

Chapter 1

Introduction

The application of hydraulic structures has caused the artificial regulation of freshwater systems and thereby changes in its ecological and hydrological balances. Many ecosystems struggle to survive with hydraulic engineering works in use or have already ceased to exist. More sustainable driven thinking in recent decades has led to the qualitative demand for an ecological sound use or natural flow criteria for river system on a European level via the introduction of the EU Water Directive. Research works have demanded the recognition of dynamics as the "fourth dimension" for water basin management, hence standing for an integrated approach of river dynamics on a basin wide level. The Spanish Water Law has obliged [6] the respective water authorities (Confederación Hidrográfica) to implement an ecologic or "natural flow" regime in all regulated catchments in respect to the regional and national water management plans.

Different criteria models have been developed in order to quantify the term natural flow according to ecological, hydrological and purely chemical data. Tennant's [30] model e.g. disposes over the abundance of fish life in respect to certain hydrological regimes as the criteria, whereas White [33] establishes a relationship between the wet perimeter and the hydraulics. With the IFIM (Instream Flow Incremental Methodology) Stalnaker and Bovee [13] developed a model which is currently being applied to various basins in North America. Souchon [29] and Gustard [18] have proposed its application for the UK and France and first steps have been undertaken by García de Jalón [5] and Cubillo [14] to consider the IFIM for Spain. As part of the Spanish National Water Plan (PHN) the natural flow is currently determined as the mean of hydrological flow records. Adaptation of dynamic models for the Tajo basin has been undertaken by Baeza [28] and García de Jalón and first works for the Ebro basin have been initiated by Palau and Alcazar [26].