

# Flood Risk Assessment and Management

How to Specify Hydrological Loads,  
Their Consequences and Uncertainties

Andreas H. Schumann

Editor

Ruhr-University Bochum, Germany



Springer

# Contents

<b>1</b>	<b>Introduction – Hydrological Aspects of Risk Management . . . . .</b>	<b>1</b>
	Andreas H. Schumann	
<b>2</b>	<b>Uncertainties in Weather Forecast – Reasons and Handling . . . . .</b>	<b>11</b>
	Dirk Schüttemeyer and Clemens Simmer	
<b>3</b>	<b>Interpolation of Precipitation for Flood Modelling . . . . .</b>	<b>35</b>
	Uwe Haberlandt	
<b>4</b>	<b>Framing Uncertainties in Flood Forecasting with Ensembles . . . . .</b>	<b>53</b>
	Andreas H. Schumann, Yan Wang, and Jörg Dietrich	
<b>5</b>	<b>Design of Artificial Neural Networks for Flood Forecasting . . . . .</b>	<b>77</b>
	Johannes Cullmann and Gerd H. Schmitz	
<b>6</b>	<b>Advances in Regionalising Flood Probabilities . . . . .</b>	<b>97</b>
	Ralf Merz	
<b>7</b>	<b>Rainfall Generators for Application in Flood Studies . . . . .</b>	<b>117</b>
	Uwe Haberlandt, Yeshewatesfa Hundecha, Markus Pahlow, and Andreas H. Schumann	
<b>8</b>	<b>Copulas – New Risk Assessment Methodology for Dam Safety . . . . .</b>	<b>149</b>
	Bastian Klein, Andreas H. Schumann, and Markus Pahlow	
<b>9</b>	<b>Hydraulic Modelling . . . . .</b>	<b>187</b>
	Mark Musall, Peter Oberle, and Franz Nestmann	
<b>10</b>	<b>Groundwater – The Subterranean Part of Flood Risk . . . . .</b>	<b>211</b>
	Thomas Sommer	
<b>11</b>	<b>Quantification of Socio-Economic Flood Risks . . . . .</b>	<b>229</b>
	Bruno Merz, Annegret Thieken, and Heidi Kreibich	

<b>12</b>	<b>Application of Scenarios and Multi-Criteria Decision Making Tools in Flood Polder Planning</b> . . . . .	<b>249</b>
	Andreas H. Schumann and David Nijssen	
<b>Index</b>	. . . . .	<b>277</b>