



REFRESH - Stronger need for maintaining environmental flow in streams in a changing climate

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Verdonschot, 2012

What are the implications of global change for EU biodiversity and water related policies?

A key prerequisite for effective management of stream ecosystems is the **identification of the environmental flow**, i.e. the amount of water required for sustaining an aquatic ecosystem in terms of discharge, duration and timing. So far, there is neither an EU-wide definition of ecological flow, nor a common understanding of how it should be calculated.

To address this gap, the European Commission has proposed developing a guidance document by 2014 under the auspices of the Water Framework Directive Common Implementation Strategy. The findings of the Project REFRESH in stream ecology represent a **major contribution to the development of this guidance** as they focus on the identification of the upper and lower boundaries of environmental flow for small lowland streams.



REFRESH

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The key objective of REFRESH is to develop a framework that will enable water managers to design cost-effective restoration programmes for freshwater ecosystems.

Visit the REFRESH website: www.refresh.ucl.ac.uk

Synthesis

- Changes in bed and bank structure and modification of water flow are among the **main current threats to the ecological status of streams in Europe**. Climate change impacts will modify stream flow further.
- Experiments in REFRESH show that **stream macroinvertebrates are vulnerable to spates 7 times greater** than base flow and that **ecosystems of natural streams are more resilient to multiple spates** than those of semi-natural streams.
- Aquatic macroinvertebrates sensitive to low flow disappear within days after the onset of stagnation and in eutrophic streams stagnation brings about **oxygen depletion and an additional loss of macroinvertebrates** with high oxygen requirements.
- **Pools remaining in a temperate stream bed during droughts are no refugia for stream biota as is commonly believed.**
- Storing water in the catchment is the principle measure to guarantee stable flow. Substrate variability can be managed by **restoring stream morphology and creating retention basins or wires**. The principle should be to let the processes in the system optimise the conditions for species.
- REFRESH has **highlighted a number of land management and forestry measures for regulating stream flow and sediment transport** such as **(re-)constructing wetlands, modifying forest densities and cutting cycles**, and adding coarse woody debris to the streams.

Edwards, F.K., R. Baker, M. Dunbar and C. Laizé, 2012. Review on processes and effects of droughts and summer floods in rivers and threats due to climate change on current adaptive management strategies. REFRESH Deliverable 2.14: 75 pp.

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