

# Contents

<i>List of contributors</i>	ix	3.4 International experiments related to climate in South America	29
<i>Executive summary</i>	xi	3.5 Summary and conclusions	34
<i>Acknowledgements</i>	xv		
<b>1 Introduction</b>	<b>1</b>	<b>4 Assessment of the impacts of climate variability and change on the hydrology of North America</b>	<b>36</b>
J.C. van Dam		G.H. Leavesley	
1.1 Problem identification	1	4.1 Introduction	36
1.2 The climate system	2	4.2 Hydroclimatological regimes and their variability over time	36
1.3 State of the art of modelling	3	4.3 Hydrological climate change impact studies in North America	41
1.4 Related activities	5	4.4 National and international research programmes	46
1.5 Scope and structure of this volume	6	4.5 Summary and conclusions	51
<b>2 Climate change, hydrology and water resources: The work of the IPCC, 1988–94</b>	<b>8</b>	<b>5 Assessment of the impacts of climate variability and change on the hydrology of Europe</b>	<b>52</b>
I.A. Shiklomanov		N.W. Arnell	
2.1 Introduction: Purpose and objectives of the IPCC	8	5.1 Introduction	52
2.2 Organization of the work of the IPCC	8	5.2 Hydrological regimes in Europe and their variability over time	52
2.3 Materials	9	5.3 Hydrological climate change impact studies in Europe	53
2.4 Scenarios and methodological approaches	9	5.4 International projects and experiments	65
2.5 Possible changes in hydrological regimes and water quality	11	5.5 Conclusions	66
2.6 Climate change, water availability and water resources management	16		
2.7 The IPCC's conclusions and recommendations	19	<b>6 Assessment of the impacts of climate variability and change on the hydrology of Africa</b>	<b>67</b>
2.8 Comments on the IPCC's activities	20	J. Sircoulon, T. Lebel and N.W. Arnell	
<b>3 Assessment of the impacts of climate variability and change on the hydrology of South America</b>	<b>21</b>	6.1 Introduction	67
B.P.F. Braga and L.C.B. Molion		6.2 West and Central Africa	67
3.1 Introduction	21	6.3 East and Northeast Africa	78
3.2 Climate variability: Short- and long-term trends	21	6.4 Conclusions and recommendations	83
3.3 Impacts of climate change on the hydrology of South America	24		

<b>7</b>	<b>Assessment of the impacts of climate variability and change on the hydrology of Asia and Australia</b>	<b>85</b>	<b>8.2</b>	<b>Hydrological models</b>	<b>107</b>
	I.A. Shiklomanov and A.I. Shiklomanov		<b>8.3</b>	<b>Atmospheric models</b>	<b>113</b>
	7.1 Introduction	85	<b>8.4</b>	<b>Climate scenario development</b>	<b>117</b>
	7.2 Interactions between climate and hydrological characteristics	86	<b>8.5</b>	<b>Integration of hydrological and atmospheric models for impact assessment</b>	<b>119</b>
	7.3 Impacts of global warming on river runoff	95	<b>8.6</b>	<b>Summary and conclusions</b>	<b>120</b>
	7.4 The GEWEX Asian Monsoon Experiment (GAME)	104	<b>9</b>	<b>Conclusions and recommendations</b>	<b>123</b>
	7.5 Conclusions and recommendations	105		M. Bonell, J.C. van Dam and V. Jones	
<b>8</b>	<b>Overview of models for use in the evaluation of the impacts of climate change on hydrology</b>	<b>107</b>		9.1 Conclusions	123
	G.H. Leavesley			9.2 Recommendations	126
	8.1 Introduction	107		<i>References</i>	129
				<i>Appendix: Acronyms and abbreviations</i>	138