUCTION

Watercourses and their surroundings play an important role in urban ecology. Nowadays they are not only seen as recreation areas for citizens but also as pathways and resting sites for fauna and flora. To serve these multiple purposes improvements have to take place, not only in reference to water quality but also to the structure of the waterside. These aspects are interesting themes for the public: Co-operation of schools, in adult education courses and active participation e.g. in ‘Bachpatenschaften’ (“adopt a brook“) can lead citizens of different ages to feel more familiar with their place of residence (Schumacher und Thiesmeier, 1991; FHH, 1992; White et al., 1993; Breuste *et al.*, 1998).

The total length of running waters in the Hamburg Borough of Wandsbek (14 755 ha, 400 000 inhabitants) is about 360 km. Up until the last few decades they have been corrected with most of them looking like straightened and deepened canals filled with mobile sand. In the past they have been named open rain water pipes in the urban surroundings. For the limnologist these stretches are headwaters in a landscape formed by the glacial ages characterised by a stable bottom of gravel and boulders, being thus salmonid biotopes with cold summer water. The bank vegetation normally consists of alder wood. Unfortunately the knowledge about the potential of species richness and natural fish production has been lost in most places. Most urban brooks, nowadays, are inhabited mainly by roach and perch with a few other fish species. This discrepancy reveals the amount of work needed to change today’s status to a more sustainable environment as is described in the European Water Framework Directive (e.g. EU, 2000; LAWA, 2001).

## ADOPT A STREAM (“BACHPATENSCHAFTEN”)

The willingness of citizens to lend a helping hand in stream restoration, led to the idea of Bachpatenschaften in the 1980s. Tasks of Bachpaten vary with personal interest and the condition

of the stretch of water. Removing artificial bank protection systems, planting trees, introducing gravel beds and current deflectors are examples of the wide variety of actions (FHH, 1992). Presentations of invertebrate life to other citizens are exciting efforts carried out, as well. In the Borough of Wandsbek more than 70 Bachpatenschaften exist (Tent, 1998a). More than 800 individuals from pupils to the elderly feel responsible for their 'brook on the doorstep'. Information exchange takes place during excursions, meetings and presentations, a journal transports general knowledge. Many of the active groups went into contests of newspapers, firms, NGOs and local politics and won more than one prize, as water/organism related themes are useful tools to multiply best practice and success. – Additional contacts have been established by several groups on a regional and an international scale using offers like "Schulen für eine lebendige Elbe", G.R.E.E.N. (Global Rivers Environmental Education Network) and G.L.O.B.E. (Global Learning and Observation to Benefit the Environment) which is documented in newspapers, journals and the internet, as well.

### TROUT 2010 – THE PROJECT

After several years of inducing turbulence and brooks' dynamics a vision arose to restore the characteristics of the salmonid region in one pilot brook, Wandse Beck (fig. 1), structures like pool-riffle-sequences and meandering of the watercourse being main goals: Trout 2010.

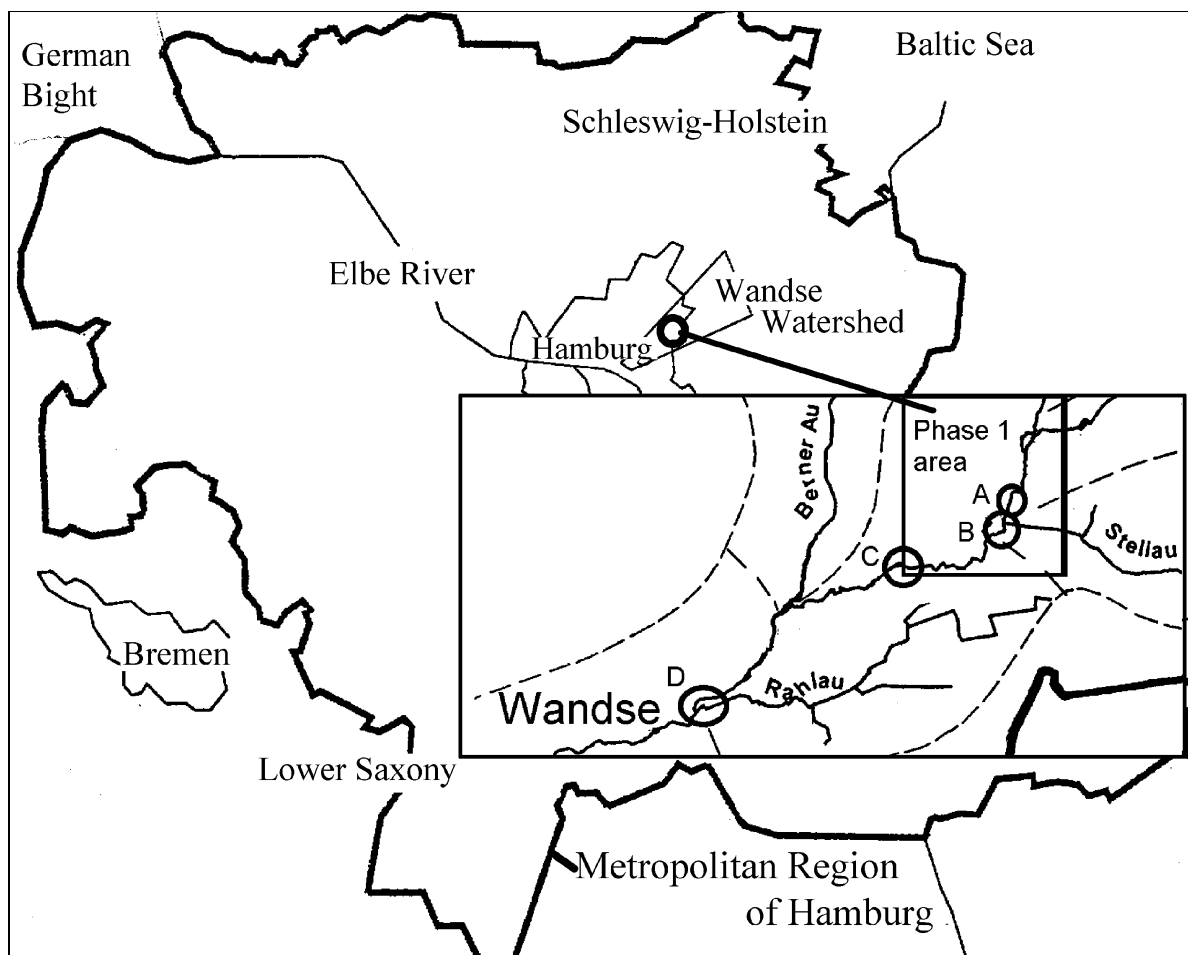


Figure 1: Wandse Beck, phase 1 area, within the Metropolregion Hamburg

First checks of chemical and physical data of the Wandse revealed that this is not a nonsense activity. Downstream a summer dry area (mainly in the Federal State of Schleswig-Holstein) a 3 km long stretch in Hamburg is dominated by summer cold water, a characteristic feature of the salmonid region of European brooks, before a row of park ponds disrupts the running waters course with resulting problems. Apart from aspects of the watercourse's temperature regime – warming up in summer and freezing during winter – here the sedimented mud releases too much nitrite into the water and thus possibly hinders the development of the salmonid fry by chronic toxicity (Tent, 2001). Experiments to breed brown trout eggs in the upper Wandse beck during two winters have shown that no principle problems are to be awaited. Both year classes have been identified by electro-fishing (fig. 2, data from ISCHUFI, 2000).

“Trout 2010“ solves necessary changes via co-operation of an NGO (BUND Hamburg), the engaged citizen groups, the „Umweltstiftung der Hamburgischen Electricitäts-Werke“ and the Wandsbek administration. Brown trout being but one key species.

The first phase (2000-2004) concentrates on the upper 3 km of the Wandse, downstream the summer dry stretch. This project area ends with the first stagnant water body “Am Pulverhof” in a row of park ponds following downstream to the rivers Alster and Elbe (Tent, 2001). Thus one main task for following project phases will be to re-establish the river continuum by by-passing these park ponds. Being part of a cultural heritage most of these former mill ponds will have to be preserved.

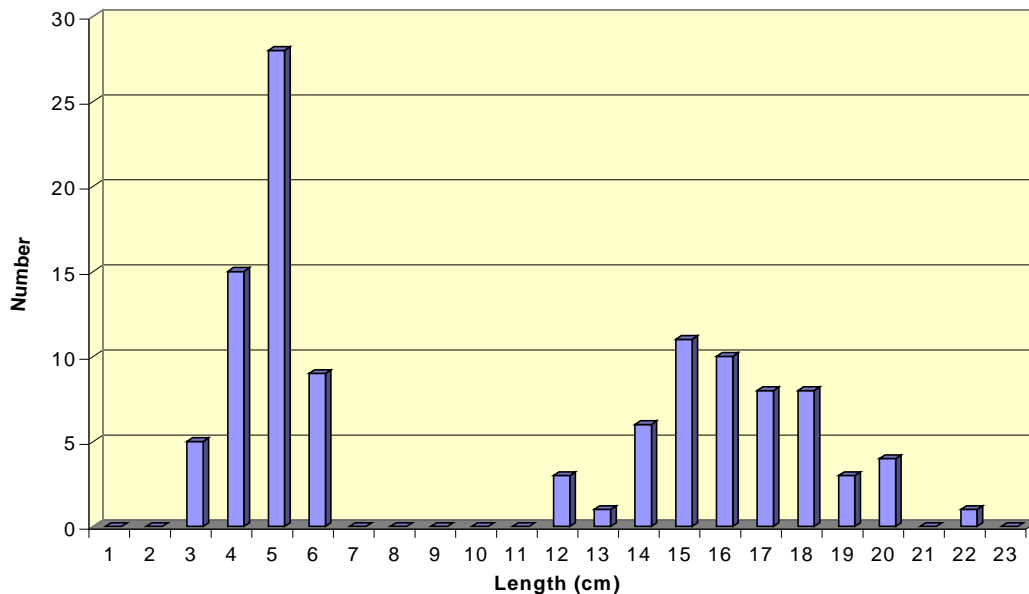


Figure 2: Size distribution of brown trout in Wandse Beck, autumn 2000 (n = 112)

### RESTRUCTURING A TROUT BROOK

Up to now the Wandsbek brooks are dominated by ubiquitous species like roach, perch and gudgeon (Wischmann und Tent, 1994). This is in accordance with findings from other worldwide, sandy and muddy urban waters (cf. Schulz und Meyer, 1995). Results of investigations in a rain water retention basin downstream project area 1 are represented in fig. 3.

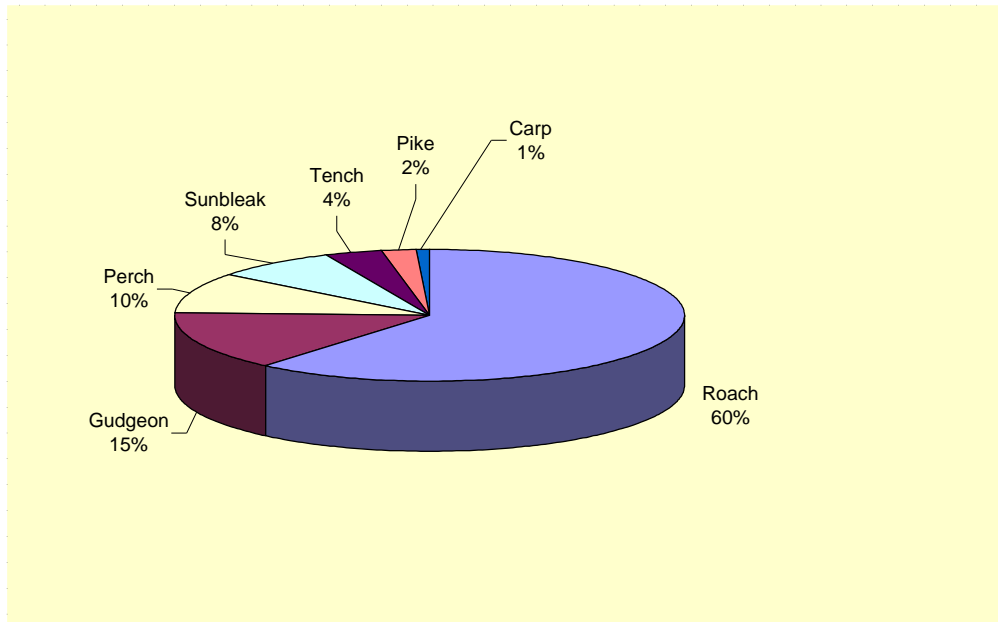


Figure 3: Fish species in rainwater retention basin “Am Pulverhof” (n = 1.036, 13 species)

Adopting international knowledge e.g. about which structures are typical for a vital brook (Madsen, 1995; Gunkel, 1996; Hansen and Madsen, 1997, 1998; Environment Agency, 1998; LAWA, 2000; Madsen und Tent, 2000; VA/SJA, 2000) the reintroduction of pools by inducing riverine dynamics through new riffles and gravel stretches (A and above in fig. 1), created by the Bachpaten, and the planting of alders will lead to the former rheotypic life, characteristic for brooks and small headwater rivers.

For brown trout, as one key species, it is of vital importance not only to fulfil the “ordinary” water quality objectives like clean water, oxygen, free passage and enough food, but also the demands for at least four life stages

- Riffles, well-aerated and free of sand so that the eggs develop to fry,
- shallow reaches with lots of shelter, e.g. overhanging vegetation along the shore line for fry,
- the same for parr, the young growing fish. Depending on the quality of the “private space”, e.g. numbers of bigger stones, up to 5-10 yearlings are produced by 1 m<sup>2</sup> river bottom.
- Bigger pools with tree roots and overhanging banks to protect the bigger fish, the spawners, who will start the circle again.

Fig. 4 shows the year 2000 aspect of the uppermost part of the Wandse Beck with the small amount of brown trout already bred in the river itself (see above, fish data of figs. 3 & 4 from ISCHUFI, 2000).

### **BIGGER CONSTRUCTION WORK**

As part of the first project phase a few weirs have to be altered to riffle stretches. This will be done by professionals. – As has been shown the administration directs it`s own construction works to a more natural shape, as well (Tent, 1998b). With the necessities for living headwaters in mind parallel to the project Trout 2010 different works have been carried out following the same goals. Within the project area a park pond has been reconstructed such that the Wandse beck now passes it unhindered (B in fig. 1). It is clearly to be seen that the brook now passes with transparent water during low and mean flow levels aside an algal green eutrophic pond.

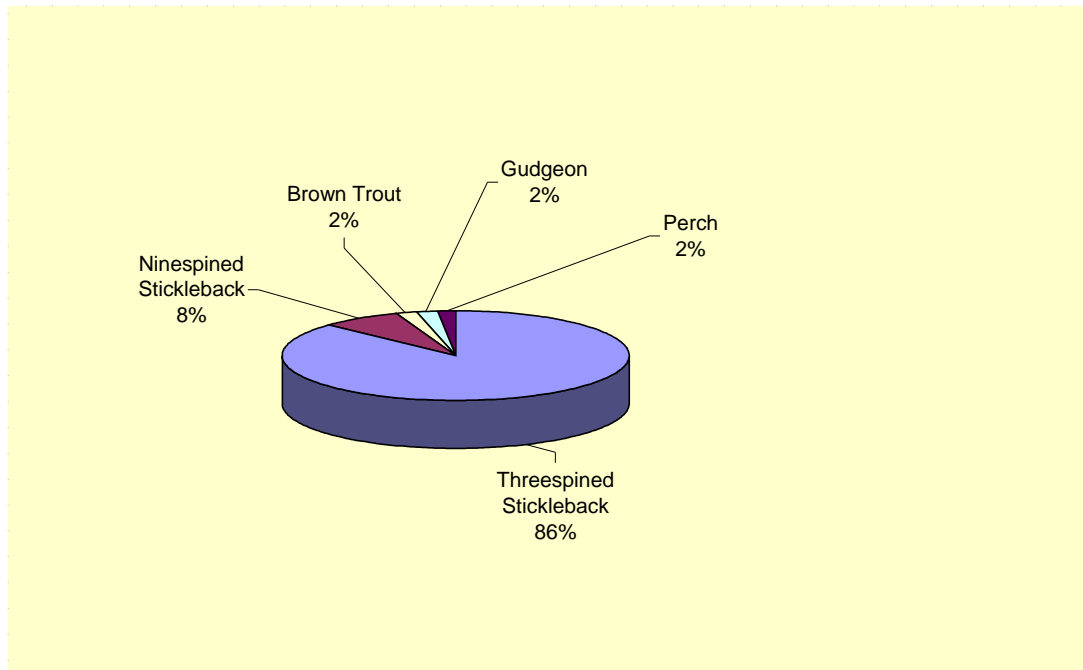


Figure 4: Fish species in project area 1, autumn 2000 (n =5.696, 10 species)

### THE PERCEPTION OF THE RIVER

After brook improvement work the documented species change from ubiquitous invertebrates to indicator organisms of lively running waters like mayflies and caddis flies (Reusch, 1995) is a real reward for the participating citizens. And it is not only an ecological but a socio-psychological approach, as well. The new perception of waters is a real phenomenon: you can hear ripples (in German: "Rauschen rauschen", Madsen und Tent, 2000) and where there was an overwide and sluggish, silent watercourse suddenly a murmuring brook appears.

During every day of e.g. riffle construction by pupils and other Bachpaten it was to be seen that these activities created strong interest for the public. As nearly every place of work is to be fairly seen within the sometimes very narrow public space many citizens pass by and thus questions and discussions arise and often transform to service for the "workers" like ice cream etc. during hot days. During one day, the location situated next to a footbridge beside a local administration building, about 400 people passed, being informed by the pupils with leaflets and via verbal information.

Within the Wandse catchment live about 200.000 inhabitants of the 400.000 in the Borough of Wandsbek. It is necessary not only to involve active participating groups but also influence the habits of everyone to reach the goal of a lively river. Necessary themes for action in environmental advice are e.g.: Excessive feeding of water fowl, disposing of garden waste on the shore with consecutive leaching of nutrients or the import of problematic plants like giant hogweed. As the river Wandse has a very low water flow during summer and autumn it is also inevitably to inform about the crucial role of small amounts of waste water from e.g. house-clearing or cleansing of market places without previous sweeping of the place. Every part of these "small" problems may disturb the process of stream rehabilitation.

Thus first questionnaires have been handed out to citizens after activities on World Water Day 2001 to have an overview about the perception of the river. It was interesting to see that most of the persons know whether there is a beck in the surroundings of their living sphere (91 %) and that most know the name of it (75 %). 50 % had realised recent improvements and 36 % knew about the “Bachpatenschaften”. Only 17 % were familiar with the relatively new and local project Trout 2010 whereas Agenda 21 – as a question for comparison – was a known theme for 42 % of the citizens. – 58 % have an imagination about causes of nowadays` problems like waste from roads or spills after accidents, 45 % can tell about the danger from feeding ducks excessively – a rather small number after years of information about that. But, as expected, most of the citizens have no clear idea where a bucket of wastewater from house-cleansing ends if it is poured out on the road. Compared to the very low water flow during dry seasons “this” bucket may harm stream life severely. So a new information leaflet, as usual including a drawing (fig. 5) was created, not to spoil the brook via rain water pipes.



Figure 5: The “waste water man”, after an original of M.M.

## OUTLOOK

After continuous improvements of brook structures within the next years investigations on changes of invertebrate fauna will be carried out. Depending on the development of species and individual numbers the stocking of “lost species” has to be considered. At the moment first ideas focus on fish species like stone loach and bullhead, with minnow and perhaps grayling to follow in downstream areas during later project phases.

The “normal” tasks of the Wandsbek administration like initiating and executing of master plans include water aspects. Thus, e.g. rain water retention is a must and where ever possible is realised near to the housing grounds in form of evaporation and seepage into the ground (cf. Geiger und Dreiseitl, 1995). Disruption of the running waters` continuum is avoided.

Scientific institutions like universities will engage in special tasks, e.g. elaboration of catchment improvements and low water flow elevation. The chain of park ponds following downstream the phase 1 stretch has to be by-passed during following project phases. For this, first diploma works have been offered, and started (C and D in fig. 1) to prepare future work.

On the long run the former ecological continuum of the Wandse Beck via the Alster and the Elbe River will be restored and thus enable species like river lamprey and sea trout to start their life cycle in the Wandse watershed.

All of this can be considered as important aspects in Agenda 21 activities and support for the improvement of the urban society. As such it is part of best practices for the „Metropolitan Region of Hamburg“, covering large parts of the federal states of Schleswig-Holstein, the Free and Hanseatic City of Hamburg and Lower Saxony (Lenkungsausschuß ..., 1999).

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Acknowledgements: My special thanks go to the manifold engaged groups of Bachpaten, the project manager Wolfram Hammer (BUND Hamburg), trout breeding and angling youth group encouraging Dieter Spangenberg, the enthusiastic environmental advisers Sabine Axt, Helga Bahr, Angelika Gerlach and Verena Rabe, always being busy in supporting the Bachpaten, and – last but not least – the umbrella man of the project, Klaus Meister, head of the administration of the Borough of Wandsbek.

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<sup>i</sup> IWA 2nd World Water Congress, 1.8 Leadership and Public Participation, Berlin, 15-19 October 2001