## **CONTENTS**

STUDY AND PRESERVATION OF BIOLOGICAL DIVERSITY	
MICROBIAL AGENTS FOR ACTIVATING THE GROWTH PROCESSES OF SEEDS AND PLANTING MATERIAL OF PINE (Boiko H. O., Kulbanska I. M.)	3 1
INFLUENCE OF AGROTECHNICAL FACTORS AND CONDITIONS OF GROWING FERTILITY OF SOIL (Vasylenko N. Ye., Averchev O. V.)	8
BIOMASS AND PRIMARY PRODUCTION OF SILVER FIR STANDS IN UKRAINIAN CARPATHIANS (Vasylyshyn R. D., Lakyda I. P., Vasylyshyn O. M.)	1
<ul> <li>2. Potential of biomass of mountain fir forests</li></ul>	
INVERTEBRATE FAUNA OF THE "MYKHAILIVSKA TSILYNA" NATURE RESERVE (Govorun O. V.)	
before the reserve became independent in 2009	5
ECOLOGY AND ENVIRONMENTAL PROTECTION	
COMPREHENSIVE GEOPHYSICAL OBSERVATIONS IN THE CENTRAL PART OF THE TRANSCARPATHIAN INTERNAL DEPRESSION (Ihnatyshyn V. V., Ihnatyshyn M. B.,	0
Ihnatyshyn A. V.)	

3. The nature of modern horizontal movements of the crust	
in the Oash Deep Fault Zone for the period 1998–2018.  Analysis of kinematic characteristics.	.113
STUDY OF THE STATE OF NATURAL-ANTHROPOGENIC GEOSYSTEMS UNDER CONDITIONS OF LIMITED FUNCTIONING OF THE UNDERGROUND HYDROSPHERE MONITORING SYSTE (Koshliakov O. Ye., Dyniak O. V., Koshliakova I. Ye.)  1. Changes in the geological environment and hydrogeological conditions of technogenically loaded territories on the example of the territory of the city of Kyiv  2. Peculiarities of monitoring the state of the underground hydrosphere of technogenically loaded territories 3. Experience of GIS integration with problem-oriented modeling systems for studying the state of the underground hydrosphere	CM . 127 . 128 . 130
TAXONOMIC FEATURES OF VASCULAR PLANTS OF THE ECOLOGICAL TRAIL OF THE COMPLEX NATURE MONUMENT OF NATIONAL IMPORTANCE "HORYN' STEEP SLOPES" (Kuzmishyna I. I., Merlenko N. O., Ozhema B. R.)	. 149 . 156
THE MAIN DIRECTIONS OF THE TECHNICAL SOLUTION OF THE MYKOLAIV REGION HYDROECOSYSTEMS PROTECTION PROBLEM FROM ANTHROPOGENIC IMPACT (Magas N. I., Trokhymenko G. H., Gomelya M. D.)  1. Reconstruction of water treatment station	. 170 . 172
EXAMPLE OF USAGE OF GEO-ECOLOGICAL METHODS IN THE INSPECTION OF RECREATIONAL LAND ON EXAMPLE OF THE CITY OF KAMIANSKE (Neposhyvailenko N. O.)	. 191
2. Inspection of land with satellite images	

CRITERIA FOR ENVIRONMENTAL IMPACT ASSESSMENT (Pokshevnytska T. V.)	210
The problem's prerequisites emergence and the problem's	210
formulation	
2. Analysis of existing problems	
3. Determination of environmental impacts	219
4. Criteria for the impact of planned activities on the environment	221
THE AGROSPHERE OF THE ZONE OF INFLUENCE OF THE URBASYSTEM: CREATION, FORMATION AND FUNCTIONING	AN
(Pryshchepa A. M., Biedunkova O. O., Stetsyuk L. M.)	
with urban systems	231
<ul><li>2. The essence and content of the concept "agrosphere of the zone of influence of urban systems"</li><li>3. Functions of the agrosphere of the zone of influence</li></ul>	235
of urban systems	2/13
4. Signs of territorial changes and zoning of the agrosphere	
in the zone of influence of urban systems	247
COMPREHENSIVE INTEGRATED ASSESSMENT OF ANTHROPOGENIC IMPACT ON THE NATURAL	
ENVIRONMENT OF UKRAINE (Cherba O. V., Kvasov V. A.)	
impact on the environment in Ukraine	257
2. Methodical approaches to the assessment of man-made impact on the natural environment	258
3. Methodology for the integral assessment of anthropogenic impact	230
on the natural environment.	261
4. Ecological portrait of anthropogenic load on the natural environment in Ukraine	268
ECOLOGICAL SAFETY, ENVIRONMENTAL	
AND PUBLIC HEALTH QUALITY	
ANALYSIS OF THE STATE OF AIR POLLUTION IN INDUSTRIAL CITIES OF UKRAINE DURING THE WAR PERIOD	
(ON THE EXAMPLE OF ZAPORIZHZHIA CITY) (Bielokon K. V.,	
Pirohova I. M., Hordiienko D. R.)	276
Air quality monitoring during martial law	
2. Methodology of air quality research in Ukraine	
3. Analysis of changes in air quality in Zaporizhzhia city during	
the state of war	283

PHYSIOLOGICAL REACTIONS TO EXERCISES IN HEALTHY	
CHILDREN OF PRIMARY SCHOOL AGE (Vasyleha P. A.)	297
1. Metabolic reactions to physical activity in healthy children	299
2. Possible explanations for the low efficiency of locomotion	
in children	303
3. Factors determining the level of motor activity of children	306
SCIENTIFIC PRINCIPLES OF GUARANTEEING ENVIRONMENT.	AL
SAFETY IN AREAS OF MINERAL EXTRACTION	
(Ivanov Ye. A., Bilanyuk V. I., Tykhanovych Ye. Ye.)	314
1. Geoecological studies of mining areas	315
2. The formation of geosystems after the completion	
of the development of mineral deposits	318
3. Evaluation of the ecological state of geosystems	322
4. Efficiency of use of mineral raw materials and mining waste	327
5. Problems of reclamation and revitalization of lands disturbed	
by mining	331
PHYSICAL, CHEMICAL AND MICROBIOLOGICAL	
CHARACTERIZATION OF THE BOTTOM SEDIMENTS	
OF THE VOLYN REGION LAKES AND THE POSSIBILITIES OF	
	241
THEIR USE IN MUD TREATMENT (Ilyina O. V., Pasichnyk M. P.)	
Classification and economic value of sapropel	
2. Reserves and prevalence of sapropel	
<ul><li>3. Physico-chemical and microbiological properties of sapropel</li><li>4. Sanitary and microbiological condition of bottom sediments</li></ul>	344
of lakes	350
THE NEED TO CONDUCT ENVIRONMENTAL	
	<b>11</b> 7
AND TOXICOLOGICAL STUDIES IN UKRAINE IN ACCORDANC WITH THE PRINCIPLES OF GOOD LABORATORY PRACTICE	,E
	250
(Korniyenko V. I., Khyzhnyak S. V., Midyk S. V.)	338
1. Basic approaches to conducting tests in accordance	250
with the principles of Good Laboratory Practice	339
Organization of work according of principles     of Good Laboratory Practice	365
3. Implementation of Good Laboratory Practice in Ukraine	369
3. IIIDIEHIEHIAUOII OI CIOOO LADOFAIOIV PIACUCE III UKTAINE	ากฯ

FORMATION OF INDIVIDUAL HUMAN HEALTH: MODERN BIOTECHNOLOGICAL TRENDS IN THE USE OF PROBIOTIC MICROORGANISMS IN FUNCTIONAL SOURDOUGH BAKERY PRODUCTS (Korniienko I. M., Kuznietsova O. O., Garkava K. H.) 375 1. The concept of functional nutrition, the role of probiotics in the technology of obtaining specialized bread products
MODERN ISSUES OF SOCIAL GEOGRAPHY  GERMAN EXPERIENCE OF MANAGING REGIONAL DEVELOPMENT: ASPECTS OF SPATIAL JUSTICE (Gukalova I. V.)
PHYSICAL GEOGRAPHY AND NATURAL RESOURCE USE
CURRENT STATE OF AGRICULTURAL LAND USE IN TERRITORY OF ZHOVTANETSKA TERRITORIAL COMMUNITY OF LVIV REGION (Voitkiv P. S., Ivanov Ye. A., Nakonechny Yu. I.)
THE RIVER NETWORK OF THE CITY OF POLTAVA: RETROSPECTION AND MODERNITY (Yermakov V. V., Sarnavskyi S. P.)
and formulating the task

3. Prerequisites for the establishment of a settlement	459
4. Influence of relief and lithological basis	
5. Influence of the climatic factor	468
6. Peculiarities of the soil and vegetation cover within the city	
of Poltava	
7. Influence of the anthropogenic factor	471
GEOLOGICAL AND GEOMORPHOLOGICAL, CLIMATIC AND HYDROLOGICAL CONDITIONS OF KRYVYI RIH	
LANDSCAPE TECHNICAL SYSTEM (Koptieva T. S.)	
landscape technical system	
2. Climatic conditions of Kryvyi Rih landscape technical system	490
3. Hydrological conditions of Kryvyi Rih landscape	
technical system	494
HISTORY OF NATURAL SCIENCES AND RESEARCH	
IMPLEMENTATION OF CROSS-CUTTING CONTENT LINES IN THE 9 <sup>TH</sup> GRADE CHEMISTRY COURSE (Babenko O. M.)	
2. Methodology for the implementation of cross-cutting content lines in the 9th grade chemistry course	
INNOVATIVE MODELS OF TEACHER TRAINING FOR THE MASS INTRODUCTION OF STEM EDUCATION IN UKRAINE (Buturlina O. V.)	
Assessment of the teaching staff readiness to implement  STEM innovations	
Development of teacher training for the mass introduction of STEM education	
METHODS OF STUDYING THE BASICS OF CHEMICAL	
PRODUCTION IN INSTITUTIONS OF GENERAL SECONDARY EDUCATION (Vakal Yu. S.)	545
1. Formation of knowledge about the basics of chemical production as components of subject competence of students in chemistry	546
2. Comprehensive approach to the system of knowledge about	
chemical production	553

"NATURE AND RESERVE AFFAIRS" FOR STUDENTS OF HIGHER EDUCATION MAJORS 205 "FORESTRY" AND 206 "HORTICULTURE" (Ishchuk L. P., Ishchuk H. P.)  1. Program of the educational discipline "Nature and reserve affairs" 2. Experience of practical training	584
EDUCATIONAL POSSIBILITIES OF USING GEO-INFORMATION RESOURCES IN THE PROCESS OF TRAINING STUDENTS OF GEOGRAPHIC SPECIALTIES (Korol O. M.)  1. Educational possibilities of geo-informational software  2. Educational possibilities of web resources	614
PREPARING MODERN CHEMISTRY TEACHER IN THE CONTEXT OF EDUCATION REFORMS (Prybora N. A., Bohatyrenko V. A.)  1. Updating the system of organization of the learning proces	638 642
MODERN ISSUES OF METHODS OF TEACHING NATURAL SCIENCE DISCIPLINES	
THE HISTORICAL AND PEDAGOGICAL PROCESS OF TRAINING FUTURE TEACHERS FOR RESEARCH ACTIVITIES AT THE GLUKHIV TEACHERS' INSTITUTE (1874–1917) (Lutsenko O. I.)	656
1. Professional and pedagogical training in teachers' institutes of Ukraine in the second half of the 19th and early 20th centuries	656
CREATIVE PORTRAITS OF UKRAINIAN SCIENTISTS IN HISTORICAL PROGRESS GENETICS IN THE 20TH CENTURY (TO THE 200TH ANNIVERSARY OF THE BIRTH OF GREGOR JOHANN MENDEL) (Torianyk V. M.)	
of the formation and development of modern genetics	682

2. Achievements of domestic scientists in the history	
of genetic research and genetic education in Ukraine	692
3. Achievements of domestic scientists in the history of revival	
and development of genetic research and genetic education	
in Ukraine	700
4. Scientific and educational activity of teachers of A. S. Makarenko	
Sumy State Pedagogical University in the history of genetic research	
and genetic education in Ukraine	710