

EFI + Improvement and Spatial Extension of the European Fish Index



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A project overview

On January 1st, 2007 the EC-funded research project “Improvement and Spatial Extension of the European Fish Index (EFI+)” was started. EFI+ is a research project designed to gain new knowledge, and to further develop and improve biological assessment methods that meet needs of the Water Framework Directive (WFD). **The output of the project will be a standard methodological approach to assess the ecological status of rivers in accordance with the WFD.** Therefore, the **EFI+** project represents a **direct and obligatory contribution to the Water Framework Directive** in the further development and implementation of harmonised fish-based assessment tools and standard methods that can be used in EU Member States, as well as in Candidate countries.

Between 2001 and 2004 the EC-funded FAME project aimed at development, evaluation and implementation of standardised fish-based methods to assess the ecological status of running waters in Europe¹. The main output of FAME was the European Fish Index (EFI), the first standardised fish-based assessment method applicable across a wide range of European rivers. The EFI employs a number of environmental descriptors to predict biological reference conditions and quantifies the deviation of fish community structure from reference conditions on a statistical basis. The EFI was developed for Western and Northern Europe and was calibrated against an expert judgment based pre-classification of human pressure status. Although a wide range of river types was included in the development of the EFI, very large rivers were underrepresented. EFI has now been used and tested in several European countries within the national monitoring programmes of the WFD.

The overall objective of **EFI+** is to overcome existing limitations of the EFI by developing a new, **more accurate and pan-European fish index**. The scientific and technological objectives are to (1) evaluate the applicability of the existing EFI and make necessary improvements to the existing index in Central-Eastern Europe and Mediterranean ecoregions, (2) extend the scope of the existing EFI to cover very large rivers, (3) analyse relationships between hydromorphological pressures (incl. continuity disruptions) and fish assemblages to increase the accuracy of the EFI, (4) adapt existing software to the requirements of the new EFI to allow calculation of the ecological status for running waters,

¹ The FAME project was funded within FP5, Energy, Environment and Sustainable Management. Key Action 1: Sustainable Management and Quality of Water, EVK1 -CT-2001-00094, <http://fame.boku.ac.at>

(5) implement and disseminate the EFI and supporting software by integration of the project results into the CIS activities (Common Implementation Strategy) and ongoing national and international monitoring programmes such as the Joint Danube Survey. These results will be presented in end-user workshops and at an international conference.

Organisation and timetable of the EFI+ project

EFI+ consists of six technical work packages integrated through the overall project management. The project duration is 24 months, from the 1st of January 2007 to the 31st of December 2008.

Nr.	WP	Tasks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1	Basic tools	Fish data and species guilds	X	X																									
		Natural and anthropogenic descriptors	X	X																									
2	Data acquisition and management	Collecting fish data			X	X	X	X	X	X	X																		
		Collecting natural and pressures descriptors			X	X	X	X	X	X	X																		
		Database Management			X	X	X	X	X	X	X	X									X	X							
3	Pressures analysis and new metrics development	Pressure analyses								X	X	X	X	X															
		Evaluation of existing EFI									X	X	X																
		Hydromorphological pressures									X	X	X	X															
		Continuity disruption									X	X	X	X															
		Central/Eastern Rivers									X	X	X	X															
		Mediterranean Rivers									X	X	X	X															
		Large Floodplain Rivers									X	X	X	X															
Low Species Rivers									X	X	X	X																	
4	Fish Index Development	Modelling reference conditions				X	X	X	X	X	X	X	X	X	X	X	X												
		Metrics responses to pressures							X	X	X	X	X	X	X	X	X	X	X	X									
		Evaluation and sensitivity analyses																			X	X							
5	Implementation	Software and manual update										X									X	X	X						
		Catchment case-study (Danube survey)																					X	X					
6	Dissemination	End-user workshops						X																	X	X			
		Web site	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		Publications and external presentations														X	X	X	X	X	X	X	X	X	X	X	X	X	
		International Conference											X						X						X	X	X		
		Future exploitation of project results																			X	X	X	X	X	X	X	X	
		Advisory Group	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

The EFI+ team

The EFI+ team consists of 14 official partners from 13 countries. Additionally, the Netherlands is represented in the project by RIZA, who are being funded from national resources. Furthermore, several partner institutions are integrated to the EFI+ group on a national level for data provision and expert support. Two **external evaluators** and an **advisory group** support the project team in achieving the scientific objectives and integrating end-users requirements properly.



The temporal link between EFI+ and the WFD-implementation

The WFD monitoring programmes were scheduled to be in operation in the member states by the end of the year 2006. Data sampling will continue in 2007 and following years as defined in the national programmes. The result of the WFD monitoring programmes will be the basis for the river management basin plans, which should be ready by 2009. This means, the **EFI+** project, due to end in 2008, is appropriately scheduled to deliver tools for assessing the field data collected in the monitoring programmes.

Year-quarter	WFD requirements	EFI+ project schedule
2005-1	Characterisation of pressures	
2006-4 / 2007-1	Monitoring programmes in operation	Presumed start of project
2007-2		Data collection
2007-4		Evaluation of existing EFI
2008-3		New version of EFI
2008-4		Draft river management basin plans
2009-4	River basin management plans	

Tasks and working program of the first project phase

Agreeing on the appropriate set of variables (WP Basic Tools)

During the initiation phase of the EFI+ project the basic principles and the variables for data collection were agreed. As in the FAME project we will focus on existing data from electro fishing surveys. In large rivers information collected from other sampling methods will also be considered to make judgements about species composition.

The defined set of variables, which must be provided for each sampling site and fishing occasion, should enable us to account for different features and fish assemblages of European rivers, and to adequately define existing pressures at a sampling site. The main challenge for the selection of the variables was to find the best compromise between the appropriate descriptors and the time and financial resources available to the project.

The environmental variables are needed to model the reference fish fauna on site level. The pressure variables allow (1) the identification the reference sites (sites with no or only minor pressure) and (2) testing of the sensitivity of metrics and the final index to pressure intensity.

A prerequisite for environmental variables is that they must not change with, or be dependent on, the existing level of pressure. We selected finally the following site-related descriptors: altitude, distance to source/sea, flow regime, presence of lakes upstream, geology, water source type, river and valley slope, size of catchment, presence of floodplain, valley form, geomorphological river type, dominant sediment, (air) temperature, precipitation, biogeographical position of the catchment as well as soil conditions. For some variables, like river slope and wetted width the actual values will be considered since it will not be possible to gain information about the situation prior to the influence of human alteration within the 6-month-phase of data collection.

For pressures we will focus on connectivity (7 variables), hydrological and morphological changes (10 and 6 variables, respectively) and water quality (6 variables). Also, the existence of commercial navigation, as well as land use and population density, will also be taken into account.

Preparing and starting data collection (WP Data acquisition and management)

Parallel to the definition of variables, the input database and the manual were prepared. We will again use an Access database similar to the FIDES database from the FAME project. Data collection started in February after the Kick-off meeting in Bratislava and has to be finished by August 2007. We aim to have a dataset of about 9000 sampling sites, among which 15-20% will probably be reference sites.

Preparing the pressure analysis, development of new metrics and spatial extension of the European Fish Index

During the Kick-off meeting at the end of January 2007, work programs and data requirements were defined for the analysis of hydromorphological pressures and for the development of new metrics focusing on continuum disruptions, together with metrics for large, Eastern and Mediterranean rivers.

Meetings and announcements

January 24-27, 2007	EFI+ Kick-off meeting, Hydrometeorology Institute, Bratislava, Slovakia.
March 30, 2007	1 st EFI+ end-users meeting, JRC, Ispra, Italy. The 1 st end-users workshop will be organized in cooperation with the Fish Intercalibration meeting on March 28/29, 2007.
April 16-18, 2007	1 st EFI+ working group meeting, Leibnitz Institute for Freshwater Research, Berlin, Germany.
October 16-19, 2007	2 nd EFI+ Workshop, Technical University of Lisbon, Agronomy Institute – Forest Department, Lisboa, Portugal.

EFI+ webpage:

For further information please visit the EFI+ webpage at <http://efi-plus.boku.ac.at>

EFI+ newsletter:

If you would like to be on the mailing list for this newsletter please send an email to Rafaela Schinegger from the BOKU-team (rafaela.schinegger@boku.ac.at)

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