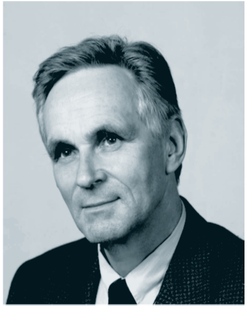

Maciej ZALEWSKI (Prof. dr hab.) - Director

The Sustainable Development Goals of the UN have to be achieved by the harmonization of human needs with the biosphere and its vital resources – fertile soils, clean water, clean air and biodiversity.
The water budget – ecosystem distribution at a catchment scale is considered in ecohydrology as a framework for the regulation of processes to enhance of Water, Biodiveristy, ecosystem Services (e.g. food, fuel), ecosystem Resilience and Cultural heritage (WBRS+C) (Zalewski 2014). Such a multidimentional goal for catchment management is the fundamental condition for the transition from exploitative to sustainable resource use, incorporating innovative tools as "Nature Based Solutions" and a systemic approach compatible with the "Circular and Bio-Economy".

Ecohydrology – integrative sustainability problem solving science

"An important stimulant for the paradigm of integrated system cycles and interdisciplinary research was the UNESCO International Hydrological Programme, wherein the theoretical framework of ecohydrology (EH) was formulated (Zalewski et al., 1997; Zalewski, 2000, 2010; Bonacci, 2003; Wolanski et al., 2004; Chicharo et al., 2001; Kundzewicz, 2002; Timchenko et al., 2000; Harper et al., 2008). However, other important developments in EH have also been made by a large spectrum of scientific teams (e.g. Rodrigues-Iturbe, Ehleringer et al., 2000; Gurnell et al., 2000; Lucks, 2006; Woods et al., 2007).
The first proposed definition of ecohydrology was the "scientific background to use ecosystem properties as management tools toward sustainability of water resources" (Zalewski 2000). Thus, EH is an integrative, transdisciplinary, problem-solving science where the key word is REGULATION of processes and catchment is a template for integration of knowledge on the dynamics of hydrological and ecological processes and for determining the hierarchy of drivers used for designing best methods and systemic solutions.

The roots of such approach appeared in the debate among ecologists on density dependent density independent regulation of ecosystems, e.g. Krebs (1996) and further concepts, i.e. Abiotic Biotic Regulatory Continuum (Zalewski and Naiman, 1985; Zalewski et al., 1997; Zalewski, 2000, 2010) formulated from the general theories of physics, hydrology and ecology which implicit goal is to achieve sustainability. Furthermore, the discipline incorporates not only hydrology and ecology. Recent development in EH has been expanded by range of scientific fields such as geophysics, geology, molecular biology, genetics, geo-information techniques, mathematical modelling with socio-economical concepts (e.g. foresight) and encompasses aspects of law (Fig. 1)." (Zalewski M., 2013) (see ecohydrology, hydrology Elsevier webpage www.elsevier.com).
The UNESCO IHP Ecohydrology webpage (http://ecohydrology-ihp.org/demosites/)

Structure-oriented thinking				Process-oriented thinking
	CONSERVATION	RESTORATION	ECOLOGICAL ENGINEERING	ECOHYDROLOGY
Goal	Maintaining bidiversity and the natural character of ecosystems	Reversing degradation of the strukture of ecosystems	"Design of ecosystems for the mutual benefit of humans and nature" (Mitsch 1992)	Reglation of water-biota interplay for the enhancement of ecosystem potencial and its harmonisation with society needs
Unit	Ecosystem Population UNESCO MaB Bisphere Reserve	Ecosystem patch Ecosystem	"Functional ecosystem"	Catchment's hydrological mezocycle
Status	MAINTAINING "status quo"	ENHANCEMENT of secondary succesion processes at terrestrial ecosystems or reversing eutrophication in aquatic ecosystems	SHAPING of the functions of ecosystem	REGULATION of water-biota interplay for sustainable catchment and coastal zones

Fig. 1. Evolution of paradigms in environmental sciences towards sustainability from structure to process oriented thinking as a results of increasing complexity sustainability problems to be solved