

---

Viktor Sadovnichy • Askar Akaev •  
Ilya Ilyin • Sergey Malkov • Leonid Grinin •  
Andrey Korotayev  
Editors

# Reconsidering the Limits to Growth

A Report to the Russian Association of  
the Club of Rome

---

# **Contents**

<b>Introduction: Hoping for the Future . . . . .</b>	<b>1</b>
Victor Sadovnichy, Askar Akaev, Ilya Ilyin, Sergey Malkov, Leonid Grinin, Yury Sayamov, and Andrey Korotayev	
<b>Part I Looking into the Past and the Future</b>	
<b>Macrohistorical Approach . . . . .</b>	<b>17</b>
Victor Sadovnichy, Askar Akaev, Ilya Ilyin, Sergey Malkov, Leonid Grinin, Ivan Aleshkovski, and Andrey Korotayev	
<b>The Future Society and the Transition to It . . . . .</b>	<b>35</b>
Viktor Sadovnichy, Askar Akaev, Ilya Ilyin, Sergey Malkov, Leonid Grinin, Aleksey Andreev, and Andrey Korotayev	
<b>Part II Problems, Forecasts, Solutions (Climate, Ecology, Demography, Aging)</b>	
<b>Climate and Energy: Energy Transition Scenarios and Global Temperature Changes Based on Current Technologies and Trends . . . . .</b>	<b>53</b>
Askar Akaev and Olga Davydova	
<b>Ecology: Life in the “Unstable Biosphere” . . . . .</b>	<b>71</b>
Natalia Kovaleva	
<b>Demography: Toward Optimization of Demographic Processes . . . . .</b>	<b>97</b>
Andrey Korotayev, Sergey Malkov, and Jameelah Musieva	
<b>Global Aging: An Integral Problem of the Future. How to Turn a Problem into a Development Driver? . . . . .</b>	<b>117</b>
Leonid Grinin, Anton Grinin, and Andrey Korotayev	
<b>Part III Problems, Forecasts, Solutions (Technology, Economics, Socio-Political Development)</b>	
<b>Technologies: Limitless Possibilities and Effective Control . . . . .</b>	<b>139</b>
Leonid Grinin and Anton Grinin	

<b>Economics: Optimizing Growth . . . . .</b>	<b>155</b>
Leonid Grinin, Anton Grinin, and Sergey Malkov	
<b>Sociopolitical Transformations: A Difficult Path to Cybernetic Society . . . . .</b>	<b>169</b>
Leonid Grinin, Anton Grinin, and Sergey Malkov	
<b>Future Political Change. Toward a more Efficient World Order . . . . .</b>	<b>191</b>
Leonid Grinin, Anton Grinin, and Andrey Korotayev	
<b>High-Income and Low-Income Countries. Toward a Common Goal at Different Speeds . . . . .</b>	<b>207</b>
Leonid Grinin, Sergey Malkov, and Andrey Korotayev	
<b>Africa: The Continent of the Future. Challenges and Opportunities . . . . .</b>	<b>225</b>
Leonid Grinin and Andrey Korotayev	
<b>Part IV Modeling Social Self-Organization and Historical Dynamics – from Agrarian to Cybernetic W-Society</b>	
<b>Modeling Social Self-Organization and Historical Dynamics.</b>	
<b>An Overview . . . . .</b>	<b>241</b>
Victor Sadovnichy, Askar Akaev, Ilya Ilyin, Sergey Malkov, Leonid Grinin, Vasily Popov, and Andrey Korotayev	
<b>Modeling Social Self-Organization and Historical Dynamics.</b>	
<b>A General Approach . . . . .</b>	<b>253</b>
Askar Akaev, Sergey Malkov, Stanislav Bilyuga, Artemy Malkov, Jameelah Musieva, and Andrey Korotayev	
<b>Modeling Social Self-Organization and Historical Dynamics.</b>	
<b>Agrarian Society . . . . .</b>	<b>309</b>
Sergey Malkov, Natalia Kovaleva, Leonid Grinin, and Andrey Korotayev	
<b>Modeling Social Self-Organization and Historical Dynamics.</b>	
<b>Industrial Society . . . . .</b>	<b>337</b>
Askar Akaev, Sergey Malkov, Olga Davydova, Natalia Kovaleva, Artemy Malkov, Leonid Grinin, and Andrey Korotayev	
<b>Modeling Social Self-Organization and Historical Dynamics: Global Phase Transitions . . . . .</b>	<b>387</b>
Sergey Malkov, Leonid Grinin, Anton Grinin, Jameelah Musieva, and Andrey Korotayev	
<b>Modeling Social Self-Organization and Historical Dynamics: Modern Society and a Look into the Global Future. Cybernetic W-Society . . . . .</b>	<b>419</b>
Askar Akaev, Sergey Malkov, Leonid Grinin, Stanislav Bilyuga, Olga Davydova, Anton Grinin, Natalia Kovaleva, Artemy Malkov, Jameelah Musieva, and Andrey Korotayev	

<b>Modeling Social Self-Organization and Historical Dynamics: Africa's Futures . . . . .</b>	<b>461</b>
Andrey Korotayev, Sergey Shulgin, Vadim Ustyuzhanin, Julia Zinkina, and Leonid Grinin	
<b>Analyzing Social Self-Organization and Historical Dynamics. Future Cybernetic W-Society: Sociopolitical Aspects . . . . .</b>	<b>491</b>
Leonid Grinin and Anton Grinin	
<b>Analyzing Social Self-Organization and Historical Dynamics: Life Quality Index . . . . .</b>	<b>521</b>
Sergey Malkov, Stanislav Bilyuga, and Jameelah Musieva	
<b>Conclusion: Reconsidering the Limits – Suggestions (Come On!) . . . . .</b>	<b>531</b>
Victor Sadovnichy, Askar Akaev, Ilya Ilyin, Sergey Malkov, Leonid Grinin, Dmitry Ivanov, and Andrey Korotayev	