International Conference

ABSTRACTS BOOK
ICAE-2015

7-10 May, 2015
Tbilisi – Batumi
COMMITTEES

Local Organizing Committee

L. MATCHAVARIANI – Conference Chairman, Tbilisi
D. NIKOLAISHVILI – Advisory Committee Coordinator, Tbilisi
M. KORIDZE – Deputy Conference Chairman, Batumi
A. MESKHIDZE – Deputy Conference Chairman, Batumi
L. LAGIDZE – Publishing Responsible, Tbilisi
Z. GULASHVILI – Organizational Executor, Logistician, Tbilisi
N. PAICHADZE – Executive Secretary, Tbilisi
G. BREGVADZE – Field Trips Manager, Tbilisi

Scientific Program Committee

R. BOTCHORISHVILI – Prof. Dr., Faculty of Exact & Natural Sciences, TSU
J. SALUKVADZE – Prof. Dr., Faculty of Social & Political Sciences, TSU
L. MATCHAVARIANI – Prof. Dr., Faculty of Exact & Natural Sciences, TSU
D. KERESELIKIDZE – Prof. Dr., Faculty of Exact & Natural Sciences, TSU
N. ELIZBARASHVILI – Prof. Dr., Faculty of Exact & Natural Sciences, TSU
Z. SEPERTELADZE – Prof. Dr., Faculty of Exact & Natural Sciences, TSU
D. NIKOLAISHVILI – Prof. Dr., Faculty of Exact & Natural Sciences, TSU
L. LAGIDZE – Assoc. Prof. Dr., Faculty of Exact & Natural Sciences, TSU
M. ALPENIDZE – Prof. Dr., Faculty of Natural Sciences, Sokhumi SU
B. KALANDADZE – Assoc. Prof. Dr., Faculty of Exact & Natural Sciences, TSU
V. TRAPAIDZE – Assoc. Prof. Dr., Faculty of Exact & Natural Sciences, TSU
N. BOLASHVILI – Dr., Vakhushti Bagrationi Institute of Geography, TSU
T. TSINTSADZE – Dr., Director, Institute of Hydrometeorology, GTU
R. KHUKHUNAISHVILI – Prof. Dr., Faculty of Natural Sciences, BSU
G. SOPADZE – Dr., “Ecovision” –The Union for Sustainable Development
International Scientific Advisory Committee

BARINOVA, Sophia – University of Haifa, ISRAEL
BILASHVILI, Kakhaber – Tbilisi State University, GEORGIA
DINU, Mihaela Sofia – Romanian-American University, ROMANIA
EFE, Reçep – Balikesir University, TURKEY
FELIX-HENNINGSEN, Peter – Justus Liebig University Giessen, GERMANY
GAD, Abd-Alla – Environmental Studies & Land Use Division, NARSS, EGYPT
GAZZOLA, Patrizia – Insubria University, Varese, ITALY
HAYDE, László G. – UNESCO-IHE Institute for Water Education, The NL
IANKOVA, Katia – University of Greenwich, London, UK
LIOUBIMTSEVA, Elena – Grand Valley State University, USA
MAKEEV, Alexander – Lomonosov Moscow State University, RUSSIA
MANOHARAN, Maragatham – Tamil Nadu Agricultural University, INDIA
MATCHAVARIANI, Lia – Tbilisi State University, GEORGIA
NIKOLAISHVILI, Dali – Tbilisi State University, GEORGIA
OTTE, Anette – Justus Liebig University Giessen, GERMANY
ÖZTÜRK, Münir – Ege University, TURKEY
PARANINA, Alina – St.Peterburg RSPU of A.I. Herzen, RUSSIA
PATIARETCHI, Charita – Western Australia University, AUSTRALIA
SKVORTSOVA, Elena – Moscow V. Dokuchaev Soil Institute, RUSSIA
SHEIN, Evgeny – Prof., Lomonosov Moscow State University, RUSSIA
TSIVTSIVADZE, Nodar – Tbilisi State University, GEORGIA
VODENSKA, Maria – Sofia University, Sofia, BULGARIA
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENSITIVE ALPINE PLANT COMMUNITIES TO THE GLOBAL ENVIRONMENTAL CHANGES (KAZBEGI REGION, THE CENTRAL GREAT CAUCASUS)</td>
<td>17</td>
</tr>
<tr>
<td>THE EFFECTS OF WIND CORRIDORS ON ECOLOGICAL URBAN LANDSCAPE PLANNING: A CASE STUDY FOR DÜZÇE</td>
<td>18</td>
</tr>
<tr>
<td>NICKEL AND IRON IN SELECTED SERPENTINE GEOPHYTES FROM TURKEY</td>
<td>19</td>
</tr>
<tr>
<td>RIVER ADJARISTSKALI SEDIMENT RUNOFF CALCULATION ACCORDING TO THE ENERGETIC PRINCIPLE</td>
<td>20</td>
</tr>
<tr>
<td>RESOURCES OF ORCHIS PURPUREA HUDS. IN AZERBAIJAN AND THEIR CONSERVATION</td>
<td>21</td>
</tr>
<tr>
<td>NATURAL-GEOGRAPHICAL ZONING AND GEO-ECOLOGICAL PROBLEMS OF GEORGIA’S BLACK SEA COAST</td>
<td>22</td>
</tr>
<tr>
<td>HERBALS USED FOR THE TREATMENT OF HYPERTENSION IN THE BLACK SEA REGION OF TURKEY</td>
<td>23</td>
</tr>
<tr>
<td>AN OVERVIEW OF THE SWAMP FORESTS OF TURKEY</td>
<td>24</td>
</tr>
<tr>
<td>ASSESSMENT OF ECOTOURISM POTENTIALS IN HATAY-TURKEY</td>
<td>25</td>
</tr>
<tr>
<td>MEDICINAL AND AROMATIC PLANTS OF IGDIR (TURKEY), NAKHCIVAN (AZERBAIJAN), AND TABRIZ (IRAN)</td>
<td>26</td>
</tr>
<tr>
<td>SPECIAL FEATURES OF CHANGEABILITY OF DAILY SUM OF PRECIPITATION IN TBILISI IN 1957-2006</td>
<td>27</td>
</tr>
<tr>
<td>DYNAMICS OF THE THIRTY-YEAR MOVING AVERAGE VALUES OF THE AIR TEMPERATURE IN TBILISI AND ST.-PETERSBURG WITH 1851 TO 2010 AND THEIR EXTRAPOLATION TO 2051-2080</td>
<td>28</td>
</tr>
<tr>
<td>PHYTOREMEDICATION OF CONTAMINATED SOILS, CONTAMINATED WITH HEAVY METALS FROM GOLD MINE IN GEORGIA</td>
<td>29</td>
</tr>
<tr>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>ALGAL INDICATION OF CLIMATIC GRADIENTS</td>
<td>30</td>
</tr>
<tr>
<td>T. Basilashvili</td>
<td></td>
</tr>
<tr>
<td>CHANGES OF GEORGIAN MOUNTAINOUS RIVERS WATER FLOWS, PROBLEMS AND RECOMMENDATIONS</td>
<td>31</td>
</tr>
<tr>
<td>T. Basilashvili</td>
<td></td>
</tr>
<tr>
<td>IMPACT OF CLIMATE CHANGE ON RIVER RESOURCES FLOWING INTO MOUNTAIN WATER RESERVOIR AND ITS FORECAST (ON THE EXAMPLE OF ZHINVALI WATER RESERVOIR)</td>
<td>32</td>
</tr>
<tr>
<td>B. Beritashvili, M. Shvangiradze, N. Kapanadze, N. Tsintsadze</td>
<td></td>
</tr>
<tr>
<td>ADAPTATION TO CLIMATE CHANGE IN GEORGIA</td>
<td>33</td>
</tr>
<tr>
<td>T. Bliadze, V. Chikhladze</td>
<td></td>
</tr>
<tr>
<td>PRELIMINARY RESULTS OF A STUDY OF AIR TEMPERATURE DISTRIBUTION IN TBILISI INTO SUMMER SEASON</td>
<td>34</td>
</tr>
<tr>
<td>V. Boynagryan, B. Najafiha</td>
<td></td>
</tr>
<tr>
<td>DYNAMICS OF THE SHORELINE OF THE SOUTH-EASTERN PART OF THE CASPIAN SEA (IRAN) AND IT INFLUENCE TO ECOLOGY OF THE COASTAL ZONE</td>
<td>35</td>
</tr>
<tr>
<td>N. Çakiciera, A. Aytin, S. Korkut</td>
<td></td>
</tr>
<tr>
<td>EFFECTS OF HEAT TREATMENT ON VARNISH AND AGING PROCESS ON WILD CHERRY (CERASUS AVIUM (L.) MONENCH) WOODS</td>
<td>36</td>
</tr>
<tr>
<td>A. Çelik, G. Görk, E. N. Herken, E. I. El-Sarag, A. Ermis</td>
<td></td>
</tr>
<tr>
<td>PROLINE, ANTIOXIDANT AND PHENOLIC COMPOUNDS OF HALOPHYTE EXTRACTS IN RELATION TO PLANT PARTS AND SOIL ANALYSIS</td>
<td>37</td>
</tr>
<tr>
<td>A. Çelik, E. I. El-Sarag, E. N. Herken, A. Ermis</td>
<td></td>
</tr>
<tr>
<td>PRE-TREATMENT SEEDS UNDER SALINITY LEVELS OF PANCRATIUM MARITEMUM L. GROWN IN MEDITERRANEAN REGION</td>
<td>38</td>
</tr>
<tr>
<td>B. Cetin, E. Cicek, D. Esen, S. Kulaç, A. K. Ozbayram</td>
<td></td>
</tr>
<tr>
<td>SOME OF THE SEED CHARACTERISTICS OF COMMON BOX (BUXUS SEMPERVIRENS) GROWN IN DIFFERENT PROVINCES OF TURKEY</td>
<td>39</td>
</tr>
<tr>
<td>I. Cürebal, R. Efe, A. Soykan, S. Sönmez</td>
<td></td>
</tr>
<tr>
<td>FLOOD RISK ANALYSIS AND MAPPING IN THE EDREMIT STREAM BASIN</td>
<td>40</td>
</tr>
<tr>
<td>K. Onur Demirarslan, B. Yalçın Çelik</td>
<td></td>
</tr>
<tr>
<td>GENERAL REVIEW ON HAZARDOUS WASTE MANAGEMENT</td>
<td>41</td>
</tr>
<tr>
<td>I. Diasamidze, G. Bolkvadze, N. Varshanidze, N. Turmanidze, E. Jakeli</td>
<td></td>
</tr>
<tr>
<td>LIFE FORMS OF VEGETATION OF ADJARA’S OAK FOREST</td>
<td>42</td>
</tr>
<tr>
<td>L. Dimeyeva</td>
<td></td>
</tr>
<tr>
<td>NATURAL AND ANTHROPOGENIC DYNAMICS OF VEGETATION IN THE ARAL SEA COAST</td>
<td>43</td>
</tr>
</tbody>
</table>
CONTENTS

L. Dimeyeva, E. Ablaikhanov, A. Islamgulova

VEGETATION OF THE SOUTHERN RANGE OF JUNGGAR ALATAU MOUNTAINS.............................. 44

A. Donica

NEW HABITATS FOR ENDANGERED PLANT SPECIES FROM THE MIDDLE DNIESTER BASIN (REPUBLIC OF MOLDOVA) .................................................................................................................. 45

G. Dumbadze

THE STATE OF POLLUTION OF BATUMI BLACK SEA COASTLINE WITH OIL AND OIL PRODUCTS IN 2006-2014.................................................................................................................. 46

G. Dumbadze, T. Frangishvili

OIL POLLUTION IN THE BLACK SEA AT THE BATUMI COASTLINE DURING 2006-2014......... 47

R. Efe, I. Curebal, A. Soykan, S. Sönmez

ANTHROPOGENIC FACTORS CAUSING ENVIRONMENT DEGRADATION IN DALYAN WETLAND AND THE VICINITY (EDREMIT-BALIKESIR, TURKEY)......................................................... 48

N. Elizbarashvili

GEO ECOLOGICAL FUNCTIONS OF GEORGIA’S LANDSCAPES AND ACTUAL PROBLEMS OF LANDSCAPE ECOLOGY ............................................................................................................. 49

R. Entzeroth, A. Fenske, S. Hanig

SURVEY ON TICKS (IXOIDAE) AND BORRELIOSIS INFECTIONS IN DRESDEN, SAXONY .......... 50

F. Er, V. Arefieva, F. Mikalsoy

FRUIT NURTITION (Fe, Zn, Cu, B, Mo) AND QUALITY EFFECTS ON ORCHARDING.................. 51

E. Eroğlu, C. Acar, G. Çakır, A. Kalın

A BASED ON ECOLOGICAL IDENTIFICATION OF LANDSCAPE CHARACTER IN MOUNTAIN ROADSIDE CORRIDOR BY USING LANDSCAPE METRICS......................................................... 52

D. Eşen, O. Yildiz

15-YEAR EXPERIENCE ON THE MANAGEMENT AND CONTROL OF RHODENDRON PONTICUM L. IN TURKEY.................................................................................................................. 53

I. Faridah-Hanum

TOWARDS THE DEVELOPMENT OF MANGROVE QUALITY INDEX (MQI): BENCHMARKING MANGROVE HEALTH FOR PENINSULAR MALAYSIA .......................................................... 54

A. Gad

INVESTIGATING DESERTIFICATION SENSITIVITY AT SOME WESTERN DESERT OASES, EGYPT, USING REMOTE SENSING AND GIS ..................................................................................... 55

G. Gagua, V. Gogitidze, M. Gongadze

WAYS OF IMPROVEMENT OF AGRO-ECOLOGICAL CONDITIONS OF VINE IN INNER KAKHETI...... 56

R. Gakhokidze

THE POSSIBILITIES OF THE NEW AGROBIOORGANIC GREEN TECHNOLOGY.......................... 57
M. Gakhutishvili
ARSENIC MINING POLLUTION IN GEORGIA: EVALUATION OF REMEDIATION APPROACHES........ 58

P. Gazzola
MAKING SUSTAINABLE ECOLOGICAL DEVELOPMENT A PART OF GOVERNMENT POLICY ........ 59

A. Gegechkhori
MEDITERRANEAN ENCLAVES ALONG THE BLACK SEA COASTAL REGIONS (WITHIN THE CAUCASUS ECOREGION) ........................................................................................................ 60

V. Geladze, N. Bolashvili, T. Karalashvili, N. Matchavariani, N. Chikhradze, D. Kartvelishvili
CREATION OF MANAGEMENT SYSTEM BASIS FOR KAKHETI WATER RESOURCES .............. 61

N. G. Gemejiyeva, Zh. Zh. Karzhaubekova
LIFE CHARACTERISTIC OF CISTANCHE SALSA (C.A. MEY.) G. BECK – PERSPECTIVE MEDICINAL PLANT OF THE SOUTH PERI-BALKHASH LAKE SAXAUL FORESTS ................. 62

N. Gokhelashvili
THE ROLE OF THE PUBLIC IN ENVIRONMENTAL DECISION-MAKING .................................. 63

T. Göktürk, Y. Aksu
BARK BEETLE FAUNA (COLEOPTERA: CURCULIONIDAE: SCOLYTINAE) OF THE CONIFEROUS FORESTS IN EASTERN BLACK SEA REGION OF TURKEY ........................................ 64

G. Grigolia, D. Kereselidze, K. Bilashvili, V. Trapaidze, G. Bregvadze
ASSESSMENT OF VARIABILITY OF FLOODS AND FRESHETS FREQUENCY IN SEPARATE MONTH OF SOME GEORGIA’S RIVERS ........................................................................... 65

S. Gücel, S. Sakçalı, K. Kadis, M. Öztürk
DIURNAL CHANGES OF WATER RELATIONS OF GOLDEN OAK (QUERCUS ALNIFOLIA) GROWING AT DIFFERENT ALTITUDES IN CYPRUS ........................................................................ 66

A. Gunya

N. Gvarishvili, A. Sharabidze
PECULIARITIES OF SUCCESSIVE PROCESSES OF NATURALLY RENEWED FOREST ON THE LANDSLIDE SLOPES .................................................................................. 68

K. R. Hakeem, I. Faridah-Hanum, R. Mohamed
MAPPING THE PROTEOME OF THICK WALLED AND RAPIDLY GROWING BAMBOO FOR THE DEVELOPMENT OF THICK WALLED BAMBOO PLANTLETS .............................................. 69

L. Hambaryan, M. Nalbandyan
PECULIARITIES OF DEVELOPMENT OF PHYTOPLANKTON AS AN INDICATOR OF THE ECOLOGICAL STATE IN MODERN HYDROCHEMICAL CONDITIONS OF MASRIK RIVER ...................... 70
CONTENTS

N. Jamaspashvili, N. Beruchashvili, L. Beruchashvili, M. Sharashenidze
LANDSCAPE-ECOLOGICAL APPROACH TO FOREST MANAGEMENT .................................................. 71

L. Jgenti, E. Tskitishvili, I. Eliava, T. Tskitishvili, N. Bagaturia, M. Gigolashvili
FAUNA AND ECOLOGY OF NEMATODES AND EARTHWORM OF HIGHLANDS DIFFERENT ECOSYSTEMS IN ADJARA ........................................................................................................... 72

K. Iankova
FAUNA AND ECOLOGY OF NEMATODES AND EARTHWORM OF HIGHLANDS DIFFERENT ECOSYSTEMS IN ADJARA ........................................................................................................... 73

T. Kacharava
SUSTAINABLE USE GENETIC RESOURCES OF MEDICINAL, AROMATIC, SPICY, POISONOUS PLANTS ......................................................................................................................... 74

B. Kalandadze, P. Felix-Henningsen
POLLUTION OF THE IRRIGATION SOILS AND CULTURAL CROPS WITH HEAVY METALS IN THE RIVER KVIRILA BASIN IN WEST GEORGIA DUE TO THE OPERATION OF ORE-DRESSING AND PROCESSING ENTERPRISES ........................................................................... 75

B. Kalandadze, R. Tolordava, D. Nikolaiashvili
ECOLOGICAL PROBLEMS OF SAMTSKHE-JAVAKHETI AGRICULTURE ........................................ 76

E. Kan, A. Khamzina, J. Lamers
ETHNOECOLOGICAL PERCEPTIONS OF COMMERCIAL FARMERS ABOUT CROPLAND DEGRADATION AND REHABILITATION MEASURES IN UZBEKISTAN ..................................................................... 77

N. Kandemir, A. Çelik, A. Ermiş, F. Yayla
ECOLOGICAL PROPERTIES OF SOME SCILLA L. TAXA (LILIACEAE) IN TURKEY ................... 78

L. Kartvelishvili
THE INFLUENCE OF CLIMATE CHANGE ON THE DEVELOPMENT OF REGIONAL TOURISM IN GEORGIA ................................................................................................................................. 79

D. Kereselidze, L. Matchavariani, V. Trapaidze, L. Lagidze, D. Svanadze, G. Bregvadze1, Z. Gulashvili
QUANTITATIVE ASSESSMENT OF PERMISSIBLE LOADS ON GEORGIA’S SOIL ......................... 80

N. Kezevadze
TERRITORIAL AND BRANCH ASSESSMENT OF WATER MANAGEMENT BALANCE OF GEORGIA BASED ON DIFFERENTIAL ESTIMATION AND MODELING OF ECONOMIC IMPACT ON WATER RESOURCES ......................................................................................... 81

N. Kezevadze
ACCUMULATIVE PROCESSES OF SOLID DEPOSITS IN ZHINVALI RESERVOIR ...................... 82

N. Khan, Farhatullah
HERITABILITY AND GENETIC ADVANCE STUDIES FOR BIOCHEMICAL TRAITS IN F2-3 INTROGRESSED FAMILIES OF BRASSICA ....................................................................................... 83
M. A. Khan
WEEDS AND THEIR IMPACT ON BBIODIVERSITY AND SOCIO-ECONOMIC STATUS
OF THE PEOPLE IN PAKISTAN ........................................................................................................... 84

J. Kharchilava, V. Chikhadze, Kh. Chargazia
CHANGEABILITY OF SURFACE OZONE CONCENTRATION IN TBILISI IN LAST 30 YEAR ............. 85

A. Khoetsyan, S. Khachatryan
THE CHARACTERISTICS OF LANDSCAPE DYNAMICS IN REPUBLIC OF ARMENIA (RA) ............. 86

G. Khomeriki, G. Meladze
RESOURCES AND THREATS OF THE ECO-TOURISM DEVELOPMENT IN GEORGIA ................. 87

S. Khorava, A. Kikava
PROTECTION OF ADJARA COAST ZONE BY ARTIFICIAL BEACH .................................................. 88

R. Khukhunaishvili, M. Koridze, M. Nagervadze, C. Khizrevanidze, S. Gabaidze
RUPHENOTYPICAL VARIATIONS OF TAS2R38 GENE AND ITS BIOECOLOGICAL SIGNIFICANCE .......................................................................................................................... 89

N. Kiknadze
COMPARATIVE CHEMICAL – EXPERTISE RESEARCH OF WATERS IN SOME SMALL RIVERS OF KHELVACHAURI REGION ........................................................................................................... 90

G. Kordzakhia, L. Shavliashvili, G. Kuchava
LAND RESOURCES RESEARCH OUTPUTS IN GEORGIA ........................................................................ 91

G. M. Kudabayeva, P. V. Vesselova, M. P. Danilov, B. M. Sultanova
IMPORTANT PLANT AREAS OF THE PERI-NORTH TIEN SHAN SUBPROVINCE
AS PERSPECTIVE PROTECTION AREAS OF PHYTOBIODIVERSITY .............................................................. 92

I. Kupradze, A. Jorjadze, A. Arabidze, T. Beltadze, K. Batsatsashvili, N.Y. Paniagua Zambrana,
R.W. Bussmann
ETHNOBIOLOGICAL STUDY OF SVANETI FUNGI AND LICHENS: HISTORY OF RESEARCH,
DIVERSITY, LOCAL NAMES AND TRADITIONAL USE ........................................................................... 93

M. Kurashvili, G. Adamia, L. Amiranashvili, T. Ananiashvili, M. Pruidze, T. Varazi, M. Gordeziani,
G. Khatisashvili
CREATION OF PHYTOREMEDIATION TECHNOLOGY FOR CLEANING ENVIRONMENT
POLLUTED WITH ORGANOCHLORINE PESTICIDES ........................................................................... 94

E. P. Kvachantiradze
THERMODYNAMIC MODEL OF SOIL MOISTURE SUPPLY FORECAST .................................................. 95

T. Kvritishvili, G. Tsereteli, R. Khakhadze
EXPERIENCE USE OF WORLD SOIL RESOURCES (WRB) IN GEORGIA ON EXAMPLE
OF THE HIGH MOUNTAIN SOILS ............................................................................................................. 96
## CONTENTS

L. Lagidze, L. Matchavariani, D. Kereselidze, N. Tsvitsivadze, N. Paichadze, N. Motsonelidze, M. Vakhtangishvili  
**THE INFLUENCE OF METEOROLOGICAL CONDITIONS ON ATMOSPHERIC POLLUTION IN GEORGIA** ................................................................. 97

A. Latiff, I. Faridah-Hanum  
**FOREST BIODIVERSITY, ECOSYSTEM CHANGES AND CONSERVATION IN MALAYSIA** ................. 98

M. Lebedeva, M. Lebedev  
**REFLECTION OF CLIMATE CHANGES IN THE MICROFABRIC OF SUBARIDIC SOILS IN THE SOUTHEAST OF EUROPEAN RUSSIA** .................................................................................................................. 99

Z. Lezhava, K. Tsikarishvili, N. Bolashvili, L. Asanidze, N. Chikhradze  
**PRELIMINARY OUTCOMES OF THE EKI MOUNTAIN KARST-HYDROLOGICAL AND SPELEOLOGICAL STUDY** ......................................................... 100

I. Papashvili, G. Lominadze, S. Khorava  
**THE TENDENCIES OF MODERN DEVELOPMENT OF THE RIONI – SUPSA INTERFLUVE REGION OF THE SEA SHORE** ................................................................. 101

N. Lomtatidze, N. Alasania  
**MONITORING OF CONCENTRATION OF MAJOR POLLUTANTS OF ATMOSPHERE IN BATUMI** ...... 102

G. Magalashvili  
**ISSUE OF THE USE OF WASTES CAUSING QUESTIONS IN SOME ORE MINING COMPLEX** .......... 103

A. Makeev, E. Zazovskaya, E. Kulinskaia  
**ECOLOGY OF PALEOSOLS** ........................................................................................................... 104

G. Makharadze  
**BIODIVERSITY OF THE FOULING-EPIFAUNA DISTRIBUTED IN THE SOUTH-WESTERN PART OF THE BLACK SEA** ................................................................. 105

M. Margaryan  
**THE PROSPECTS OF USING TREATED WASTEWATER IN AGRICULTURE IN THE REPUBLIC OF ARMENIA** ........................................................................ 106

K. B. Marwat  
**SILYBUM MARIANUM AND PARTHENIUM HYSTEROPHORUS: THREAT TO BIODIVERSITY AND COP PRODUCTION** ........................................................................ 107

L. Matchavariani  
**INTENSITY, DISTRIBUTION AND ROLE OF PROFILE-FORMING PROCESSES IN PEDOGENESIS OF GEORGIA** ........................................................................ 108

L. Matchavariani, D. Nikolaishvili  
**FORMS AND EXTENT OF FERRUGINATION IN SOILS OF GEORGIA** ................................................ 109
I. Matchutadze, H. Joosten, M. Tsinaridze
WORLDS UNIQUE KOLKHETI MIRES: GLOBAL AND REGIONAL CLIMATE REGULATION .......... 110

L. Megrelishvili, L. Kartvelishvili
PECULIARITIES OF CLIMATE PARAMETERS CHANGES IN GEORGIA ........................................ 111

G. Meladze, M. Meladze
IMPACT OF GLOBAL WARMING ON THE VEGETATION DURABLE AND DISTRIBUTION AREA OF CROPS IN THE HUMID SUBTROPICAL AND MOUNTAINOUS REGIONS OF GEORGIA ................................................................. 112

M. Metreveli, A. Meskhidze, F. Tchaidze, J. Jakeli, D. Beridze
NORTH AMERICAN MULTI-PURPOSE DEAR INTRODUCENT PLANTS IN WESTERN GEORGIA HUMID SUBTROPICAL CONDITIONS .............................................................. 113

F. D. Mikailsoy, I. A. Samofalova
APPLICATION OF ENTROPY AS CHARACTERISTICS OF INFORMATION DIVERSITY OF BULK COMPOSITION OF MOUNTAIN SOILS IN THE MIDDLE URALS .................................................. 114

D. Mikautadze, M. Kvaberidze
ROLE OF GEORGIA (IMERETI REGION) IN GREENHOUSE GAS (GHG) EMISSION REDUCTIONS .......................................................... 115

I. Mikeladze, G. Bolkavdze, M. Metreveli, R. Chagalidze, M. Davitadze, D. Beridze
THE THREATS-BIOLOGICAL INVASION OF BIODIVERSITY OF XXI CENTURY .......... 116

S. Mileva
INFLUENCE OF THE MOBILE PHOSPHORUS CONTENT AND POTASSIUM ON BIOLOGICAL ACTIVITY OF THE SOIL IN THE PREDURAL’E ........................................................... 118

D. Mumladze, N. Lomidze, N. Suknidze
CURRENT CLIMATE CHANGE OF COASTAL ZONE OF THE BLACK SEA (WITHIN THE TERRITORY OF GEORGIA) ................................................................. 119

D. Nikolaishvili, L. Matchavariani
EVALUATION OF LANDSCAPES’ SENSITIVITY IN GEORGIA ACCORDING TO GEOMORPHOLOGIC AND EDAPHIC FACTORS .......................................................... 120

D. Nikolaishvili, D. Sartania, L. Matchavariani
COMPLEX EVALUATION OF DIFFERENT FACTORS ON GROWTH OF GRAPE IN GEORGIA ...... 121

S. Nikolaishvili, Ts. Gvarishvili
BATUMI AND POTI PORTS PHYTOPLANKTON BIODIVERSITY ........................................... 122

S. Nurashov, E. Sametova
ALGA SPECIES DIVERSITY OF THE NATURAL PARK “BOROVOYE” .................................... 123

M. Öztürk
E3 – ECOLOGY, ECONOMY, ENVIRONMENT ........................................................................... 124
N. Paghava, N. Palavandishvili
INLAND WATERS OF ADJARA AS A POWER RESOURCE AND THEIR ECOLOGICAL CONDITION .......................................................... 125

A. Paranina, R. Paranin
NAVIGATION IN GEOGRAPHICAL SPACE AS A FACTOR OF DEVELOPMENT OF CIVILIZATIONS ................................................................................................................... 126

M. Phutkaradze, N. Gorgiladze
ECOLOGICAL PROBLEMS OF ECOTOURISM IN ADJARA .......................................................... 127

E. Querci
THE COMPANY LOW COST HIGH VALUE NAU! AND THE COLLaborATION WITH THE LEAGUE FOR THE ENVIRONMENT .......................................................... 128

A. Saghatelyan, Sh. Asmaryan, Y. Muradyan, G. Tepanosyan
TOWARDS SUSTAINABLE LAND USE: NEW METHODS FOR ASSESSING THE ECOLOGICAL STATE OF ARMENIAN GRASSLANDS ................................................................................................ 129

M. S. Sakçalı, A. Ablazov, S. Smajlović
COMPARATIVE STUDIES ON EFFECTS OF SILICON AND NANO-SILICON ON TWO TOMATO CULTIVARS .......................................................... 130

S. Sakçali, E. Altundağ, M. Küçük, M. Öztürk
STUDIES ON THE TRACE ELEMENTS IN SOIL-PLANT SYSTEM AROUND MURGUL COPPER MINE IN TURKEY .......................................................................................................................... 131

I. Samofalova
GENETIC CHARACTERISTICS OF BROWN FOREST SOILS ON THE MIDDLE URALS .......................................................... 132

D. Sartania
TRADITIONAL CULTURE OF NATURE MANAGEMENT IN SAMTSKHE-JAVAKHETI .......................................................... 133

BIOGEOPHYSICS OF SOILS IN ĆUMRA REGION OF CENTRAL ANATOLIA IN TURKEY .......................................................... 134

E. Shein, E. Milanovskiy, N. Sheina, A. Yudina
MODERN METHODS IN PHYSICS OF NATURAL DISPERSE SYSTEMS: THE LASER DIFFRACTION AND SEDIMENTATION METHODS .......................................................... 135

G. Sitpayeva
STUDY AND PRESERVATION OF WILD RELATIVES OF CULTIVATED PLANTS OF THE NORTHERN TIEN SHAN (WITHIN KAZAKHSTAN) .......................................................................................................................... 136

G. Sitpayeva, T. Murzatayeva, S. Inerbayeva, K. Makhmudova
STUDY AND APPROBATION OF EX SITU CONSERVATION METHODS FOR PRESERVATION OF THE BIODIVERSITY OF WILD RELATIVES OF CULTIVATED PLANTS OF KAZAKHSTAN .......................................................... 137
E. B. Skvortsova, E. V. Shein, A. V. Dembovetsky, K. N. Abrosimov, N. A. Shnyrev, K. M. Gerke,
K. A. Romanenko, A. B. Skvortsov

A STUDY OF LOAMY SOIL’S MICROSTRUCTURAL CHANGES DURING SWELLING AND SHRINKAGE USING X-RAY MICROCTOMOGRAPHY ............................................................ 138

A. Soykan, R. Efe, I. Curebal, S. Sönmez

SUSTAINABLE USE OF ECOTOURISM AND NATURE TOURISM AREAS IN BALIKESIR (NW TURKEY) .................................................................................................................. 139

N. Stepanyan-Gandilyan

TRADITIONS OF THE “GREEN” MENTALITY IN YEZIDI (KURDISH) CULTURE .................................................. 140

N. Sulkhanishvili

STRATEGIC ENVIRONMENTAL ASSESSMENT OF ARAGVI RIVER BASIN ................................................................. 141

M. Tatishvili, M. Meladze, I. Mkurnalidze, M. Kaisauri

SATELLITE TECHNOLOGIES IN FOREST ECOLOGICAL MONITORING ................................................................. 142

M. Tatishvili, M. Meladze, I. Mkurnalidze, M. Kaisauri

NATURAL HYDROMETEOROLOGICAL EVENTS IN GEORGIA UNDER GLOBAL CLIMATE CHANGE BACKGROUND ........................................................................................................... 142

L. Tielidze, L. Gadrani, M. Tsitsagi, N. Chikhradze

DYNAMICS OF THE GLACIERS IN THE KODORI RIVER BASIN (ABKHAZIA, GEORGIA) IN 1911-2014 .................................................................................................................. 143

N. Tkhilava

IMPORTANCE OF INTEGRATED WATER RESOURCES MANAGEMENT IN FLOOD AND FLASH FLOOD MANAGEMENT ........................................................................................................... 144

V. Tsanava, A. Meskhidze, Sh. Lominadze, E. Tsanava

MAIN PRINCIPLES OF ECOLOGIZATION OF FERTILIZATION SYSTEMS FOR SUBTROPICAL CULTURES ........................................................................................................... 145

E. Tsereteli, G. Gaprindashvili, T. Donadze, T. Nanobashvili, O. Kurtsikidze

SOME ASPECTS OF THE METHODOLOGY OF DISASTER GEOLOGICAL PROCESS HAZARD AND RISK MAPPING ON THE EXAMPLE OF GEORGIA ........................................ 146


MEASURES OF DRINKING WATER SUPPLY RESERVOIRS ECOLOGICAL PROBLEMS SOLUTION .......................................................................................................................... 147

N. Tsivtsivadze, E. Khatiashvili, L. Lagidze, N. Motsonelidze

DETERMINATION OF CHLORINE SAFE DOSE FOR DRINKING WATER DISINFECTION ............................................. 148

B. Turgut, M. Ozalp, B. Kose

PHYSICAL AND CHEMICAL PROPERTIES OF RECENTLY DEPOSITED SEDIMENTS IN THE RESERVOIR OF THE BORCKA DAM IN ARTVIN, TURKEY ............................................. 149
CONTENTS

S. Uzun, H. Muderrisoğlu, O. Yildiz, N. Aksoy, M. Sarginci, B. Toprak
IMPACTS OF RECREATIONAL USAGE ........................................................................................................... 150

I. Uysal, E. Yücel, S. Gücel, M. Öztürk
NUTRIENT TURNOVER STUDIES ON THE MONUMENTAL PLATANUS ORIENTALIS TREES FROM ÇANAKKALE-TURKEY ........................................................................................................ 151

A NEW APPROACH AND TOOLS FOR PERFECTING PHYTOREMEDIATION TECHNOLOGY .......... 152

M. Varshanidze, E. Mikashavidze
SEASONAL DYNAMIC OF MACROZOOBENTOS, OF THE GEORGIAN BLACK SEA COAST ZONE ........................................................................................................................................ 153

M. Vodenska, N. Popova
ECOLOGICAL IMPACTS AND SUSTAINABLE TOURISM DEVELOPMENT IN NATURAL PROTECTED AREAS (THE CASE OF BULGARIA) ........................................................................................................ 154

O. Yildiz, E. Altundağ, B. Çetin, Ş. T. Güner, İ. Gursoy, M. Sarginci, B. Altunay, B. Toprak, Ö. Mutlu
EFFECTS OF GYPSUM AND SULFUR AS SOIL AMENDMENTS ON AFFORASTATION SUCCESS IN INLAND PART OF ANATOLIA: EARLY RESULTS ........................................................................... 155

A. Yıldız, A. Aksoy, Ç. Vardar, E. Ünal
BIOMONITORING OF HEAVY METALS BY USING TRANSPLANTED LICHEN, PSEUDEVERNIA FURFURACEA, IN ÇANKIRI CITY, TURKEY ........................................................................................................ 156

A. Yıldız, A. Aksoy, Ç. Vardar
USING OF PSEUDEVERNIA FURFURACEA (L.) ZOPF BIOINDICATOR FOR HEAVY METALS......... 157

A. Yıldız, A. Aksoy, Ç. Vardar
DETERMINATION OF AIR POLLUTION BY PSEUDEVERNIA FURFURACEA (L.) ZOPF IN AN URBAN AREA ........................................................................................................................................ 158

H. F. Zakir, A. Sajid, Farhatullah
MOLECULAR CHARACTERIZATION OF BUCKWHEAT LANDRACES OF NORTHERN AREAS OF PAKISTAN ............................................................................................................................... 159

N. Zarnadze, S. Manjgaladze, Ts. Bolkvadze
PECULIARITIES OF MICROCLONAL PROPAGATION OF THE PLANTS .............................................................. 160

S. Zeynalova

PARTICIPANTS LIST ........................................................................................................................................... 162
SENSITIVE ALPINE PLANT COMMUNITIES TO THE
GLOBAL ENVIRONMENTAL CHANGES (KAZBEGI
REGION, THE CENTRAL GREAT CAUCASUS)

O. Abdaladze¹, G. Nakhutsrishvili², K. Batsatsashvili¹, K. Gigauri¹,
T. Jolokhava¹, G. Mikeladze²

¹ Alpine Ecosystems Research Program, Institute of Ecology, Ilia State University, Tbilisi, Georgia
² Department of Plant Systematic, Institute of Botany, Ilia State University, Tbilisi, Georgia
Email address: alpine_ecology@iliauni.edu.ge (Otar Abdaladze)

Abstract

Sensitive plant communities are complexes of species particularly susceptible to global environmental changes (climate, land use, etc.). In the temperate zone alpine areas are considered as the most important “hot spots” in this respect. In the Central Great Caucasus, which is the traditional alpine vegetation monitoring site in the Caucasus, on the basis of 50-years long (1964-2014) phytosociological and ecological studies the most sensitive plant communities were distinguished: 1) Treeline ecotone communities, including: (a) Evergreen prostrate shrubbery dominated by Rhododendron caucasicum, (b) Dwarf semi-shrubbery dominated by Dryas caucasica and (c) Thermo-hygrophilous subalpine tall herbaceous vegetation dominated by Heracleum sosnowskyi; 2) Subalpine broad-leaved mesophilous meadows dominated by Anemonastrum fasciculatum, Geranium ruprechtii, Betonica macrantha and Trollius ranunculus; 3) Alpine carpet-like meadows (“Alpine carpets”) consist of Campanula biebersteiniana, Veronica gentianoides, Taraxacum porphyrautum, Sibbaldia semiglabra, etc.; 4) Snow-bed vegetation (Galanthus platyphyllus, Fritillaria latifolia, etc.), and 5) Subnival/nival vegetation patches formed by 2-5(7) species (Cerastium kasbek, Alopecurus dasyanthus, Tripleurospermum subnivale, Saxifraga sibirica, S. flagellaris, Delphinium caucasicum, Nepeta supina, Pseudovesicaria digitata, Symphyoloma graveolens, etc.). Totally habitats of these plant communities cover about 1/3 of Kazbegi region area. Temperature rise, decrease in precipitation will lead to abrupt decrease of already small areas covered by Tertiary’s relict tall herbaceous vegetation; elimination of a number of highly sensitive plant species including: relic, rare, endemic and critically endangered; disappearance of alpine snow-bed species. On account of early snow thawing or belated snowfall in autumn chionophyte plants (elfin, prostrate and dwarf shrubs and forbs in the alpine zone) sensitive to low moisture content, few and short-term snow cover and high temperature will lose. Probably sharp changes should be expected in subnival/nival zones, first of all, related to abrupt decrease in the glacier areas and subsequent increase in the distribution range of many species. According to the scenario suggested for the South Caucasus, which is based on predicted 3.9°C rise of temperature and decrease of precipitation by 9-13% during the century, it is expected that further climate warming may significantly change the vegetation and consequently the landscapes in the region. The vegetation may become similar to that of dry gorges of the Rocky Ridge of the Great Caucasus, which are situated 10-15 km to the north of the Kazbegi region.
THE EFFECTS OF WIND CORRIDORS ON ECOLOGICAL URBAN LANDSCAPE PLANNING: A CASE STUDY FOR DÜZCE

M. Kıvanç Ak, S. Özdede, E. Eroğlu, Y. Memlük
Düzce University, Faculty of Forestry, Department of Landscape Architecture, Düzce, Turkey
E-mail: mehmetkivancak@duzce.edu.tr

Abstract
The aim of all planning and design understandings in the history is to provide a better life for human. One of the most important factors affecting human beings comfort is, without doubt, the wind. Even small changes in positions of buildings within the urban pattern can affect the wind and make big changes in microclimate. Duzce, the city chosen for the research sample, mostly has a plain surface in its populated central areas. Therefore, if the speed of wind and direction are processed in the right fashion, a better quality of life and a contribution to the urban ecology can be provided. This study investigated the importance of wind, which is one of most crucial elements of climate, in ecological planning of urban life. Main aim of the study is to look at how the wind affects landscape planning and design approaches. Besides, the study seeks to expose how building corridors contributes to the city. The corridors in this context are mainly in the areas where the city is expanding and these corridors are supported by urban models that are sustainable excluding the infrastructure. In accordance with the purposes, Urban Plannings of Duzce Municipality was investigated by using the official urban planning scale 1/1000. The city was analysed by focusing on urban landscape design. Meteorological data and urban plannings were employed as data. Moreover, it was aimed to put forth statistical meanings by using meteorological data. The most important aim of the study is to find out the relationship between urban landscape and the wind. Besides, making a city planning and a design model is also an important output of this study. Consequently, the study explored how structural and vegetational elements change the function of wind and highlighted the outcomes that help to provide optimum wind conditions for people.
NICKEl AND IRON IN SELECTED SERPENTINE GEOPHYTES FROM TURKEY

A. Aksoy, Z. Leblebici, J. Çelik
Akdeniz University, Faculty of Science, Department of Biology, Antalya, Turkey
E-mail: aksoy@akdeniz.edu.tr

Abstract
“Serpentinophytes” have the ability to grow on ultramafic soils (poor in essential nutrients and rich in nickel, iron, chromium etc.). These plants are valuable plant resources for emerging phytoremediation. Sepentinophytes are associated with specialized microflora. Approximately 500 plant species are known to hyperaccumulate heavy metals and metalloids. In the present study, 14 different geophytes species grown in serpentine habitats in district Yahyalı of Kayseri Province, Turkey, viz., Gagea fibrosa, Tulipa armena var. armena, Allium scorodopasum subsp. rotundum, Allium callidictyon, Ornithogalum moligophyllum, Ornithogalum armeniacum, Muscarica comosum, Muscaria neglectum, Muscaria azureum, Muscaria armeniacum, Colchicum triphyllum, Iris persica, Crocus sieheanus and Gladiolus atroviolaceus were investigated. All plant specimens collected were deposited in the Herbarium of the Biology Department of Akdeniz University. Samples of soil and different plant part (underground and above ground) were analyzed for nickel (Ni) and iron (Fe) by using Varian ICP-OES. Ni concentrations for Gagea fibrosa 2580-1575 mg kg\(^{-1}\) (dry weight) in soil and underground parts of plants respectively. Fe concentrations for Gagea fibrosa 28430-10500 mg kg\(^{-1}\) (dry weight) in soil and underground parts of plants respectively. Fe concentrations for Allium callidictyon, 28370-28396 mg kg\(^{-1}\) (dry weight) in soil and underground parts of plants respectively. Out of the 14 samples, Gagea fibrosa is a new addition to the list of Ni and Fe hyperaccumulators. Also, Allium callidictyon is a new addition to the list of Fe hyperaccumulators. Significance of serpentinophytes is discussed in this paper.
RIVER ADJARIISTSKALI SEDIMENT RUNOFF
CALCULATION ACCORDING TO THE ENERGETIC PRINCIPLE

M. Alaverdashvili, O. Khmaladze, D. Kiknadze, N. Kokaia, N. Khupenia
Iv. Javakhishvili Tbilisi State University, #3 I.Chavchavadze ave. 0179, Tbilisi, Georgia
E-mail: merab.alaverdashvili@tsu.ge

Abstract
Almost more than half century Georgian Black Sea seashore rivers are impacted by anthropogenic activity, caused quantitative reduction of sediment, that nourished coastline. On Adzharia coast already have begun serious erosion processes, caused by the building on the River Chorokhi of Turkish territory, 16 cascades of H/P stations. The problem will become much dangerous after the accomplishment of three H/P stations building on River Chorokhi and four ones on its tributary- Adjaristskali, all on the territory of Georgia. The dam construction, resulted in water discharge regulation, has reduced the river Chorokhi sediment drift from 11,2 m. t./year till to minimal- 100 thousand t/year, which, despite carrying out beach protection works, catastrophically influenced on the on Adjarian seashore dynamics. The norm of sediment runoff (suspended and bottom) has been established according to time-invariant observances, equals to 400 thousand tons annually. In our paper the norm of load runoff has been calculated using of so called “energy principle”, which equals to 395 thousand tones annually. The obtained results almost coincides with each other and enables to use the mentioned “energy method” at other river as well.
RESOURCES OF ORCHIS PURPUREA HUDS. IN AZERBAIJAN AND THEIR CONSERVATION

F. Aleskerova, N. Mehtiyeva, V. Alizade
Institute of Botany, Azerbaijan National Academy of Sciences, Baku, Azerbaijan
E-mail: juk_87@box.az

Abstract
Orchis purpurea Huds. (Orchidaceae Juss.) is a perennial tuberous plant with 30-80 cm in height. Leaves are broadly oval or elliptical, obtuse, with 3-6 cm width and up to 20 cm length. The flowers are large, with a vanilla scent, collected in polyanthous inflorescence. Outer tepals are elliptic-ovate purple-violet color, interior - linear, mesoptetalum is up to 15 mm length whitish or pale pink with dark purple flecks. Flowering and fruiting in April-May, propagated by seeds. Its areal covers almost all regions of the Greater and Lesser Caucasus, Kur-Araz and Samur-Davachi lowlands as well as Gobustan. It grows from lowland to middle mountain belt in meadows, bushes, forests, forest edges and clearings. Xeromesophyte, found as fragmented groups with 3-5 individuals. Orchis purpurea is medicinal and ornamental plant. Used in officinal, folk medicine and veterinary medicine. Phenol carbonic acids (o-hydroxycinnamic acid) are revealed in its leaves, anthocyanins (khrizantemin, cyanine, ofrisanin etc.) in flowers, carbohydrates (mucilage) in underground parts. Tubers are a source of salep used as the obducing, anti-inflammatory and emollient means. Applied internally in diseases of the stomach, liver, heart, diabetes, pulmonary tuberculosis etc., externally in carbuncles, toothache and for improving the hair growth. It is also used for phytopreparation in cosmetics. As a result of influence of environmental (torrent, drought etc.) and anthropogenic factors (grazing, cutting of trees, collecting by local population flowers for decoration, aboveground parts and tubers for medicinal purposes) the number of populations of this species is significantly reduced in their previously known locations. Consequently, as a rare and endangered species it is included in the “Red Book of Azerbaijan”. For sustainable development of resources of Orchis purpurea it is necessary to carry out measures such as the elaboration of approaches for their ex situ conservation, as well as searching their new habitats.
NATURAL-GEOGRAPHICAL ZONING AND GEO-ECOLOGICAL PROBLEMS OF GEORGIA’S BLACK SEA COAST

M. Alpenidze¹, Z. Seperteladze², E. Davitaia², G. Gaprindashvili³, T. Aleksidze²
¹ Sokhumi State University, Department of Geography, Tbilisi, Georgia
² Ivane Javakhishvili Tbilisi State University, Department of Geography, Tbilisi, Georgia
³ National Environmental Agency, Department of Geology, Tbilisi, Georgia
Email address: Melor07@mail.ru (M. Alpenidze), zura_sep@mail.ru (Z. Seperteladze), gaprindashvili.george@gmail.com (G. Gaprindashvili)

Abstract
The region’s natural geographic zones meant detection and mapping of Geo-complexes of Identified taxonomic rank. Geo-complexes - Individual territorial units differ from one another by natural conditions, landscapes hypsometry location and their spatial distribution, geo-ecological problems, shape and scale of anthropogenic impacts and extent of the character and quality of agriculture. Interest of Geo-ecological problem of the Region is caused by Black Sea (within Georgia) coast nature use process, utilization of the dynamic equilibrium potential faults. Negative changes in the functioning of natural systems and the disorder lead to unwanted changes. Possible solution to the problem of ecological science and environmental components geo-complexes scientific studies based on geographical and ecological aspects of the current state estimates, analysis and forecasts. Research object: Black Sea coastal zone – the eve of the land and sea include three geomorphological elements: coastline, beach and underwater slope. It is obvious that the acute deficit of sediment to the main geo-ecological problem even worse by strong anthropogenic pressure, which in turn is connected with the region’s natural resource potential (Resort-recreational, Balneology, mineral). Studies found that the magnitude of the loads exceeded the scale of anthropogenic and natural coastline of the permitted limits, contradicts the condition of the natural environment, focused on the conflict situation and the creation of an entirely new type of anthropogenic landscapes (aquatic, technogenic, recreational) towards development. Sea landscapes of natural conditions and ecological problems in the development of mixed-mode based on the detailed study was made possibility of natural-geographical zoning.
HERBALS USED FOR THE TREATMENT OF HYPERTENSION IN THE BLACK SEA REGION OF TURKEY

V. Altay, M. Öztürk
Biology Department, Faculty of Science & Arts, Mustafa Kemal University, Hatay, Turkey
E-mail: volkanaltay34@gmail.com

Abstract

It is a known fact that many local herbs have been used right from antiquity to control hypertension. An application of this practice is observed in the Black Sea region as well. The area occupies 18 percent of the total area of Turkey with its 141,000 km² of land, and is bordered by the Marmara Region to the west, the Central Anatolia Region to the south, the Eastern Anatolia Region to the southeast, the Republic of Georgia to the northeast, and the Black Sea to the north. The elevations range between 1500-1800 m in the west and 3000-4000 m in the east in Kaçkar Mountains. The higher slopes facing northwest are densely forested. The area around Trabzon is world-renowned for the production of hazelnuts, and farther east the Rize region has numerous tea plantations. The northern slopes contain dense growths of both deciduous and evergreen trees. Black Sea region has an oceanic climate, with high and evenly distributed rainfall the year round. The eastern part of that coast averages 2,500 mm annually which is the highest precipitation in the country. Attempt has therefore been made here to bring together the ethnobotanical knowledge present in the region and used for the treatment of hypertension. Our studies have revealed that many herbalas are used to overcome the problem of both hyper and hypo tension. We found that 23 taxa belonging to 21 genera and 14 families are used for the treatment of this health disorder. The most commonly used plants are Urtica dioica, Allium sativum and Viscum album ssp. album. The information presented here includes the detailed information on the vernacular names, places of distribution, part of the plant used and ways of consumption together with a discussion on the status of herbal drug treatment.
AN OVERVIEW OF THE SWAMP FORESTS OF TURKEY

V. Altay
Biology Department, Faculty of Science & Arts, Mustafa Kemal University, Hatay, Turkey
E-mail: volkanaltay34@gmail.com

Abstract
There are 14 recorded swamp forests in Turkey locally known as “longoz”. These are typical habitats supporting a large biodiversity with highly diverse ecological communities and classified as a unique, endangered world-class alluvial ecosystems. The 6 of these are conservation demanding. The largest of these is “İğneada Swamp Forest” with an area of 2500 km2. The biodiversity here includes 610 plant taxa, 314 species of insects, 233 species of birds, 50 species of mammals, 25 species of reptiles, 30 species of freshwater fish, 20 species of marine fish. It is the largest in Europe. The “Acarlar Swamp Forest” is 250-1250 m wide and 7,5 km long. It is placed as a wild life development area, with an endemic Hottonia palustris found only here in Turkey. There are some rare species as well like Leucojum aestivum. The “Sankum Longoz Forest” in Sinop on the Black Sea coast too possesses a rich biodiversity. The “Karacabey Swamp Forest” is 730 ha with over 600 plant taxa. The general plant diversity is composed of woody taxa like Fraxinus angustifolia ssp. oxycarpa, Fraxinus excelsior, Pterocarya pterocarpa, Carpinus orientalis subsp. orientalis, Clematis vitalba, Dioscorea communis, Helleborus orientalis, nitrogen-fixing species Alnus glutinosa subsp. glutinosa, Alnus glutinosa ssp. barbata, Acer campestre ssp. campestre, Ulmus minor, Ulmus glabra, Cornus mas, Carpinus orientalis ssp. orientalis and Quercus robur ssp. robur. Other taxa found in such forests depending on the phytogeographical region are; Carpinus betulus, Pterocarya fraxinifolia, Fraxinus ornus ssp. ornus, Populus tremula, Populus alba and Ulmus laevis. The swamp forests are important genetic reserves included amongst the rare global forest types and regarded as one of the subtypes of aquatic ecosystems. These forests have been separated as protected areas in Turkey, but are facing a threat due to unsustainable human activities.
ASSESSMENT OF ECOTOURISM POTENTIALS IN HATAY-TURKEY

V. Altay, F. Karahan
Biology Department, Faculty of Science & Arts, Mustafa Kemal University, Hatay, Turkey
E-mail: volkanaltay34@gmail.com

Abstract
Ecotourism, which is known as nature-based tourism activity, is very important due to supporting conservation efforts to protect natural resources and socio-cultural heritage in specific areas and developing economic conditions for the benefit of local people. It is grouped taking into account various criteria such as vehicles used such as bicycles, balloons, raft, horse; the region’s nature like mountains, plateaus, caves; and activity features like rivers, hunting, science, and trekking. Most common ecotourism activities are trekking, scuba diving, river tourism, horse trekking, cycle riding, botanical excursions, wild life-fauna watching, photo safaris, farm and ranch tourism. The present study was carried out in Hatay province and its environs including parameters like climate, land morphology, vegetation, wildlife and cultural values. The natural resource such as mountains, flora / fauna, protected areas, lakes, rivers, water falls, streams, springs and caves were evaluated. The cultural resource values included in this study were historical buildings, sacred places, handicrafts, local food and drinks, festivals, sportive activities and others. The study aimed at identifying and determining the potential ecotourism resources and environmental attractions effective in Nature tourism development in Hatay from the users’ view point. The guidlines for sustainable development the area also has been included.
MEDICINAL AND AROMATIC PLANTS OF IGDIR (TURKEY), NAKHCIVAN (AZERBAIJAN), AND TABRIZ (IRAN)

E. Altundağ, S. Jamshid Ibadullayeva, B. Aslanipour, M. Öztürk  
Düzce University, Düzce, Turkey  
E-mail: ernazaltundag@gmail.com

Abstract
Healing properties of plants are known to the humans since ancient times. The use of natural medicines is an important issue. Medicinal plants are used as: medicinal herb juices, raw as salad, in brewing, baking, ointment, and so on. The objective of the study is to observe the medicinal and aromatic plants of Iğdır (Turkey), Nahçivan (Azerbaijan), and Tebriz (Iran). Three of them have borders with each other and have similar cultures. A total of 348 naturally distributed taxa belonging to 58 families are used in the traditional medicine in Iğdır (Turkey), Nahçivan (Azerbaijan), and Tebriz (Iran). These mainly belong to the families like Asteraceae (67 taxa), Lamiaceae (39 taxa), Rosaceae (27 taxa), Apiaceae (23 taxa), Fabaceae (23 taxa), Brassicaceae (14 taxa), Liliaceae (14 taxa), Poaceae (11 taxa), Polygonaceae (10 taxa), Ranunculaceae (10 taxa). Most common taxa among these are; Achillea millefolium, Artemisia absinthium, Berberis vulgaris, Cichorium intybus, Fumaria officinalis, Glycyrrhiza glabra, Hypericum perforatum, Helichrysum plicatum, Origanum vulgare, Peganum harmala, Plantago major, Rosa canina and Urtica dioica. 54 taxa were observed to be poisonous. Local people in the region generally use herbal remedies as carminative, anthelminthic, orexigenic, stomachic, analgesic, tonic, diuretic and for rheumatic pain, nephralgia, kidney stones, hemorrhoids, skin troubles and gynecologic diseases. This area has a great potential about medicinal plants and interesting folk medicine culture.
SPECIAL FEATURES OF CHANGEABILITY OF DAILY SUM OF PRECIPITATION IN TBILISI IN 1957-2006

A. Amiranashvili
Mikheil Nodia Institute of Geophysics at Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia
E-mail: avtandilamiranashvili@gmail.com

Abstract
Wide-ranging studies of contemporary climate change in Georgia were begun in 1996 and they continue on the present time. First of all the inventory of greenhouse gases in Georgia was carried out, spatial-temporary variations in the fields of temperature, precipitation, cloudiness, aerosol air pollution, surface cover and other climate-forming parameters were studied. Later there have been begun works on forecasting of air temperature and precipitation change in some region of Georgia. In particular results of detailed statistical analysis of the average semi-annual and annual values of precipitation in Tbilisi for the period 1957-2006 are presented earlier. In the indicated period of time the weak positive trend of precipitation in the cold period of year was observed. Trends of precipitation for a year and warm half-year periods are not observed. In this work, which presents the continuation of the foregoing studies, some results of the standard statistical analysis of observational data of the Hydrometeorological department of Georgia of daily sum of precipitation (DSP) in Tbilisi in 1957-2006 are represented. Thus, the statistical structure of atmospheric precipitation with a daily intensity of 0 (without precipitation), 0.1-2, 2.1-5, 5.1-15, 15.1-30 and >30 mm for the five-year time intervals from 1957-1961, 1962-1966,…, to 2002-2006 is studied. The weak positive and positive trend of DSP respectively for the ranges of 5.1-15 and 15.1-30 mm was observed. The negative and weak negative trend of DSP respectively for the ranges of 0.1-2 and 2.1-5 mm was observed. The trend of DSP with an intensity of >30 mm was not observed.
DYNAMICS OF THE THIRTY-YEAR MOVING AVERAGE VALUES OF THE AIR TEMPERATURE IN TBILISI AND ST.-PETERSBURG WITH 1851 TO 2010 AND THEIR EXTRAPOLATION TO 2051-2080

A. Amiranashvili¹, Kh. Chargazia¹, L. Trofimenko²
¹ M. Nodia Institute of Geophysics of Iv. Javakhishvili Tbilisi State University
² Russian Research Institute of Hydrometeorological Information-World Data Center
E-mail: khatuna.chargazia@gmail.com

Abstract
In recent years the problem of observed and expected climate change on our planet acquired special urgency. This problem has high value in Georgia, because of the variety of climatic regions in its territory, and also, naturally, in Russia, with its extensive territory and variety of natural and climatic conditions. In our last studies with the use of different statistical models the estimations of the expected changes of the air temperature for the next decades in Tbilisi and other regions of Georgia were carried out. On the basis of 100-years (1907-2006) and 163-years (1850-2012) time-series of observations the analysis of the dynamics of the changeability of the average annual air temperature in Tbilisi and St.-Petersburg was carried out. With the use of a 100-years time-series of observations the expected change of the air temperature in these cities is evaluated. In the present work, which is the continuation of the indicated studies, the statistical structure of the thirty-year moving average values of the temperature of air in Tbilisi and St.-Petersburg with 1851 to 2010 (1851-1880, 1861-1890..., 1981-2010) is studied and with the use of two models (ARIMA, EXPERTMODELER) their extrapolation for 2051-2080 is carried out. Within the limits of each thirty-year period of observations autocorrelation in the time-series of air temperature, their stability in time, trends, speed of change of temperature, etc. is studied. Prognostic calculations showed that in 2051-2080 the average annual air temperature in Tbilisi is expected 14.0±0.4 °C (ARIMA) and 14.8±1.4 °C (EXPERTMODELER) against 13.7 °C in 1981-2010, while in St.-Petersburg - 6.4±0.4 °C (ARIMA) and 8.6±4.0 °C (EXPERTMODELER) against 5.8 °C in 1981-2010. The comparative analysis of the indicated results with the obtained earlier prognostic estimations of the air temperature in Tbilisi, St.-Petersburg, and also its mean global values is carried out.
PHYTOREMEDIATION OF CONTAMINATED SOILS, CONTAMINATED WITH HEAVY METALS FROM GOLD MINE IN GEORGIA

G. Avkopashvili¹, A. Gongadze², R. Gakhokidze¹, M. Avkopashvili³
¹ Iv. Javakhishvili Tbilisi State University, Department of Bioorganic Chemistry, Faculty of Exact & Natural Sciences, e-mail: gurandi19@gmail.com;
² Iv. Javakhishvili Tbilisi State University, Andronikashvili Institute of Physics, Condensed Matter Physics Department;
³ Iv. Javakhishvili Tbilisi State University, Department of Geography, Faculty of Exact & Natural Sciences.

Abstract
The proposed research aims to develop a suitable technique to phytoremediate contaminated soils in Georgia. These soils were polluted with heavy metals after gold mining. It is the aim to test the potential heavy metal accumulator green amaranth (Amaranthus viridis). The most contaminated soils in Georgia are from the Kazreti or the Bolnisi region. Agricultural products produced on that contaminated soils harm human health, which means that this soil is practically useless for agriculture. Hence, it is of relevance to develop and improve biotechnological methods, which eventually then can be applied to produce agricultural products on formerly polluted soils in Georgia. Products that are ecologically clean and acceptable for international market.
ALGAL INDICATION OF CLIMATIC GRADIENTS

S. Barinova1,*, V. Gabyshev2, M. Boboev3, L. Kukhaleishvili4, O. Bilous5
1 Institute of Evolution, University of Haifa, Mount Carmel, Haifa, Israel
2 Institute for Biological Problems of Cryolithozone SB RAS, Yakutsk, Russia
3 Khatlon Scientific Center Academy of Sciences of the Republic of Tajikistan, Kulob-town, Tajikistan
4 Tbilisi Botanical Garden and Institute of Botany, Tbilisi, Georgia
5 Institute of Hydrobiology of NAS of Ukraine, Kiev, Ukraine
E-mail address: barinova@research.haifa.ac.il (S. Barinova)

Abstract
Bio-indication is only possible because algal communities respond to environmental changes in a consistent way. In particular, the vectors of algal changes over latitudes and altitudes are well correlated with respective climatic gradients. The relationships between biotic and climatic changes are insufficiently studied so far, but regularities are analyzable provided the adequate geographic scale. Thus the impact of seasonality requires ecological study of the aquatic object as a whole or a considerable part of it. For the gradient analysis of altitudinal changes the sampling data must cover a region of diverse relief, whereas latitudinal gradients are traceable of sizeable parts of continents encompassing different climatic zones. In our studies, the impact of temperature changes is invariably significant when revealed with the help of bio-indication analysis. In the boreal realm, algal development most typically show three seasonal peaks correlated with the dynamics of ice cover, whereas two to single peak are distinguished down the latitudes. The latitudinal dynamics is fairly obvious in the quantitative relationships between diatoms, green, golden algae, and Infraspecies-Species variability. With climatic stress ascending to the north, the role of diatoms, but in the high Arctic regions drops significantly. The Infraspecific variability index increases from 1.09 up to 1.42. To the south, over the mountainous areas of Tajikistan, Georgia, Mediterranean and India, diatoms consistently decrease over the altitudinal range 200 – 2500 meters, while the other algal groups betray a less significant variation. Such regularities are more obvious with statistical correlation of climatic variables and freshwater algal diversity. Thus the distribution of phytoplankton species in the rivers of Yakutia and Chukotka over the gradient of DHI index and the duration of the ice free period is controlled by sun light intensity in the first place, but also reflects variation in the climatic stress resistance, the most prominent in the case of diatom algae.
CHANGES OF GEORGIAN MOUNTAINOUS RIVERS WATER FLOWS, PROBLEMS AND RECOMMENDATIONS

T. Basilashvili
Institute of Hydrometeorology, Georgian Technical University, Tbilisi, Georgia
Email address: jarjinio@mail.ru

Abstract
As a result of Global warming the Caucasus glaciers increasingly start melting, which in its turn leads to the higher water flows and disasters. While in drier regions evaporation increases, the water levels in the rivers decrease and the crops dwindle. In the long run, some of the glaciers will disappear, which will have a negative impact on water resources, water supply will lower and the country’s economic development will be halted. For increasing water resources, reforestation is a solution as forests play a vital and regulating role for superficial and underground water supplies. Forests enhance the quality of water and increase its supply and discharge. Forests strengthen the soil and prevent erosion, landslides, high water flows, floods and avalanches. Thus, the more forests the less negative consequences. In agricultural lands, forests are needed to protect vegetation and soil from emaciating and drying. In the dry climate regions water reservoirs must be built in the terrains which permit to do so, which will resist to serious water flows, mitigate the consequences of disaster and supply water to farms and population during the dry spells. For protecting river waters from the elements, for their rational utilization and effective and safe exploitation having forecasts of water flows is vital. In East Georgia work to increase rainfall artificially should be restored, which in its turn will protect the region from hail. For obtaining technical water technologies for turning salty sea water into fresh one should be utilized.
IMPACT OF CLIMATE CHANGE ON RIVER RESOURCES FLOWING INTO MOUNTAIN WATER RESERVOIR AND ITS FORECAST (ON THE EXAMPLE OF ZHINVALI WATER RESERVOIR)

T. Basilashvili
Institute of Hydrometeorology at the Georgian Technical University, Tbilisi, Georgia
E-mail: jarjinio@mail.ru

Abstract
Zhinvalli water reservoir serves multiple purposes – it (partially) supplies water to Tbilisi water reservoir, irrigates arable lands of eastern Georgia, supplies fresh water to Tbilisi and Rustavi (1.5 mln. people) and generate 585 mln. hour of energy. In addition, recreational centers and fish pools are built at the reservoir. The supply of water to the reservoir depends on the water flow of the Aragvi and accurate forecast of the water supply to the reservoir.
In accordance with the objective stated and based on the research, hydrological features of water resources flowing into the Zhinvalli water reservoir have been ascertained for different seasons, trends of changes over the years have been identified, expected scope of changes has been determined and probable meanings of water discharge have been established. In addition, empirical formulas have been worked out for determining water flow in the yet unstudied rivers.
With the view of forecasting water resources flowing into the water reservoir, by applying multifactor statistical models methodology for forecasting water discharges of the three main tributaries (the White, the Black and of Pshavi) have been worked out: in the vegetation period, high waters, quarterly and monthly. These forecasts are essential for yearly planning optimal working regime of Zhinvalli water reservoir and rational allocation of its water resources: for water supply, irrigation and power supply and for the environmental security and security of the reservoir itself, which will result into major economic benefits.
ADAPTATION TO CLIMATE CHANGE IN GEORGIA

B. Beritashvili¹, M. Shvangiradze², N. Kapanadze¹, N. Tsintsadze¹

¹ Institute of Hydrometeorology at the Georgian Technical University.
² Georgia’s Third National Communication to the UNFCCC, e-mail:ecohydmet@yahoo.com

Abstract

During the last half-a-century climate change in Georgia is being manifested by the increase of mean annual temperature in West Georgia by 0.3 – 0.40C and in East Georgia – by 0.4 – 0.50C. Annual sums of precipitation grew by 9% in western and varied in the range of ± 3% in eastern parts of the country. To the end of current century the rise of annual temperature by 3.50C is projected in western regions and by 4.10C – in eastern regions of Georgia. At the background of current climate change the intensification of extreme weather events is observed all over the country. Accounting for the future forecast this requires the timely working out and implementation of relevant adaptation measures. Project proposals prepared within the frameworks of Georgia’s Second and Third National Communications to the UNFCCC comprise seashore artificial nourishment, replenishment of river banks and amelioration with plants, arrangement of early warning systems, the restoration of irrigation systems and rehabilitation of windbreaks, reclamation of river banks, etc.
PRELIMINARY RESULTS OF A STUDY OF AIR TEMPERATURE DISTRIBUTION IN TBILISI INTO SUMMER SEASON

T. Bliadze, V. Chikhladze
M. Nodia Institute of Geophysics of Iv. Javakhishvili Tbilisi State University,
E-mail: tamuna.b813@yahoo.com

Abstract
Microclimate is understood as a local climate emerging under the influence of relief differences, vegetation, soil state, and the presence of water, buildings and other characteristics of underlying surface of land. The characteristics of the microclimate manifest themselves in the upper soil layers and in the lower atmospheric boundary layer up to a height of several meters or ten of meters, often to a height of 100-150 m and a horizontal scale up to some tens meters to 10 km. Most part of a city represents a plateau of warm air with the temperature increasing toward the center. The thermal uniformity of the plateau is broken by the influence of parks, rivers and densely built-up industrial zones and buildings. A variety of microclimatic characteristics of the city form the so-called “Urban Climate” significantly differing from the rural. In the work some results of research on distribution of air temperature in Tbilisi are presented.

Measurements of air temperature in both regimes of stationary measurements on two fixed bases of observation (territory of the Institute of Geophysics - basic meteorological station and Tortoise Lake – standard automatic meteorological station) and irregular mobile route regime measurements on 20-30 points in different districts of the city in the summer 2010 are carried out. Points of measurement settled down at the heights from 397 to 648 m above sea level. The distance from these points to a base station varies from 0.7 to 17.2 km.

The maps of the spatial distribution of air temperature are represented. In particular, it is received that the temperature difference between a base station and points of measurements in various districts of the city reaches 5°C.
DYNAMICS OF THE SHORELINE OF THE SOUTHEASTERN PART OF THE CASPIAN SEA (IRAN) AND IT INFLUENCE TO ECOLOGY OF THE COASTAL ZONE

V. Boynagryan¹, B. Najafiha²
¹ Yerevan State University, Armenia; vboynagryan@ysu.am
² Geological Survey of Iran; b_najafiha@gsi.ir

Abstract
Changes of the shoreline and its results owing to rising of the sea level of 2,35m during from 1977 to present-day with the largest rising in 1995 are examined on example of the Gorgan spit (Miankaleh peninsula) and adjoining from the west sections of the southern coast of the Caspian Sea. Changes of the shoreline are revealed by study of the geomorphologic structure of the coasts, aerial and space photographs of different years. The raising of the sea level involved increase the gulf area about 50%, flooding of shallow mud flats of the root part of spit and shift of it outset to the west. The spit became longer and narrower. The raising of the sea level became the cause of rolling of storm waves over narrow areas of the sand spit. It led to the destruction of some villages in the spit, abrasion of the sea slope of the coastal terrace and separate areas of the coast to the west from the spit. Sea salt water started to come to the gulf more than earlier and it, together with the rising of the water level exercised negative influence on fauna and flora of the gulf. The rising of the sea level is accompanied by a decrease of width of beaches up to full of wash of ones in the separate sections. Abrasion of coasts increased at the town Ferehabad. Stone barrier taking the blows of the waves was created for protection of coasts. Many buildings built during the low sea level in direct nearness from the water’s edge now are flooded and wrecked or lost connection with the coast and stay in the middle of the sea as islands. Further rising of the Caspian Sea level can become a cause of the breaching of the Gorgan spit in the separate sections and conversion of it to a chain of islands.
EFFECTS OF HEAT TREATMENT ON VARNISH AND AGING PROCESS ON WILD CHERRY (CERASUS AVIUM (L.) MONENCH) WOODS

N. Çakiciera, A. Aytin, S. Korkut
Düzce University, Forestry Faculty, Düzce, Turkey
E-mail: nevzatccakicer@duzce.edu.tr

Abstract
The current level of intensive wood extractions from natural forests puts pressure on ecosystems’ production capacity. The biggest challenge for forest manager is to take necessary measures to ensure sustainable wood supply. On the other side, the woods on the markets are short in supply and needs to be used efficiently. Thus, there is a need to increase researches for different aspects of wood materials in usages.

The aim of the current study is to investigate the wood properties of wild cherry (Cerasus avium (L.) Monench) under different heat treatments and varnish applications. The heat treatments were applied at 190 and 212°C for one and two hours. Then five different types of varnish were applied to the treated wood materials. The varnish treatments consisted of; 1- water based single component varnish (WB1), 2 - water based single component polyurethane modified (WBM), 3 - water based with two components (WB2), 4- polyurethane (PU) and 5- synthetic yacht varnish (SYN). Upon the application of different varnishes, accelerated aging treatments (QUV) were applied to the specimens.

To compare the treatment affects colors and luminosity values of the samples were measured. The results of the data revealed that loss of luminosity values of samples were lower after QUV for water based varnish treatments. The longer the QUV treatments were applied the lower the value of G and color differences (ΔE*) was detected. On the other hand, the highest values of ΔE* and PU were recorded on varnishes, but the lowest values were measured on SYN.
PROLINE, ANTIOXIDANT AND PHENOLIC COMPOUNDS OF HALOPHYTE EXTRACTS IN RELATION TO PLANT PARTS AND SOIL ANALYSIS

A. Çelik, G. Görk, E. N. Herken, E. I. El-Sarag, A. Ermis
Art and Science Faculty, Pamukkale University, Denizli, Turkey
E-mail: acelik@pau.edu.tr

Abstract
High soil salinity has a devastating effect on plant metabolism, where, salt stress responses in plants are the increases of reactive oxygen species, free radicals, highly toxic to living cells causing most of oxidative damage in aerobic cells. Natural antioxidants give the capability of living cells to counteract their damaging and scavenge these free radicals. So, a comparative screening to antioxidants and phenolic compounds of Pancratium maritimum and Salicornia perennis parts (Root, Herb, Bulb) in relation soil analysis from different locations (P.maritimum; L1, seashore level; L2, seashore sand dune; L3, island seashore level; L4, island seashore sand dune; S.perennis L5, saline swamp) was investigated. Fresh plant samples were collected from different saline seashores and swamp at Kuşadası peninsula (41°9’11”N / 35°4”E & 42°7’49”N / 35°5’4”E). The highest salinity levels (1.15 dS m-1) were at L4, while, the maximum pH value was 8.19 at L3. Organic matter percent was low (0.07-0.56%) but the alkaloid level (CaCO3%) was high at most of locations. At the second location, Bulbs gave the highest proline content (2.113 µmol g-1 fw), while, roots of S.perennis gave the highest DPPH and ABTS contents (0.46670, 0.02200 mMol TE g-1) and Total phenolic (1.470 g GAE g-1). Roots from 1st location gave the maximum contents of Syringic acid, Quercetine, Ferulic acid and P-kumarik acid, while P.maritimum Herbs gave the highest means of Cafeic, and Vanillic acid, but Herbs of S. perennis (L5) gave highest contents of Hesperidin and Resveratrole. According to these results, high salinity/alkaloid levels gave high levels of proline and phenolic compounds, while Roots grown under low organic matter and high soil fertility levels gave high antioxidant contents than herbs, which could be as a source of natural antioxidants.
PRE-TREATMENT SEEDS UNDER SALINITY LEVELS OF PANCRATIUM MARITEMUM L. GROWN IN MEDITERRANEAN REGION

A. Çelik¹, E. I. El-Sarag², E. N. Herken¹, A. Ermis¹
¹ Art and Science Faculty, Pamukkale University, Denizli, Turkey
² Faculty of Environmental Agricultural Sciences, Suez Canal University, Ismailia, Egypt
E-mail: acelik@pau.edu.tr

Abstract
Soil salinity lead to the reduction of crop production, so one of the important methods to increase production in saline soils is the use of resistant plants of salinity, such as Pancratium maritimum L., medicinal annual plant. A laboratory germination test was conducted to determine seed germination capacity and velocity under different salinity levels. Seeds were collected from Kuşadası peninsula, Turkey. Sixteen pre-treatments of seed germination were used before germinated seeds under three CaCl₂ concentrations (32, 48 and 64 dsm⁻¹). Results showed that neither directly nor freezing pre-treatments had a significant effect on seed germination parameters. There are increases in germinated seeds (85-100%) when they pre-soaked in tap and warm water with scarification by spongy seeds. Germination was inhibited by increasing salinity levels. Pre-soaking of scarified spongy seeds prevent salinity inhibition occurred from high levels (64 dsm⁻¹) in both tap and warm water. These data provide useful information for conservation and reintroduction of this species to saline regions.
Abstracts Book

SOME OF THE SEED CHARACTERISTICS OF COMMON BOX (BUXUS SEMPERVIRENS) GROWN IN DIFFERENT PROVINCES OF TURKEY

B. Cetin, E. Cicek, D. Esen, S. Kulaç, A. K. Ozbayram
Düzce University, Forestry Faculty, Düzce, Turkey
E-mail: bilalcetin@duzce.edu.tr

Abstract
Morphological and physiological characteristics of common box seeds (Buxus sempervirens) collected from six provinces (Hatay, Kahramanmaraş, Düzce, Kastamonu, Giresun and Rize) were investigated. Seed sizes and the weight of 1000 seeds (WTS) were significantly different among the provinces (P-value <0.005). Kahramanmaraş province has the highest seed length (6.3 mm) and width (3 mm) values. The lowest seed length (5.3 mm) and width (2.67 mm) values were recorded for Rize provinces. WTS values overall the provinces were calculated as 16 g. The highest value for WTS was measured as 17.57 g for Kahramanmaraş province. Rize province had the lowest WTS value which is about 20% lower than that of Kahramanmaraş province. Air-dry and saturated moisture content of the seeds averaged as 8.21% and 34.13%, respectively. Viable seed ratio was about 97% across all the provinces. Germination tests revealed that only seeds from Duzce provinces had about 1% germination rate at 15oC constant temperature treatment. The seeds from the other provinces did not showed germination at any of the treatments. Seeds received pre-treatments had shown between 0.75-1.75% germination rate in GA3 + cool stratification treatments for the seeds collected from Düzce and Kastamonu provinces.
FLOOD RISK ANALYSIS AND MAPPING IN THE EDREMIT STREAM BASIN

I. Cürebal, R. Efe, A. Soykan, S. Sönmez
Balikesir University, Department of Geography, Faculty of Arts and Science, Balikesir, Turkey
E-mail: curebal@balikasir.edu.tr; curebalisa@hotmail.com

Abstract
The Edremit Stream takes its source from the high areas of the Kaz Mountains and Mount Eybek, and it flows into the Aegean Sea. The basin houses Edremit district settlements and neighbourhoods. These settlements cover an area of 7.8 km². The Edremit Stream is affected by floods and inundations in the Northern Anatolia. The district settlement which is in the lower areas of the basin and through which the Edremit Stream flows is impacted to a great extent by these disasters. They mostly cause material damage. This study aims to determine the areas under the risk of inundation. Thus, analyses were carried out by using the Geographic Information Systems techniques and methods. The extent of inundation risk in the basin, the areas to be affected by inundation, and the condition of settlements in terms of inundation were determined. Geological, geomorphological, inclination, aspect, precipitation, distance from the river, underground water, soil and land use features data were combined with Weighted Overlay, and, consequently, inundation risk analysis was performed. Analyses show that 17% of the basin area and 71.1% of the settlement areas of the basin have a high risk of exposure to inundation. Consideration of inundation risk analyses for the land use in the basin and particularly for the identification of the features and developmental directions of the settlement areas will help reduce possible moral and material damage.
GENERAL REVIEW ON HAZARDOUS WASTE MANAGEMENT

K. Onur Demirarslan¹, B. Yalçın Çelik²
¹ Artvin Çoruh University, Engineering Faculty, Department of Environmental Engineering, Artvin, onurdemirarslan@artvin.edu.tr
² Artvin Çoruh University, Engineering Faculty, Department of Environmental Engineering, Artvin,

Abstract
Today, industrialization is one of the mandatory requirements of the modern society. Industrial activities brought by the rapid economic development; accelerate the increase in hazardous waste generation. Due to the impact of the increase in the amount of hazardous waste, public health management of these wastes has been an increasingly important research topic in recent years. Management of hazardous waste is seen as one of the environmental problems that need to be resolved in a practical and lasting solution. Environment pollution depending on the production of hazardous waste causes rapid depletion of sustainable resources. Hazardous wastes must be collected separately from other wastes in an appropriate manner because of the characteristics that threaten the health of humans and other living things. Collecting, transferring, recycling and disposal of hazardous wastes are made possible by a special infrastructure. The number of disposal facilities for hazardous waste is lacking and the number of recovery and recycling facilities is limited in Turkey. In addition, waste producers are unconscious. So, these factors complicate the hazardous waste management. For this purpose, the process of production of hazardous waste and disposal is examined in this study. In addition, difficulties related to hazardous waste management are discussed in this paper.
LIFE FORMS OF VEGETATION OF ADJARA’S OAK FOREST

I. Diasamidze, G. Bolkvadze, N. Varshanidze, N. Turmanidze, E. Jakeli
Batumi Shota Rustaveli State University, Batumi, Georgia, e-mail: inga-diasamidze@yahoo.com

Abstract
This paper outlines the experiences to the diversity of life forms of oak forest of South Colchis. Morphology of buds is discussed and plants are divided into groups according to the seasonal rhythm of development. A total of 426 species characterized by a great diversity of life forms have been described in the Adjara oak forest. In the overall spectrum of life forms distributed in Adjara oak forest trees are represented 27 species. Out of them 4 species are evergreen plants and 23 ones are deciduous tree. The peculiarities of renovation bud are common to all species of this group. All plants develop the buds of scaled type. According to the classification of life forms offered by, Raunkiear they can be attributed to phanerophytes. Shrubs-37 species, make 8,7% of overall quality of the species. The 11 species are evergreen plants and 26 ones are deciduous ones. The 30 species of shrubs are characterized by buds of scaled type. 7 species are characterized by buds of mixed and hypsophilic type. Lianas are represented by 5 species, of which 2 species are evergreen and 3 ones are deciduous, with the buds of open and scaled types. Among species distributed in oak forest of South Colchic - Adjara herbaceous plants dominate with 375 species (83,8% of overall number species). The 238 species (55,8%) out of them are polycarpic plants and 119 species (28%) are monocarpic ones, among which 83 species (19,5%) belong to annual monocarpic plants and 36 species (8,5%) to biennial plants. According to the life span of the assimilation surface of leaf and plant relation to this or that seasonal during the year, species described in oak forest of Adjara have been divided into the following seasonal groups: 1. Evergreen plants, 2. Summer and wintergreen plants, 3. Summer-green plants; 4. Ephemerals.
NATURAL AND ANTHROPOGENIC DYNAMICS OF VEGETATION IN THE ARAL SEA COAST

L. Dimeyeva
Institute of Botany & Phytointroduction /Ministry of Education & Science, Almaty, Republic of Kazakhstan,
Email address: l.dimeyeva@mail.ru

Abstract
Natural dynamics (primary successions) are studied in the dry seabed of the Aral Sea. Long-term studies of vegetation have identified three types of primary successions: psammosere, halosere and potamosere (sere of shrubby riparian vegetation). They differ by soil texture and salinity, patterns of temporal dynamics, and stages, selected on a basis of ecological-physiognomic features of dominant plants. Late seral stages were identified for succession types: psammophytic shrub (Calligonum spp, Astragalus brachypus, etc.) for psammosere; haloxerophytic and xerophytic dwarf semishrubs (Anabasis salsa, Artemisia pauciflora, A. terrae-albae) for halosere. There is a change of a dominant plant and succession dynamics in late seral stages in potamosere (Tamarix spp. → Calligonum spp, Haloxylon aphyllum, Artemisia terrae-albae).

Anthropogenic dynamics of vegetation (secondary successions) depends on factors of disturbance. There is a set of anthropogenic factors causing degradation of vegetation cover: (1) agricultural: overgrazing, haymaking, plowing, clearing trees and shrubs; (2) linear structures (paved and dirt roads); (3) water management: construction and operation of hydraulic structures, fluctuation in river runoff and the sea level, disturbance in the natural flooding regime; (4) fires; (5) recreations. The leading factors in the region are connected with water management and irrigation. To identify the dynamics of plant communities and potential degradation trends, there are series of shifts (successional series): hydro-, xero-, halo-, psammo- seres characterizing moisture content and edaphic environments. Changes in the hydrologic regime of the Syrdarya river, building of the hydraulic structures lead to reduction of hydromorphic vegetation and a change it into halophytic desert. The construction of the Kokaral dam and restoration of the Small Aral Sea has led to the rehabilitation of wetlands and plant diversity. Hydrogenous succession facilitated a gradual recovery of populations of rare species listed in the Red Data Book of Kazakhstan, IUCN, Europe (Scirpus kasachstanicus, Nymphoides peltatum, Salvinia natans, Typha minima).
VEGETATION OF THE SOUTHERN RANGE OF JUNGGAR ALATAU MOUNTAINS

L. Dimeyeva, E. Ablaikhanov, A. Islamgulova
Institute of Botany & Phytointroduction / Ministry of Education & Science, Republic of Kazakhstan,
E-mail: l.dimeyeva@mail.ru

Abstract
The Junggar Alatau mountain system stretches in the latitudinal direction at 450 km between N 44 and 46°. It consists of mainly two parallel, high mountain ranges: the northern and the southern. Vegetation occupies an intermediate position between the Northern Tien Shan and the Altai mountains. The vegetation of the southern range has features of typical Central Asian mountain systems (Cerasus tianschanica, Bothriochloa ischaemum, Krascheninnikovia ceratoides, Kochia prostrata) as well as some typical Siberian species (Abies sibirica, Trollius altaicus, Atragene sibirica). The regularities of altitudinal zonality of vegetation in the Southern Junggar Alatau mountains are studied. The following belts are identified: piedmont deserts; mountain steppe with sub-belts of desert and meadow steppes; forest-meadow belt; subalpine meadows, steppes and elfin woods; cryophytic (alpine) meadows and steppes. The forest-meadow belt is presented by fragments on the slopes of northern exposure. Small-lived and coniferous-deciduous forests grow only in the river valleys. Sub-belt of the typical bunch grass steppe is not found due to the aridity of the southern range and plowing foothill plains. Characteristics of main types of vegetation are done for each altitudinal belt. According to ecological-physiognomic classification, in the Southern Junggar Alatau range there are 5 vegetation types: arboreal, shrubby, dwarf semi shrub, meadow, steppe.
NEW HABITATS FOR ENDANGERED PLANT SPECIES FROM THE MIDDLE DNIEPER BASIN (REPUBLIC OF MOLDOVA)

A. Donica
Institute of Ecology and Geography, Kishinev, Moldova
E-mail: alacrete@mail.ru

Abstract
The study included researches in Natural Areas Protected by State, in 2011-2014, in the middle of the Dniester River basin, located on the border with Ukraine, in order to delineate habitats of rare species of plants, with national and international protection status, within existing areas across Europe and identifying new habitats (in the study) for the most threatened species of flora in the region. Physical and geographical peculiarities of the investigated region, conditioned a unique floristic diversity, played by chorology of rare identified species, these being mentioned in the various Annexes of Environmental Conventions (Bern,1979; Washington,1973; Appendix IUCN,2008; Red Book of republic of Moldova, 2001 and Red Book of Ukraine,2009, as neighboring country), therefore requires additional measures and habitat rehabilitation. By comparing data on the distribution of rare species of plants, covered in the study, in Geobotanical districts of our country (Negru,2002 Gheide-man,1975) and their distribution maps from the Red Book of Republic of Moldova (2001), our research data have identified 8 new habitats of growth and development of endangered plant species included in the Red Book of Republic of Moldova
THE STATE OF POLLUTION OF BATUMI BLACK SEA COASTLINE WITH OIL AND OIL PRODUCTS IN 2006-2014

G. Dumbadze
Batumi Shota Rustaveli State University, Faculty of Natural Sciences and Health Care. Department of Biology, Batumi, Georgia
E-mail: gugulidumbadze@hotmail.com

Abstract
The current study sheds some light on the environmental aspects of the Black Sea at Batumi coastline wherein there is oil accidental spills, and this causes a high level-pollution, which drive us to do this research. This pollution has a considerable negative effect on environmental state of the Black Sea. Therefore, the research aims at studying the pollution rate in the Black Sea on the Batumi coastline caused by the oil spills during a nine-year period (2006-2014). The study reported that there were nine accidental spills of oil and oil products over this period. During this period, about 3.145 tons of oil was accidentally spilled to the sea, and this caused a considerable rate of environmental pollution due to this oil leakage. The highest pollution took place in 2006, and a small amount was in 2011, but the least was 2013 over the period between 2006 and 2014. In 2014 (January-May), the oil pollution did not occur at the Black Sea Batumi coastline water. Apart from accidental spills of oil at localized areas, Batumi coast of the Black Sea did not show chronic oil pollution. In general, it can be stated that large spatial and temporal variability of the petroleum hydrocarbon distribution were encountered in the 2006 and 2011 years. It seems that patches of oil pollution are often local and of short time visible. Oil surrounding coastal zone increased blue - green algae points as indicators of water pollution consists of biogenic substances.
OIL POLLUTION IN THE BLACK SEA AT THE BATUMI COASTLINE DURING 2006-2014

G. Dumbadze, T. Frangishvili
Batumi Shota Rustaveli State University, Batumi, Georgia
E-mail: gugulidumbadze@hotmail.com

Abstract
Pollution, loss of biodiversity and coastal degradation have been considered, as the major issues which affect negatively upon the environmental state of the Black Sea. Scientists have identified several crucial problems for the Black Sea associated with various sources of pollution. In recent years the chemical pollution has been looked upon as the most serious transboundary problem. Oil pollution threatens the Black Sea coastal ecosystems and the levels of pollution are substantial in many coastal areas and at the river mouths. The aim of the research was to study the pollution of the Black Sea coastline by oil spill during a seven year period (2006-2014) and its impact on the sea coastal ecosystems. The study showed that, in 2006-2014 implemented nine accidental spills of oil and oil products. During this period, about 3.144255 tons of oil was spilled in the sea. The most significant spill was in 2006. In 2013, there were two accidental spills, Oil Quantity Amounted to 0.000118 and 0.000634 tons. Therefore, pollution of sea water has been exceeded the permissible limit (57 - to 138 – fold). In 2014 (January-May) the petroleum and oil pollution did not take place at the Black Sea coast. Oil surrounding coastal zone increased blue-green algae points as indicators of water pollution consists of biogenic substances.
ANTHROPOGENIC FACTORS CAUSING ENVIRONMENT DEGRADATION IN DALYAN WETLAND AND THE VICINITY (EDREMIT-BALIKESIR, TURKEY)

R. Efe, I. Curebal, A. Soykan, S. Sönmez
Balikesir University, Department of Geography, Faculty of Arts and Science, Balikesir, Turkey
E-mail: recepefe@hotmail.com

Abstract
This study identifies the features of the Dalyan Wetland located on the Aegean shores in the northwest of Turkey, and it discusses the importance of this ecosystem. Human-caused environmental problems were detected near the wetland. Field work was carried out to come up with solutions, and suggestions were presented. Conducted through the comparison of various satellite images taken on different dates thanks to geographical information system and remote sensing technologies, the study demonstrates the area variation of the wetland. Current situation and problems were identified as a result of field work. The main human-caused problems are as follows: Uncontrolled and unplanned settlement within the natural borders of the Dalyan wetland, dumping waste and rubble on alluvium that is an aquifer, physical and chemical pollution in the rivers cutting across the area, olive waste water (kara-su) discharged into the wetland, uncontrolled waste inputs, geothermal waters that are not reinjected, polluting elements from the solid waste storage area of Edremit, and problems caused by the highway.
Abstracts Book

GEO ECOLOGICAL FUNCTIONS OF GEORGIA’S LANDSCAPES AND ACTUAL PROBLEMS OF LANDSCAPE ECOLOGY

N. Elizbarashvili
Department of Geography, Iv. Javakhishvili Tbilisi State University, Georgia.

Abstract

Numerous scientific studies are dedicated to the problem of landscape ecology every year, and there is a special magazine and collection of works in this field published regularly. The trends dedicated to the landscape ecology are almost forty, including ecological inventory of the components of landscape, structure, functioning, age, genesis, volume, diversity, self-purification, value, conservation, self-organization, uniqueness, balance, plasticity, pollution, degradation, alteration, optimization, potential, stability, sensibility, comfort, productivity, etc.

It is clear that the list of such issues can be further extended. However, in the final run, we will have to deal with the evaluation of the structure and functioning (modern state), potential and stability of the landscape. It is them, to which more than one urgent issue of landscape ecology needing the focusing of the scientific-geographical studies is related.

Landscape, with its essence, is a territory, which is the result of the spatial-and-time associations of the geographical components. A landscape of any range (planetary, regional or local) has its horizontal and vertical structure as a result of a permanent change of substance and energy in it in space and time. At the same time, a landscape is an open system associated with functioning of a neighboring landscape and economic and social activity of the society.

Landscape functioning can be considered as a set of many natural and anthropogenic processes, with physical (mechanical), chemical and biological processes as most evident with their outcomes. Such processes are a subject of geophysical, geochemical and geo-biocenology study of the landscapes. In respect of landscape ecology, the synthesis of the study results of the above-mentioned processes remains topical.

Functioning of the landscapes, together with the human economic activity, directly determines the structure, state, potential, etc. of the landscapes. Landscape functioning can be studied in details only through stationery studies; however, peculiarities of certain processes can also be identified through the field studies.

Landscape functioning can be considered as a set of many natural and anthropogenic processes, with physical (mechanical), chemical and biological processes as most evident with their outcomes. Such processes are a subject of geophysical, geochemical and geo-biocenology study of the landscapes. In respect of landscape ecology, the synthesis of the study results of the above-mentioned processes remains topical.
SURVEY ON TICKS (IXOIDAE) AND BORRELIOSIS INFECTIONS IN DRESDEN, SAXONY

R. Entzeroth, A. Fenske, S. Hanig
Technische Universität Dresden, Dresden, Germany
E-mail: rudolf.entzeroth@tu-dresden.de

Abstract
A survey on ticks of roe deer (Capreolus capreolus) and hunting dogs was done in 2008-2009 in urban area of Dresden, Saxony. Ticks were determined by scanning electron microscopy and Borrelia spec infections by nested PCR. Ticks from roe deer were 27,1% from dogs 30,4% Borrelia-DNA positiv.
FRUIT NURTITION (FE, ZN, CU, B, MO) AND QUALITY EFFECTS ON ORCHARDING

F. Er¹, V. Arefieva², F. Mikalsoy³
1 Cumra College of Applied Sciences, University of Selcuk, Cumra/Konya, 42500, Turkey, e-mail: fatiher@selcuk.edu.tr
2 Russian State Agrarian University – Moscow Timiryazev Agricultural University, Faculty of Agronomy and Biothechnology, Department of Soil Management and Experimental Design, 127550, Timiryazevskaya Str., 49, Moscow, Russian
3 University of Igdir, Department of Soil Science and Plant Nutrition, 76000, Igdir, Rıza Yalçın Str, Turkey

Abstract
Nowadays, while increasing world population, providing nutrition to humanity has been occupying scientists for decades and alternative solutions about the matter are still important and up-to-date. Thus, recent years one of the important problems is current global increasing quantity and quality parameters of agricultural yield. Plant nutrition, providing higher yield firstly, also has another important effect on product quality. Involuntarily excessive or insufficient nutrition lowers product yield and quality, decreases fruit durableness and taste, some compounds may increase to the level that may endanger human health as it can be seen from the researches.
A BASED ON ECOLOGICAL IDENTIFICATION OF LANDSCAPE CHARACTER IN MOUNTAIN ROADSIDE CORRIDOR BY USING LANDSCAPE METRICS

E. Eroğlu, C. Acar, G. Çakır, A. Kalın
Düzce University, Faculty of Forestry, Department of Landscape Architecture, Düzce, Turkey
E-mail: enginneroglu@duzce.edu.tr

Abstract
Mountainous areas cover almost 20 percent of the world. These areas are very variable owing to their topology, geomorphology, hydrology, fauna, flora and climate. This situation gives rise to clear characteristics on mountains. The differences between what the landscapes have on their structure and how they are perceived explain the main characters. In mountainous areas, the parts that degradations excluding residential impact can easily be seen in are road corridors. These corridors, which divide the whole into small parts and create special lines, are main components of the mountain areas. Landscape ecology is in the leading concept of management of the field of ecology is a rapid development. In recent years, landscape ecology is observed a rapid increase and these studies that they showed diversity and differences have expanded the boundaries of the landscape ecology. The landscape ecology emphasizes the relationship between ecological processes and spatial patterns with basically the causes and consequences within a certain scale. Landscape when viewed from above, is seen as a mosaic. The landscape mosaic in a plan is seen as the form of a matrix in the background patch patterns and corridors. In this study, the corridors are important components of the landscape are discussed in terms of landscape metrics in particular of road corridor in mountain areas. The main purpose of the study is to realize patch analyze in fragmentation of the roadside corridor and to identified ecological units of the landscape. In the process of the study, roadside corridor was digitalized by using satellite images of the study area in GIS and then, ecological landscape units were identified and classified by using patch analyze in GIS. As a result; in study area, 14 different landscape character and 222 landscape unit were identified along with the roadside corridor by using landscape metrics.
15-YEAR EXPERIENCE ON THE MANAGEMENT AND CONTROL OF RHODENDRON PONTICUM L. IN TURKEY

D. Eşen, O. Yildiz
Düzce University, Faculty of Forestry, Düzce, Turkey
E-mail: deryaesen@duzce.edu.tr

Abstract
Purple-flowered rhodendron (Rhodendron L.) is native to Turkey, growing in dense populations in the understory of the mesic forests of Black Sea Region of TURKEY. Although dense populations of this vigorous shrub provides significant soil conservation value on steep northern slopes of the North Anatolian Mountains, it is considered a major impediment to forest natural and artificial regeneration in various locations in the world including UK and Turkey. Rhododendron is also an important forest vegetation management problem on the eastern US. For the last 15 years, research has focused on understanding the ecology of this significant woody weed as well as successful weed control practices varying from manual to chemical control methods. Rhododendron is an important element of the region’s forest, shaping up the forest ecosystem (i.e. physical, biological, and chemical effects). Manual removal of the weed has long been employed in Turkey. Lately, mechanical controls of rhododendron with low impact machinery and chemical control with systemic herbicides have been used. This paper discusses of the key findings of the long-going research on the ecology and control of rhododendron.
TOWARDS THE DEVELOPMENT OF MANGROVE QUALITY INDEX (MQI): BENCHMARKING MANGROVE HEALTH FOR PENINSULAR MALAYSIA

I. Faridah-Hanum
Faculty of Forestry, University Putra Malaysia, Selangor, Malaysia
E-mail: i.faridahhanum@gmail.com

Abstract
The mangroves in Peninsular Malaysia are still exposed to many threats especially from adverse economic activities upstream and the mangrove ecosystem itself, which often lead to the decline of its quality. No measure of mangrove quality as an index has ever been developed elsewhere in the world except for Tampa Bay in Florida. With the remaining mangroves left in Peninsular Malaysia at approximately 97,500 hectares, the development of Mangrove Quality Index (MQI) will be a way forward to determine mangrove health and provide solutions to rectify disturbances and take effective mitigation measures to protect the resource sustainability. Matang Mangroves were chosen by virtue of its being the largest tract of well managed mangrove forest in Peninsular Malaysia. A total of 50 potential parameters identified from past studies that were proven to be worthy biotic, abiotic and socio-economic parameters for this project and relevant Malaysian Environmental Quality Index metrics are currently being investigated for their suitability to be used as usable and practical metrics in assessing mangrove quality. Each parameter is given a score value on a scale of 1-5, with 1 indicating the most impacted and 5 the most pristine conditions. The scores will then be added together and divided by the total possible score resulting in a number from 0 to 1, with 0 being the most impacted and 1 being the most pristine. At the end of the project, practical and usable metrics for measuring mangrove quality will be identified, and the Matang MQI developed. It will serve as a benchmark for measuring the quality of other mangroves in Peninsular Malaysia.
INVESTIGATING DESERTIFICATION SENSITIVITY AT SOME WESTERN DESERT OASES, EGYPT, USING REMOTE SENSING AND GIS

A. Gad
National Authority for Remote Sensing and Space Sciences, Cairo, Egypt
E-mail: abdallagad@gmail.com

Abstract
A number of three oases, located in the Middle Western desert of Egypt were investigated. ETM satellite images, geologic and soil maps were used as main sources for calculating the index of Environmental Sensitivity Areas (ESAI) for desertification. Algorism is adopted from MEDALLUS methodology as follows: ESAI=(SQI*CQI*VQI)^1/3. Where SQI is soil quality index, CQI is climate quality index and VQI is vegetation quality index. SQI is based on rating parent material, slope, soil texture, and soil depth. The VQI is computed on bases of rating three categories (i.e. erosion protection, drought resistance, plant cover). The CQI is based on aridity index, derived from values of annual rainfall and potential evapotranspiration. Due to the homogenous hyper arid climatic conditions, dominating the western desert, value of CQI was considered 1 in studies oases. Arc-GIS-9 software was used for computation and sensitivity maps production. The results show that soils of the oases are characterized only by moderate and low quality indices, except the Kharga oasis which includes 24.4% of its soils as high quality. The oases at northern latitudes attain larger areas of soils characterized by moderate quality index than those of low one. Soils at the southern latitudes are characterized by more occurrences of low soil quality indices. The calculation of VQI showed a wide range between average in areas exhibited by Halophytic plants and weak to very weak in areas covered by Saharan vegetation and adopted cultivations. Concerning the climatic quality index (CQI), oases are localized in hyper arid zone, where evapotranspiration extremely exceeds the values of precipitation. Areas characterized by low desertification sensitivity represent 7.3% of the Bahereya oasis, while those of moderate sensitivity represent 92.7 and 0.8% of Bahereya and Kharga oases respectively. The whole Dakhla oasis is exhibited by sensitive and very sensitive environmental sensitive areas for desertification.
WAYS OF IMPROVEMENT OF AGRO-ECOLOGICAL CONDITIONS OF VINE IN INNER KAKHETI

G. Gagua, V. Gogitidze, M. Gongadze
Vakhushti Bagrationi Institute of Geography of Iv. Javakhisvili Tbilisi State University, Academy of Agricultural Sciences of Georgia, e-mail: givi_gagua@yahoo.de

Abstract
Species of the vine and the place of its growth are reflected in the wine as in the mirror” (F. Davitaia). The properties of wine produced from the same vine species grown on the right and left banks of the Alazani River and in the areas approaching the Great Caucasus and Gombori ridges strongly differ from one another, which apart from the climatic conditions is due to the soil properties. Soil supplies vine with nutrients and at the same time influences the quality of wine produced from grapes in Inner Kakheti. Especially the blackish color of soils created on detrital cones of the Rivers of Durudji, Bursa, Chelti, Shorokhevi causes intensive absorption of solar energy and the growth of the soil temperature and their composition loosens the soil and increases its aeration.

Agricultural plants in Kakheti, including vineyards, almost every year are hailed. In order to avoid natural disasters, it is necessary to finance agriculture properly, just to equip viticulture with special mechanized nets. Continuous covering of vineyards in the vegetation period is not profitable. The covering of vineyards is advisable to be carried out only by Capron meshes in hail hazardous situations observing a mechanize rule.
THE POSSIBILITIES OF THE NEW AGROBIOORGANIC GREEN TECHNOLOGY

R. Gakhokidze
Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia
E-mail: rgakhokidze@gmail.com

Abstract
Due the fact that the population of the world is going to exceed nine billion, in order to meet the basic needs of the mankind, it is necessary to increase food production three times in the nearest three decades.

On the basis of many years of fundamental research we studied the ways of management of the vivid cell and revealed universal regulators of a new generation, which we named bioenergyactivators having no analogues in the world. They make it possible to gain biologically pure, high quality crop with minimal chemicalization, without contaminating the Environment.

The expansion of biofuel production may be achieved with the use of bioenergyactivators. Fossil fuels (coal, oil, gas) have been identified as the major reason for the change of temperature in the atmosphere. They have been dramatically adding to the carbon dioxide levels in the atmosphere.

Biofuel is one of the alternative fuel options that have a potential to help reduce oil consumption and pollution causing global warming. Although in the process of burning biofuels release roughly as much carbon dioxide as regular fossil fuels, such crops soak up carbon dioxide as they grow. That is why biofuels are thought to reduce overall exhaust emissions as compared to fossil fuels.

Bioethanol is the most common biofuel, accounting for more than 90% of total biofuel usage. Ethanol can be produced from many feedstocks. The production of ethanol from sugar cane and sugar beet is energy-efficient since the crop produces high yield per hectare and sugar is relatively easy to extract. With the help of bioenergoactivators a yield of sugar from sugar beet per hectare rises from 7 to 32 tons, which makes it possible to meet people’s demand on food as well as on biofuel.
ARSENIC MINING POLLUTION IN GEORGIA: EVALUATION OF REMEDIATION APPROACHES

M. Gakhutishvili
Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia
E-mail: marinagakh@gmail.com

Abstract
Gold-arsenic, arsenic and gold-antimony deposits in Georgia are of significant economic importance. Realgar As4S4-Orpiment As4S6 (Lukhuni, Racha) and Arsenopyrit FeAsS (Tsana, Svaneti) ores of Georgia are unique in the world. The arsenic content in these ores is particularly high and reaches an average of 12%. Although the mining of arsenic deposits have temporarily ceased, important volumes of As containing industrial wastes are still present at the various mining sites, located at Ambrolauri (Racha) and Lentekhi (Svaneti). The content of arsenic in tailings varies between 8% and 60%. At the same time, they contain commercially important quantities of the precious metals gold, silver. Arsenic has long been known because of its acute and long-term toxicity. It is one of the most toxic elements that can be found. It occurs in soil and minerals and it may enter air, water and land through wind-blown dust and water run-off. It causes serious polluting when it enters rivers or ground water, and it is a particular problem where either of these sources is used as drinking water supplies. Although the mining facilities are now out of operations, the environmental pollution resulting from the former activities is still acting. For example, recent studies has shown that the content of arsenic in the soils around the factory were 20 to 30 times those of background levels. However, the nature, importance and extent of the environmental effects of the As mining in Georgia are very poorly known. Our research intends to assess the environmental impact of the As mining in Georgia and to evaluate the various approaches for remediation/rehabilitation of the mining sites, considering the socio-economic context of the country. Making recommendations for the Georgian government including actions for public awareness is possibly for legislation.
MAKING SUSTAINABLE ECOLOGICAL DEVELOPMENT A PART OF GOVERNMENT POLICY

P. Gazzola  
Department of Economics, Insubria University, Varese, Italy,  
E-mail: patrizia.gazzola@uninsubria.it

Abstract
The research aims to analyze the evolution of the concept of sustainable ecological development and the central rule of the government policy for the improvement of the quality of life. Nowadays sustainability is at the forefront of many organization’s agenda. Government policies play a fundamental rule, but there is a disjoint between the government policy on sustainable development and its actual participation in the endeavor. The government has to take account of sustainable development as a part of how it develops its policies. The system has to be defined at various levels of aggregation. It is assumed that changes in the behavior of public institutions and organizations are a prerequisite for sustainable ecological development. The paper, using the model of five capitals, explains how the sustainable ecological development can help to improve the quality of life of citizens. A minimum necessary condition for sustainable ecological development is the maintenance of the total natural capital stock at or above the current level. This work explores the link between natural capital and sustainability from a government policy perspective and it examines how sustainable ecological development must be integrated within public sector organization’s planning.

The research considers, that the goal of sustainable ecological development is to use the natural resources wisely in the short-term so that these resources are available in the long-term. Ecological sustainability relies on the fact that humans have the ability to exhaust the natural resources, leaving nothing but polluted water and infertile soil for future generations. Ecological sustainability is the belief that all humans must use resources wisely and efficiently so that these resources never become exhausted or over polluted.
MEDITERRANEAN ENCLAVES ALONG THE BLACK SEA COASTAL REGIONS (WITHIN THE CAUCASUS ECOREGION)

A. Gegechkori
Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia
E-mail: arngegechkori@yahoo.com

Abstract
The most important crises in the recent history of the Mediterranean Sea occurred during the Messianian (about 6 mya ago) called the “Messinian Salinity Crisis” (MSC).

The world’s five Mediterranean-type climates are characterized by dry summer months and a cool, wet winter. The Mediterranean-type vegetation shows several adaptations to drought. This area is characterized both of very high levels of vascular plants diversity (22,500 species). Today, circum-Mediterranean regions are home to some particular maquis-type plant species (species of Olea, Quercus, Arbutus, Erica, maritime Pinus).

Among others, to the circum-Euxinian distribution of Mediterranean enclaves the most comprehensive work was dedicate by V.P. Maleev (1940). The pseudomaquis communities in the Euxinian region confined to relict niches in a narrow strip along the Turkish Black Sea region (Pinus pinea, Arbutus andrachne, Erica arborea, Cistus spp.). Between Novorosyisk and Anapa (Russia) Mediterranean biota find its purest expression species of Juniperus, Pistacia. In Georgia (Cape Bichvinta) ‘primary maquis’ is represented by Pinus brutia var. pityusa, Arbutus andrachne and Erica arborea in which species of Cistus spp., Arundo donax are also abundant. Finally, ancient connection with the Mediterranean flora have been found in Shuakhevi district in Adjara. Here, about 700 m Arbutus andrachne is a rare admixture in thermophilous Quercus dshorochensis and Pinus kochiana forest communities, with Cistus salviifolia in the undergrowth; nearby occur a single stand of Osmanthus decorus. This negligible and impoverishment stand of pseudomaquis is the last microrefugium to expand its range in South Colchis.

The comprehensive survey in the Mediterranean biogeographical region via psyllid (Hemiptera, Psylloidea) fauna and its infiltration in circum-Euxinian countries have been done by me (Gegechkori, 1984, 1985, 2004).
CREATION OF MANAGEMENT SYSTEM BASIS FOR KAKHETI WATER RESOURCES

V. Geladze, N. Bolashvili, T. Karalashvili, N. Matchavariani, N. Chikhradze, D. Kartvelishvili
Vakhushti Bagrationi Institute of Geography at Ivane Javakhishvili Tbilisi State University,
E-mail: vakhtanggeladze@yahoo.com

Abstract
The fresh water deficit is one of the most important global problems today. The scarcity of available water resources is frequently created artificially by intensive growth of urbanization of population, industry and agriculture without properly taking into account the availability of water resources. Therefore, the system of management of water resources (water resources - water consumption - water supply) must proceed from that position, that deficiency or surplus of water should be evaluated in accordance with the need for it.

On the background of current climate change for mitigation and adaptation to the mentioned process, in the whole world, and in Georgia as well, arises the necessity of exact estimation of the amount of water resources in order to arrange the efficient fresh water management and supply system and its proper use.

Kakheti region has been selected to carry out the research. According to the forecast, at the end of the 21st century in the southern part of Kakheti it is expected decrease of the hydrothermal coefficient from 1,1 to 0,7, which will shift the region’s climate from the subtropics into the very dry category [1]. The influence will be spread along the entire territory of Kakheti. On that basis and from the management point of view water resources of Kakheti region are the important and interesting to proceed to the controlled use of water and to estimate water deficit or excess according to its requirements.
LIFE CHARACTERISTIC OF CISTANCHE SALSA (C.A. MEY.) G. BECK – PERSPECTIVE MEDICINAL PLANT OF THE SOUTH PERI–BALKHASH LAKE SAXAUL FORESTS

N. G. Gemejiyeva, Zh. Zh. Karzhaubekova
Institute of Botany & Phytointroduction Ministry of Education and Science, Almaty, Kazakhstan
Email address: ngemed58@mail.ru (N.G. Gemejiyeva), zhanna1322@mail.ru (Zh. Zh. Karzhaubekova)

Abstract
The present study was carried out within the framework of grant financing of scientific surveys per subject: Restoration potential of producing vegetation of solonchak cistanche (Cistanche salsa (C. A. Mey.) G. Beck) in the South Peri–Balkhash Lake area (2012–2014). The survey object is perspective medicinal plant encountered within the South Peri–Balkhash Lake area solonchak cistanche of the Orobanchaceae Vent. family, which in Kazakhstan is produced only at the territories of Almaty and Zhambyl regions and then it is exported to Korea and China as raw stock for production of a number of pharmacologically active compounds having wide spectrum of effect such as hypertension, sexual vigor, antioxidant activity, where at present time, the producing areas and reserves in these countries have diminished. The life characteristic of this species was studied for the purpose of balanced use and preservation of natural populations of cistanche as perspective source for production of plant-based preparations of tonic and antioxidant effect. As a result of surveys, the peculiarities of distribution and floristic composition of vegetation communities including solonchak cistanche located within the South Peri–Balkhash Lake area totaling at least 48 species of plants of 16 families were identified. As per results of field surveys, the inventory and monitoring of producing areas of cistanche were carried out before and after raw stock production. The reserves of raw stock materials were calculated and schematic maps on distribution of identified producing areas of cistanche within the surveyed area were compiled. The total hydroalcoholic extracts were received and preliminary phytochemical screening of cistanche vegetable stock collected in 2013–2014 in the area was provided. The stolons of studied plant were found to contain main groups of biologically active compounds such as flavonoids, coumarines, carbohydrates, amino acids, organic acids, alkaloids, triterpenoids, saponins. The structures of two substances were extracted and identified.
THE ROLE OF THE PUBLIC IN ENVIRONMENTAL DECISION-MAKING

N. Gokhelashvili
Department of Environmental Policy and International Relations, Ministry of Environment and Natural Resources Protection, Tbilisi, Georgia
Email address: n.gokhelashvili@moe.gov.ge

Abstract
Many cases prove that involvement of the public in decision-making process on environmental issues has a real influence on proposed or planned activities and the final decisions are acceptable for all main stakeholders: government, the public, and developer of activity. Despite the facts demonstrating the role of the public in environmental decision-making, various experts approach to the public participation process with doubt and some criticism. From their point of view, many aspects of public participation are still questionable, such as who, why, how, at what stage should participate, etc. This article does not aim to answer each existing question. But along with the criticism of various experts, highlighting some important aspects of public participation, the article aims to: demonstrate a rationale of public participation in environmental decision-making; show the trend in this direction based on the analysis of violations of public participation procedures in some countries; demonstrate the real influence of the public on final decisions with regard to the environment, focused on the concrete examples. The arguments and conclusions made on this overview creates additional inspiration for further discussions and exploration of different aspects of public participation in environmental decision-making.
BARK BEETLE FAUNA (COLEOPTERA: CURCULIONIDAE: SCOLYTINAЕ) OF THE CONIFEROUS FORESTS IN EASTERN BLACK SEA REGION OF TURKEY

T. Göktürk¹, Y. Aksu²
¹ Department of Forest Entomology and Protection, Faculty of Forestry, Artvin Coruh University, Artvin, Turkey. E-mail: temel.gokturk@gmail.com
² Artvin Forest Department, Forest Protection, 08000, Artvin, Turkey.

Abstract
Bark beetles are notorious pests of natural and planted forests causing extensive damage. Bark beetles (Coleoptera: Curculionidae: Scolytinae) cause economically damage every year in coniferous forests of the Eastern Black Sea Region of Turkey. Black Sea Region as a whole has the largest area covered by forests, accounting for 25% of the total forestlands of the country. Oriental spruce, Picea orientalis (L.) is one of the main tree species that naturally grows in Eastern Black Sea Region part of Turkey. Pinus sylvestris (L.) and Abies nordmanniana (Stev.) are another import tree species in this region. Most bark beetles prefer dead, dying, or weakened trees as their breeding material and referred to as secondary insects, but they can become primary pests under outbreak conditions. Since the beginning of the epidemic disaster about 30 years ago, the coniferous trees more than 2,5 million cubic meters have been lost. In this study, bark beetle species were determined in the coniferous forests of the Eastern Black Sea Region of Turkey between 2010-2014. During the five year period, which studies were conducted, surveying studies were made. For this aim, trees weakened by other insects or drought, cutting remaining and storage woods and also trap trees were checked. As a result, we found 24 bark beetle species. These species; Hylastes angustatus (Herbst, 1793), Hylastes ater (Paykull, 1800), Hylastes cunicularius (Erichson), Hylurgops palliatus (Gyllenhal), Tomicus piniperda (Linnaeus), Tomicus minor (Hartig), Dendroctonus micans (Kugelann Ips acuminatus (Gyllenhal), Ips cembrae (Heer), Ips amitinus (Eichhoff), Ips duplicatus (Sahlberg), Ips sexdentatus (Boerner), Ips typographus (Linnaeus), Xyloterus lineatus (Olivier), Cryphalus abietis (Ratzburg, 1837), Cryphalus piceae (Ratzburg, 1837), Pityogenes bidentatus (Herbst), Pityogenes quadridens (Hartig, 1834), Pityogenes chalco graphus (Linnaeus, 1761), Pityogenes bistridentatus (Eichhoff), Pityokteines curvidens (Germ.), Pityokteines spinidens (Reitter), Orthotomicus erosus (Wollaston), Orthotomicus proximus (Eichhoff). Among these species, especially Ips typographus, Dendroctonus micans and Ips sexdentatus are the most common. The size of these bark beetles population was tried to keep under control using mechanical control, biotechnological control and biological control.
ASSESSMENT OF VARIABILITY OF FLOODS AND FRESHETS FREQUENCY IN SEPARATE MONTH OF SOME GEORGIA’S RIVERS

G. Grigolia¹, D. Kereselidze², K. Bilashvili², V. Trapaidze², G. Bregvadze²

¹ Institute of Hydrometeorology of Georgian Technical University
² Faculty of Exact and Natural Sciences of Iv. Javakhishvili Tbilisi State University
E-mails: davit.kereselidze@tsu.ge; vazha.trapaidze@tsu.ge

Abstract
Not all the floods and freshets observed every year on rivers in Georgia, lead us to destructive effects, lots of them don’t grow into catastrophes. The catastrophic nature of floods and freshets is basically caused by the excessive intensity of snow melting, which becomes even stronger, when during snow-melting period take place atmospheric precipitations of considerable extent in the form of rains. Detailed investigation of this phenomenon is very important for mitigation of results of floods and freshets. Variability of frequency of floods and freshets on Georgia’s rivers (Rioni, Chorokhi, Atcharistskali, Mtkvari, Potskhovi) has been compared. Main attention is focused on the amount of water maximum discharge’s hitting in different ranges in separate months every year during the observation period. Ranges for separate steps are selected using module coefficient, in order to make possible receipt of unified results for different rivers. Also the coefficient of freshet activity is studied, which is getting smaller with an increase of the catchment basin area. All the mentioned gives us an opportunity to compare the range of maximum discharge variation according to separate months.
DIURNAL CHANGES OF WATER RELATIONS OF GOLDEN OAK (QUERCUS ALNIFOLIA) GROWING AT DIFFERENT ALTITUDES IN CYPRUS

S. Gücel, S. Sakcah, K. Kadis, M. Öztürk
Institute of Environmental Sciences, Near East University, Nicosia, Cyprus
E-mail: sgucel@hotmail.com

Abstract
The material used was Quercus alnifolia, an ecologically important ornamental endemic species of Cyprus. Few ecophysiological studies carried out on this species. Our aim was to understand water potential (ΨL) and conductance to water vapour (gL), which are important tools for quantifying the water relations of species on a regional scale at different altitudes. The measurements were conducted at three different elevations. gL and ΨL were measured every 90 min between 06.00 and 19.00 h. One-year-old leaves from at least three different plants per species were used for all the measurements taken during May, February and September. In May it shows lower transpiration for Olympos and Lythrodontas and much higher at Prodramos. In September, the driest period of the year, transpiration rates for all locations are the lowest between 0 to 2 mmolm-2s-1. In February Prodramos shows transpiration between 1 to 3 mmolm-2s-1 and Lythrodontas shows the highest transpiration rate. Out of all three locations, Lythrodontas shows the highest transpiration values for all three seasons. WSIS is lowest in February for all locations and same as 10 MPah. May is the second with around 20 to 30 MPah. In May the highest recorded values are for Olympos, 30 MPah. In September Prodramos shows comparatively lower values. At Lythrodontas and Olympos the WSIS reached peak values of 55 and 65 respectively. A significant correlation exists between WSIS and seasons (r2=0.99) in all locations.
FORTIETH ANNIVERSARY OF THE BOOK “ALPS-CAUCASUS: TOPICAL PROBLEMS OF THE CONSTRUCTIVE GEOGRAPHY OF MOUNTAIN STATES”: WHAT WOULD BE REMAKE?

A. Gunya
Institute of Geography, Russian Academy of Sciences
E-mail: gunyaa@yahoo.com

Abstract
A relatively rich tapestry of experience in cooperation exists between the Caucasus and the Alps. Similarities in natural conditions made it possible, even in centuries gone by for close contacts to develop between the inhabitants of the Caucasus and the Alps, who could share their experience. During the Soviet era, a comparative analysis of these two regions attracted a lot of attention, especially in the field of hazards or tourism. 40 years ago, in the mid-seventies, several scientific symposia were held to compare the Alps and the Caucasus, and several papers were published presenting the common features and differences of the two regions. Among them - the book “Alps-Caucasus: Topical problems of the constructive geography of mountain states”. Since that, the conditions of the scientific cooperation between the Alps and the Caucasus have been extremely changed. In view of the current geopolitical situation in the Caucasus the understanding of what is the Caucasus is also changed, the territory should really also include those parts of Turkey and Iran which are part of the Lesser Caucasus. The possible remake of the book could strengthen the scientific cooperation processes within the Caucasus and contribute to coordinated monitoring and a cross-border exchange of information.
PECULIARITIES OF SUCCESSIVE PROCESSES OF NATURALLY RENEWED FOREST ON THE LANDSLIDE SLOPES

N. Gvarishvili, A. Sharabidze
Batum Shota Rustaveli State University,
E-mails:n.gvariSvili@mail.ru; sharabidze.a@gmail.com

Abstract
The information on the natural renewal of the damaged ecosystems as a result of natural processes is quite insufficient. Therefore, the issue of studying the peculiarities of the dynamics of successive processes of forest ecosystems renewed on the landslides of the mountainous regions in Adjara is very topical. On the slope of the Solgoman Mountain (Khulo Municipality, village Tsablana) the landslide completely destroyed the vegetation.
During a short period (25 years) a pine-tree forest was developed on the lifeless substrate, which consisted of road metals without any human intervention. On the landslide slope, along with the growth of woody plants, layered differentiation took place in the phytocenosis developed via the gradual establishment of coenotic interrelationships, plant cover was complete, a certain system of natural renewal was created, etc. It should be noted that the mixed forests are developed on the right side slope with dominance of chestnut, oak and beech.
These species of plants are not observed in the renewed forest ecosystems on the landslides. In addition, the signs of natural renewal of these species are not even noticed here, which confirms that the perspective of the development of phytocenosis in the nearest future is less presumable.
MAPPING THE PROTEOME OF THICK WALLED AND RAPIDLY GROWING BAMBOO FOR THE DEVELOPMENT OF THICK WALLED BAMBOO PLANTLETS

K. R. Hakeem, I. Faridah-Hanum, R. Mohamed
Faculty of Forestry, University Putra Malaysia, Serdang, Selangor, Malaysia
E-mail: kur.hakeem@gmail.com

Abstract

Bamboo is one of the most important, fast growing, non-timber forest plants in the world. Several putative related genes involved in shoot growth such as SuS, PAL and SUT have been identified from certain bamboo species. However, complete knowledge of bamboo development, including the formations of thick wall and its molecular mechanisms is still lacking. In the “omics” era, ‘Proteomic Analysis’ has now become one of the basic technologies to obtain essential information of the biological system. Proteomics is a powerful tool to study the global changes in protein synthesis in response to environmental stimuli as well as during development. Currently, there is a growing demand for the thick walled and rapidly growing bamboo from the industry due to its mechanical strength, high durability and uninterrupted as well as sustainable supply. At present, we have performed some proteomics studies on various commercially important known species of bamboo of Malaysia to understand the molecular mechanisms of rapid growth as well as thick wall lumen. The present study will help us to better understand the growth characteristics and physical properties of bamboo at molecular level by identifying the novel proteins associated with the production of thick wall in rapidly growing culms of bamboo. We believe that the present proteomics study shall provide a new dataset and the gene screening list, which will be a useful resource for future genetic as well as genomic studies for the development of high quality bamboo cultivars.
PECULIARITIES OF DEVELOPMENT OF PHYTOPLANKTON AS AN INDICATOR OF THE ECOLOGICAL STATE IN MODERN HYDROCHEMICAL CONDITIONS OF MASRIK RIVER

L. Hambaryan, M. Nalbandyan
The Institute of Geological Sciences of NAS, Yerevan, Armenia
E-mail: marinen3@yahoo.com

Abstract
This paper is devoted to the study of hydrochemical characteristics and phytoplankton in the river Masrik. For the study of planktonic algae were selected from 3 sampling sites: two from tributaries of the river and one from the river Masrik. The study covers the spring of 2014. According hydrochemical research of water pH ranged from 6.5-7.3. Compared with the previous year spring pH in 2014 was lower. Among anions tested relatively high sulfates differ in some areas, reaching 78-80 mg / l. Total hardness ranged from 0,73-4,21 mEq / L, and the total mineralization - in the range of 71,01 to 332,15. Studies of heavy metals revealed a relatively high content of lead, nickel and chromium in water. Visual assessment revealed a significant organic pollution of Masrik river, which confirmed of high levels of BOD5 in water. The main community in river were 3 groups of algae: diatoms, green and blue-green. Dominant group were diatoms. As a part of all groups of algae-dominated types eutrophicators, β-mezosaprobs (about 53%), indicating about average degree of organic pollution of the river. As part of the green algae found Spirogira sp. The maximum number of phytoplankton in the investigated areas was 16,854,000 cells / l, and the biomass was 162 g/m³, the minimum rates - respectively 464 000 cells / l in and 2.8 g/m³ for biomass. In water samples were found well developed whorls algae of the genus Chara, which presence indicates man-made pollution. Thus, in a more acidic environment and the presence of high levels of organic pollution created favorable conditions for the growth and development not only of phytoplankton algae, but also macrophytes, which indicates the degradation the ecological status of rivers.
LANDSCAPE-ECOLOGICAL APPROACH TO FOREST MANAGEMENT

N. Jamaspashvili, N. Beruchashvili, L. Beruchashvili, M. Sharashenidze
Javakhishvili Tbilisi State University, Tbilisi, Georgia
E-mail: njamaspashvili@gmail.com

Abstract
Ecosystems of the Caucasian mountain forests differ extraordinarily in fragility (vulnerability). Misuse of mountain forests can lead to heavy ecological consequences which, naturally, will find reflection in sustainable development of Georgia as a whole. For sustainable development of forestry in Georgia is application of the landscape-ecological approach. The primary goal landscape-ecological approaching for improvement of management of a forest is zoning territory on stability of a landscape concerning different forest economic actions. The results are mapped out to make clear reference on landscapes which are grouped in 3 basic groups. On this map red color indicates the unstable territories. Landscapes in which active geodynamic processes (especially landslides, avalanches) are frequently observed, with more phenomena like an avalanche, erosion of slopes, etc. The cabin of a forest in these landscapes should be forbidden completely. Yellow color on a map shows rather less unstable landscapes. The green color on a map of a landscape-ecological skeleton shows territories with rather sustainable landscapes. In them it is possible to make all cycle forest economic actions. Except for “semaphore” maps on which stability of landscapes is shown by a principle of a semaphore (red - yellow - green color), at the landscape-ecological approach is made also a “green” map. It is natural, that optimum forest management should take into account a degree of a biodiversity and that, especially valuable sites should be kept and in them protected territories should be organized. The landscape-ecological approach provides correct planning of a forestry and sustainable development of this is extremely important for Georgia branches.
FAUNA AND ECOLOGY OF NEMATODES AND EARTHWORM OF HIGHLANDS DIFFERENT ECOSYSTEMS IN ADJARA

L. Jgenti1, E. Tskitishvili2, I. Eliava2, T. Tskitishvili2, N. Bagaturia2, M. Gigolashvili2

1 Batumi Rustaveli State University, e-mail: lali.jgenti@mail.ru
2 Ilia State University, e-mail: eka.tskitishvili@iliauni.edu.ge

Abstract
The presented article is based on the results of faunistic investigations of soil nematodes and earthworms collected in the Ajara region (Kintrishi Reserve, Mount Mtirala, Riv. Ajaristskali gorge).

Establishing biodiversity of soil animals is of great importance for the study of biodiversity in Ajara region. Soil micro- and mesofauna make a central core of soil inhabiting animals. Two groups of invertebrates of the Adjara region (Nematodes and Earthworm) have been chosen for investigations due to scarce information on them on the one hand, and peculiarities of climatic conditions of the Adjara region, namely, high humidity, which is favorable for the performance of soil invertebrates, as they manifest hydrophilic nature. The study of soil invertebrates not only allows establishing of specific compositions, but reveals peculiarities and significances of fauna in the whole complex of invertebrates. Free-living soil nematodes of the Adjara region have been studied for the first time and fauna of earthworms specified. A total of 138 forms of nematodes is revealed, of which 108 are determined on species level. The 6 species have been registered for the first time for Georgia’s fauna. The new species Trachactinolaimus mountainus Eliava et Jgenti, 2006 has been described; and the original key is compiled for the family Actinolaimidae according to the male individuals. The 30 species of earthworms have been revealed.
Abstract
The main purpose of our paper is, based on the results of comparative studies, to reflect on the factors influencing the introduction and use of alternative energies in the hospitality sector. This is a conceptual discussion which main focus is, on one hand, to investigate the policies of facilitating the businesses of introducing the renewable energies sources in their operations and, on another hand, to investigates the attitude, the beliefs of hoteliers towards renewable energies (solar systems) on their premises. The main conclusions derives from the results of on qualitative methods using the tool of semi-structured interviews, consequently conducted in Canada (Newfoundland), Bulgaria (Sozozpol), Turkey (Mugla) and UK (London) collected in 2012-2014 about the practices of hoteliers regarding the environmental friendliness towards the solar systems. The results show different attitude and believes about their effectiveness and usefulness. The main findings show also that beside the official policies encouraging the introduction of renewable energies, the hotelier act following their own understanding and will, and their attitude has little to do with these policies. Their attitude is rather shaped by some believes influences by larger societal tendencies where they operate, often not related to the effectiveness but rather by irrational motives and believes established in the society of the respective countries. We propose conceptual discussion highlighting perceptual power of decision making as for the usage of one tool for achieving sustainability.
SUSTAINABLE USE GENETIC RESOURCES OF MEDICINAL, AROMATIC, SPICY, POISONOUS PLANTS

T. Kacharava
Georgian Technical University, Tbilisi, Georgia,
E-mail: t.kacharava@gtu.ge

Abstract
Recent years, interest in medicinal, aromatic, spicy and poisonous plants have been increased and the potential of their use has progressed, though, in modern medicine, cosmetology or cookery there are a lot of synthetic-chemical means. It is natural because the use of the latter is often followed by side effects, like allergies, while medications produced from plants have no harmful effects. Primarily, the effectiveness of herbal means comes from their high biological activity and less toxicity. It is possible to use them for various chronic and acute diseases. The process mentioned above has a great importance as in metabolic processes taking place in ontogenesis period of plants there are formed very important and precious compounds, like essential oils, alkaloids, glycosides, tanning matters, vitamins or pharmaceutically active substances that have soft and long-term effects on the human organism and stable results. They also have positive physiologic effect on the organism. After the ban of antibiotics in several countries Georgia has a chance to become one of the main manufacturer of biologically active natural substance human and animal food and take significant part in the world market with stable income because of its unique ecological clean endemic-aboriginal phytogenetic resource. We studied and unified a single complex model of the following specialty and singularity, which are conditioned by the research and cataloguing of genetic resources of the medicinal, aromatic, spicy, poisonous plants, including unique plants and those on the verge of extinction, conservation; diagnostics of the indigenous-endemic and collection material for the purposes of selection of the plants distinguished for their pharmacological and farming peculiarities; enrichment of seed bank and its inclusion into the international exchange programs; establishment of the database for the purposes of sustainable use and conservation of the aforementioned plants in certain regions of Georgia with different ecosystems.
A. Kalandadze\textsuperscript{1}, P. Felix-Henningsen\textsuperscript{2}

\textsuperscript{1} Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia
\textsuperscript{2} Justus Liebig University, Giessen, Germany
E-mail: peter.felix-h@agrar.uni-giessen.de

Abstract
At present, global environmental pollution is one of the most major problems in the world. Dissipation of chemicals is often unforeseen. This may include pollution of soils, water reservoirs or hydrologic network with industry residue, unintentional discharges of industrial waters in case of accidents, discharge of anthropogenic aerosols in the atmosphere, etc. From the onset of development of Chiatura manganese ore deposit (it is 130 years now) to 2005, 230 734 009 mln. tons of raw ore was extracted and 110 713 614 mln. tons of commodity output was realized. The manganese ore is mainly extracted by open mining. The ore dressing process at the enterprise and obsolete technological production infrastructure of the enterprise cause permanent pollution of the river Kvirila with manganese ore admixtures. The concentration of manganese ore in the river Kvirila is 10-12%. The field and analytical data evidence that except manganese, the soil and cultural crops also get polluted with different heavy metals, such as nickel, arsenic, etc. The accumulation of large quantities of heavy metals in the hydrosphere and soil and their ingress in the biological chain may have a serious harmful impact on the health of the population in the region and biofield as a whole.
ECOLOGICAL PROBLEMS OF SAMTSKHE-JAVAKHETI AGRICULTURE

B. Kalandadze, R. Tolordava, D. Nikolaishvili
Iv. Javakhishvili Tbilisis State Universtiy
E-mail: e-mail: kalandabeso@gmail.com

Abstract
Meeting the mankind’s ever growing demand for foodstuffs by using the agricultural technologies needs provision what, among other things, implies the use of the weed and pest killers in the field. It is a known fact that the quality of the agricultural products more or less depends on the ecological conditions of the environment. In addition, the growing rates of chemization is one of the alarming events during the fight for providing the population with healthy products. Therefore, searching for the solution to the ecological problems and developing the scientific basics for this purpose is very important. The goal of the study is to investigate and analyze the major ecological problems Samtskhe-Javakheti, one of the most important agricultural regions of Georgia faces. In this respect, Samtskhe-Javakheti is distinguished for specificity. Due to a small number of industrial objects in the region, the pollution of the environment with industrial waste and fumes is less. Therefore, the ecological problems are mainly the result of the excessive use of mineral fertilizers and pest and weed killers, broken down systems for the domestic waste utilization and unfair condition of infrastructure. The study was used on the literary sources and field study. During the study of the ecological state of agriculture in the region, the following problems were identified: those associated with chemization (excessive use of plant protection means, fertilizers and growth stimuli, soil pollution with heavy metals), biological and domestic waste (waste of the cattle-breeding farms, domestic waste), soil protection and water supply (overgrazing, lack of wind break belts, soil erosion, defective irrigation systems), etc. These problems hamper the development of agriculture a lot and are a big challenge for the population of the region, who is mainly employed in the agricultural sector. During the study, a particular accent was done on the different types of soils to check the reserves of humus and nutrient elements, soil structure and its physical properties. Alluvial meadow, Rab Humus calcareous – Rendzic leptosols, grey brown meadows and chernozems were studied. The major challenge to the solution of the ecological problems in the region is the shift of the agricultural production to the sustainable development of the agricultural production, what ensures the improvement of the ecological environment in the agrarian sector, avoidance of the environmental pollution and provision of the local population with healthy products. In addition, this will create a solid basis to export the agricultural production.
ETHNOECOLOGICAL PERCEPTIONS OF COMMERCIAL FARMERS ABOUT CROPLAND DEGRADATION AND REHABILITATION MEASURES IN UZBEKISTAN

E. Kan, A. Khamzina, J. Lamers
NGO KRASS, Urgench State University, Urgench, Uzbekistan
E-mail: kanelena@gmail.com

Abstract

Large-scale cotton cultivation, a Soviet legacy, left Central Asian Uzbekistan with a score of environmental problems. These are exemplified not only by the drying of the Aral Sea, but also by ubiquitous degradation of cropland soils due to water- and fertilizer intensive management practices. Our study aimed to reveal the ethno-ecological knowledge and visions of cotton-wheat growing farmers on on-going cropland degradation and rehabilitation measures. In particular, we aimed to capture farmers’ definitions of land degradation and whether or not research-recommended agroforestry options for ecological rehabilitation match farmers’ ethno-ecological beliefs and perceptions systems. To this end, a qualitative survey among 120 farmers was conducted during 2009-2010 using purposive and snowball sampling techniques in seven districts of the Khorezm province, in northwestern Uzbekistan. We documented local taxonomy and the attributes that farmers use to define cropland degradation and analyzed farmers’ perceptions of cause-effect relations in land degradation processes. The identified causes included historical and current land management practices coupled with the environmental change and influenced by resource endowments of the farmers and their commitment to land reclamation measures. Soil salinity was both a symptom and cause of soil degradation. Farmers considered land degradation as ‘permanent’ or ‘interim’ depending on their resources availability for rehabilitation measures and on administrative protocols for land use and improvement. Despite farmers’ general recognition of agroforestry benefits, basic awareness of cropland afforestation for enhancing soil health and productivity was lacking and so was silvicultural knowledge specific to tree cultivation on degraded land. In addition, the current land use policy obliging cotton cultivation in defined cropping areas demotivates agroforestry practices. The findings indicate that farmers’ ethno-ecological views and perceptions are a part of both, the problem and solution and have to be considered for enhancing the suitability and likelihood of adoption of agroforestry practices on degraded cropland.
ECOLOGICAL PROPERTIES OF SOME SCILLA L. TAXA (LILIACEAE) IN TURKEY

N. Kandemir, A. Çelik, A. Ermiş, F. Yayla
Pamukkale University, Denizli, Turkey
E-mail: ahmetermis10@gmail.com

Abstract
Ecological properties of some Scilla L. taxa (S. bifolia L., S. melaina Speta, S. siberica How., S.leepii Speta, S. ingridae Speta, S. mesopotamica Speta, S. autumnalis L., S. monanths C. Koch., S. rosenii C. Koch., S. winogradovii Sosn. and S. cilicica Siehe) have been compared and relationships between taxa have been determined. According to similarities and differences in ecological characteristics, the taxa have been divided into four groups. S.leepii and S. mesopotamica are endemic to Turkey. Because of various reason S. melaina, S.leepii, S. ingridae, S. mesopotamica, S. monanths, S. rosenii, S. winogradovii and S. cilicica, these taxa have limited distribution in Turkey. These taxa have fragrant flowers. So, they have been used as ornamental plant in the gardens, parks and balconies in our country. Soil samples of the taxa have been collected in flowering periods and physical and chemical properties (texture class, total salinity %, pH, CaCO₃ %, organic matter %, N %, P kg/da, K kg/da, Ca, Mg, Mn, Cu, Fe and Zn ppm) have been determined. It has been found that P and CaCO₃ values are more effective than the other soil factors in the distributions of investigated taxa.
THE INFLUENCE OF CLIMATE CHANGE ON THE DEVELOPMENT OF REGIONAL TOURISM IN GEORGIA

L. Kartvelishvili
National Environmental Agency of Georgia, Tbilisi,
E-mail: lianakartvelishvili@yahoo.com

Abstract
Georgia, being an ultimately diverse country due to its complex physiographical features, the problem - human vs. climate, represents one of the major challenges for our country. Its relatively small-sized territory plays host to virtually all types of climate, except for equatorial and tropical. It can easily be designated as a classical example of a poly-climatic country that is more exposed to challenge climatic variations than some other bigger countries characterized by fewer types of climate. Climate change may have a tremendous impact on tourism-related activities by modifying one of its main types of resources - natural environment. We are the first in Georgia to define the Tourism Climate Index (TCI) that describes the complex effect of various meteorological elements on development of tourism.
QUANTITATIVE ASSESSMENT OF PERMISSIBLE LOADS ON GEORGIA’S SOIL

D. Kereselidze1, L. Matchavariani2, V. Trapaidze1, L. Lagidze3, D. Svanadze4, G. Bregvadze1, Z. Gulashvili1
1 Department of Hydrometeorology, Faculty of Exact & Natural Sciences, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia
2 Department of Soil Geography, Faculty of Exact & Natural Sciences, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia
3 Department of Nature Use Management, Faculty of Exact & Natural Sciences, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia
4 Department of Geography, Faculty of Exact & Natural Sciences, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia
Email address: david.kereselidze@tsu.ge (D.Kereselidze), lia.matchavariani@tsu.ge (L.Matchavariani), v.trapaidze@yahoo.com (V.Trapaidze), lagidze_l@rocketmail.com (L.Lagidze), datosvani@posta.ge (D.Svanadze), gbregvadze76@gmail.com (G.Bregvadze)

Abstract
Environment, including different types of soils, is permanently influenced by human activity, natural and technogenic disasters, etc. These influences weaken stability of ecosystems, landscapes, soils, especially in the case when these influences exceed the value of the maximum permissible standard. Every natural effect causes weakening of soil stability. That’s why it is important to know the values of the loads, which cause failure of proper functioning of soils. At present averaged values of observation data are considered as maximum permissible norms of different loads on soils. In the meantime, actual indices of soil loads are stipulated by many variable factors. Existing standards of permissible loads on soil don’t meet requirements, which provide proper functioning. Additional demands, related through time to operating conditions and probabilistic-statistical characterizing of factors causing processes of soil degradation in time, must be raised upon actual standards. Absence of scientifically substantiated permissible load norms is a reason of soil erosion that as the final result leads to land depopulation and loss of ethno-cultural traditions. That’s why in the given work take into account factors, which cause regulatory values of parameters of soil loads. Time of possible loss, fertility to the marginal degradation was calculated for all main types of Georgia’s soils.
TERRITORIAL AND BRANCH ASSESSMENT OF WATER MANAGEMENT BALANCE OF GEORGIA BASED ON DIFFERENTIAL ESTIMATION AND MODELING OF ECONOMIC IMPACT ON WATER RESOURCES

N. Kezevadze
Directorate, ltd “Georgian Water and Power”, Tbilisi, Georgia
Email address: nkezevadze@georgianwater.com (Nino Kezevadze)

Abstract
Political and social-economic coups in the 1990s of the last century in Georgia, as well as in countries of the former USSR and East Europe has left its mark on the water management problems of those countries. Thus, for alternative assessment of probable water economy balance first priority is to select a representative period in dynamics for utilization of water resources. For Georgia such period is 1980s of the last century, as the most active period in historic economic development. The indicated period is characterized by comparatively reliable water management statistics, with stable socio-economic background and maximum anthropogenic load on water resources. For the very period branch and territorial structure of water management balance have been studied. Based on that alternative forecast have been assessed for the first quarter of the current century, according to the planned scenario during the above mentioned period. The indicated studies have been carried out based on differential assessment and mathematical modeling of economic load on water resources. Water management models have been developed for certain categories of water consumers using economic, demographic and ecological criteria.
ACCUMULATIVE PROCESSES OF SOLID DEPOSITS IN ZHINVALI RESERVOIR

N. Kezevadze
Ltd “Georgian Water and Power”, Tbilisi, Georgia, e-mail: nkezevadze@georgianwater.com

Abstract
The Aragvi basin is characterized by active erosive and denudation processes. Their intensity had especially increased after the construction of the Zhinvali reservoir. Activation of accumulative processes in the reservoir is the response to that. Taking into account the fact that the reservoir is the key facility for drinking water supply of the capital with half million population and at the same time electricity generation source, the important issue is the increase of the volume of accumulated runoff in it and determination of the intensity of the accumulation process. Activation of the aforesaid processes is confirmed by the fact that the actual intensity of the filling of the reservoir doesn’t correspond to the data of design calculations connected with its construction. Correspondingly necessity of revision of calculations made at the design stage has been required. The study has been done in several stages: in the first stage volume of accumulated solid deposits has been identified based on 13 year hydrological observations. The results of the calculations have been approximate to the design target value. Because of 13 year series of observation has not been represented and hydrological observations have not been carried out after construction of Zhinvali reservoir, it became necessary to make a broader analytical survey. For this purpose results of a series of observations have been compared to the extended series by interpolation method. According to this method period of dead storage capacity of the reservoir has been reduced twice in comparison with the series of observation. Situational analysis and bathymetric survey of the reservoir pit have shown a cardinally different picture. According to the survey dead storage capacity of the reservoir at this stage has almost been filled and intensive filling of effective storage capacity is being carried out. Correspondingly according to the data of a bathymetric survey filling period is 4 times less in comparison with the corresponding indicators of analytical research.
HERITABILITY AND GENETIC ADVANCE STUDIES FOR BIOCHEMICAL TRAITS IN F2-3 INTROGRESSED FAMILIES OF BRASSICA

N. Khan, Farhatullah
The University of Agriculture Peshawar, Pakistan, Peshawar, Pakistan
E-mail: aliawaisj@hotmail.com

Abstract
Higher heritability estimates along with high genetic advance values are effective in envisaging gain under selection in developing genotypes. The objective of the present study was to evaluate variability, heritability and genetic advance in 10 interspecific F2-3 families of Brassica species (B. napus × B. juncea, B. napus × B. rapa). These families were studied for heterospecific introgression of biochemical traits. Low to high heritability estimates were recorded for seed quality traits. Considerable variations within F2-3 families were observed for biochemical traits. Most of the F2-3 families for oil content and erucic showed moderate to high heritability indicating slightest influence of environment thus modification of trait by selection would be more effective. Among the F2-3 introgressed families 510 x 109 produced high oil i.e. 49.5 % while 532 x 118 (24.4 %), 533 x 109 (24.1 %) and high protein percentage in terms of mean performance. In the present research, individuals segregating progenies of interspecific cross populations which possessed combination of desirable traits, were identified which could be incorporated in the future breeding programs and it may facilitate varietal development. Keywords: Brassicas, Genotypes, Breeding.
WEEDS AND THEIR IMPACT ON BBIODIVERSITY AND SOCIO-ECONOMIC STATUS OF THE PEOPLE IN PAKISTAN

M. A. Khan
The University of Agriculture Peshawar, Pakistan, Peshawar, Pakistan
E-mail: azim@aup.edu.pk

Abstract
Weeds are becoming a threat to the biodiversity all over the world and specially in Pakistan. Two plant viz., Silybum marianum and Parthenium hysterophorus are naturally grown in many parts of the country. Due to higher rainfall in the past few years, the growth and reproduction of Silybum marianum has much more increased. Due to bigger vegetative growth, the plants are collected by the poor people to use as biogas. Thus their seeds are disseminated to the far off areas hence this plant has taken the shape of invasive weed in Pakistan. Similarly, Parthenium hysterophorus is used in bouquets by the poor farmers and thus is a source of income. This might be reason that many people that are susceptible to the P. hysterophorus pollens are passing through severe allergic problems. Both these plants are invasive and deprive millions of people of their food due to reduction of crop yields. Field studies were conducted to decipher the competitive ability of S. marianum. It was found the environmental conditions favoured this plant against wheat and thus has proved more competitive with high seed production. These plants are used for different purposes but on the other hand it is a serious threat to biodiversity as it leads towards monoculture. Hence the spread of these plants should be prevented and other alternatives should be searched for the inhabitants of the localities.
CHANGEABILITY OF SURFACE OZONE CONCENTRATION IN TBILISI IN LAST 30 YEAR

J. Kharchilava, V. Chikhladze, Kh. Chargazia
M. Nodia Institute of Geophysics of I. Javakhishvili Tbilisi State University
E-mail: victor.chikhladze@yandex.ru

Abstract
The increased attention is recently paid to studies of the surface ozone concentration (SOC) in different countries. This first of all is connected to the fact that ozone is the toxic pollutant of the atmosphere, whose concentration frequently exceeds the maximum permissible standard, in consequence of which the World Organization of Public Health included it in the list of five basic pollutants, whose content must be monitored during the determination of the air quality. The regular researches of (SOC) in Tbilisi are conducted by the Mikheil Nodia Institute of Geophysics from 1980 to present time. Thus, since 1984 there are data of the continuous series of ozone observations. The measurements of ozone were conducted by the electro-chemical ozone instrument OMG-200.

In this work some results of the statistical analysis of observational data of the average semi-annual and annual values of the (SOC) in the period from 1984 through 2013 are presented. Observational data for 15 hours are given. In the proposed work the analysis of data is carried out with the use of the standard statistical analysis methods of random events and methods of mathematical statistics for the non accidental time-series of observations. The statistical structure of the changeability of the mean annual, half year and monthly values of SOC in Tbilisi for the indicated period of time is investigated. Correlation connection between mean annual, half year and monthly values of SOC is established. The special features of the changeability of average monthly values of SOC on the three ten-year-old periods of time are studied. Trends and random components of time series of mean annual (five order polynomial) and half year (the five order polynomial for cold period and six order polynomial for warm period) values of SOC are eliminated.
THE CHARACTERISTICS OF LANDSCAPE DYNAMICS IN REPUBLIC OF ARMENIA (RA)

A. Khoetsyan, S. Khachatryan
ASPU, Yerevan, Armenia
E-mail: akhoetsian@ysu.am

Abstract
Studies confirm that during the geological development the evolution of the landscapes within the entire Armenian Plateau followed one general trend: that is the transformation of the slightly humid subtropical landscapes to variable humid forests and temperately humid meadow-steppe landscapes and, afterwards into turf-steppe and typical steppe landscape types. It means that the prevailing aridization trend continues to the present. While comparing landscapes of the quaternary and later eras (III-I millennia BC and modern), it appears that 37-38% of the present territory of Armenia was occupied by forests during III through I millennia BC. At present forested areas occupy only 11.17% of the country. This indicates that the anthropogenic factor (fires, deforestation, etc.) was activated in parallel to the aridization of the climate. The areas of steppes, dry steppes and semi deserts have dramatically expanded under the influence of similar factors respectively occupying 16% -36% and 6% -13%. Currently, desert landscapes (about 3%) are formed at Ararat Valley and different communities of Ararat and Arnavir regions/marzes with separate land parcels (saline soils, as well as soils under risk of salinization). Trans-alpine landscapes have expanded on this background increasing from 12% to 26%. This is due to the expansion of dry meadow steppe landscapes and reduction of alpine landscape zone (Figure 6). When analyzing the forecasted changes of the vegetation and soil covers and climatic conditions due to the global climate change, it appears that the areas currently occupied by landscapes will follow aridization trend in the coming decades. The resulting desert landscapes will occupy 7%, while semi deserts 20-21%, steppes and dry steppes 30-31%, forests 7-8%, subalpine zone about 17% and alpine zone 5% of the total territory.
RESOURCES AND THREATS OF THE ECO-TOURISM DEVELOPMENT IN GEORGIA

G. Khomeriki¹, G. Meladze²
¹ Vakhushti Bagrationi Institute of Geography at Iv.Javakhishvili Tbilisi State University, Tbilisi, Georgia
² Dep. of Geography, Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia
Email address: gogihom@hotmail.com (G. Khomeriki), meladzeg@gmail.com (G. Meladze)

Abstract
Ecological tourism can play a certain role in solving the problems of environment protection and sustainable and safe development of the country. The article considers some specific problems of the eco-tourism development in Georgia. The results of the study of the tourism potential in the regions in 2009-2014 revealed that: Georgia has substantial means to develop eco-tourism. This is true not only for the protected areas, but also for individual natural and geographical areas of the different regions (historical areas) of the country. The distinctive feature of the country’s eco-tourism potential is particularly diversified relief forms and natural eco-systems, in particular, intense variation of the landscapes and great contrasts between them (seaside and mountain, humid subtropical and arid zone, river gorges and steppe landscapes alternate over small areas), widely distributed endemic biological species, and traditional ethnographic, farming and domestic cultural forms survived in the historical regions (mostly in the mountains) of the country. The principal eco-tourism value is the natural eco-systems being only insignificantly modified due to industrial changes and maintaining their “natural originality”. In addition, numerous remnants of historical and cultural heritage give them a certain value. They naturally merge with the environment and not dominate over it, but add to its beauty. The threats to the environment are mostly associated with an increasing anthropogenic “aggression”, destruction of the traditional mode of nature management meaning certain degree of responsibility and deficient environmental laws and mechanisms of their execution. The problem is further aggravated by the fact that due to the limited territories, the eco-systems of the country are particularly sensitive to technogenic pressure. Concrete eco-tourism projects must inevitably envisage preliminary geo-ecological works.
PROTECTION OF ADJARA COAST ZONE BY ARTIFICIAL BEACH

S. Khorava, A. Kikava
Department of Geography, Batumi Shota Rustaveli State University, Batumi, Georgia,
E-mails: sxorava@gmail.com; kikava_antaz@rambler.ru

Abstract
Beaches – the “natural builted protection” against the waves influence, are formed by the hard morphodynamical processes which are held in the sea coast zone. Wide and tall beaches are the best coast-defending mechanism, which deliver the sustainability of coast zone and as a whole – they maintain geocological balance. Humans, by their rough intervention, decided to make changes in the nature, which caused to collapse the dynamic equilibrium, which existed for eons. Irrational approach and high-scaled technogenical load (regulating the rivers by dams, stopping the along the coast sediment flow with coastal spurs and other hydrotechnical buildings, opening the quarry areas and gaining a big amount of inert material from beaches, riverbeds, outfalls etc.) made negative influence on the hard morphodynamical processes, held in the Adjara sea coastal zone, which affected mostly to the most active coastal zone – beach decreasing its parameters and lost its coast-protecting mechanism function. Because of abrasive actions, the coast started to step back. Technological coast-defending constructions couldn’t deliver the sustainability of the coast and the sea zone ecological condition has violated, which was presented by wastes of iron and concrete. The time has come for creating artificial beaches, which would be not only the most effective coast defending mechanism, but the main touristic-recreational resource of the region as well.
RUPHENOTYPICAL VARIATIONS OF TAS2R38 GENE AND ITS BIOECOLOGICAL SIGNIFICANCE

R. Khukhunaishvili, M. Koridze, M. Nagervadze, C. Khizrevanidze, S. Gabaidze
Faculty of Natural Sciences and Health Care, Batumi Shota Rustaveli State University, Tbilisi, Georgia
E-mail: rusudan_kh@yahoo.com

Abstract
People have different feeling skills of the bitterness of compound phenylthiocarbamide (PTC). This trait has been shown to correlate with a number of dietary preferences and thus may have important implications for human health. There are two types of phenotypes in different ethno groups and populations according to this feature: PTC tester and PTC non-tester. Both phenotypes, besides some rare exceptions, are fixed in almost every population. We have studied the phenotypic variants of feeling the PTC bitterness spread in Georgian ethno group for the first time. Basing on the conducted experiments, about ¾ of the investigated population turned out to be sensitive towards PTC, and ¼ of the population – insensitive. We have analyzed the phenotypic structure of PTC feeling in the people who smoke in the population. The majority of the smokers (70%) turned out to be PTC non-tester and only 30% - PTC tester. It is important to study the phenotypic variants of feelings coded with TAS2R38 gene in the point of view of both – genetic structure of population and bio-ecology in order to plan different kinds of preventive measures.
COMPARATIVE CHEMICAL – EXPERTISE RESEARCH OF WATERS IN SOME SMALL RIVERS OF KHELVACHAURI REGION

N. Kiknadze
Batumi Shota Rustaveli State University, E-mail: nino-kiknadze@mail.ru

Abstract
Identification of water resource quality is one of the basic objectives for development of national economy which serves every day, cultural and security level enhancement of the population. Systematic research of water qualities within the territory of any country is the priority of this latter.
Coastal strips are densely populated at the most territory of Adjara and their role in the direction of every day and cultural life of the region, entrepreneurship and fishery is important. We have made chemical-expertise research of four small rivers in Khelvachauri region (Mejinistrskhali, Jotchostskhali, Periistskhali, Kapreshumistskhali) and as research reveals organoleptic and some chemical-physical indicators were identified in them. According to organoleptic indicators dangerous situation is in the rivers of Periistskhali and Mejinistrskhali near to pollution sources. pH of water is neutral at the headwaters during all seasons and at pollution sources pH of Mejinistrskhali and Periistskhali are beyond the set standards. River Jotchostskhali is distinguished with high consistency of dissoluble oxygen during all seasons, but with the small amount of oxygen Mejinistkhali is distinguished at all seasons and Periistskhali in summer (at pollution sources). At waterheads of all rivers concentrates of nitrates and nitrate-ions are in the limits of maximum permissible concentration. The concentration of nitrites at pollution sources are above maximal permissible concentration in summer and winter at river Mejinistkhali and in winter in river Periistskhali. Accumulation of chlorides and sulfates with highest amount is observed in rivers Mejinistskhali and Periistskhali near at pollution sources. According to chemical-expertize research the advantage of river Mejinistskhali is identified according to ecological background in comparison with Kapreshumistskhali, Mejinistskhali and Periistskhali.
LAND RESOURCES RESEARCH OUTPUTS IN GEORGIA

G. Kordzakhia, L. Shavliashvili, G. Kuchava
Georgian Technical University, the Institute of Hydrometeorology,
E-mails: giakordzakhia@gmail.com;, gkuchava08@gmail.com;, shavliashvililali@yahoo.com

Abstract
Proper exploitation of land resources is one of the main problems of the adverse impact of climate change. Soil formation is a long process, while its degradation develops much faster. Soil degradation means the process of deterioration of soil resources fertility, as a result of both natural and anthropogenic impacts. Significant impact on land resources take place in both East and West Georgia. The outputs of the present research show that the main reasons of land resource degradation in Georgia are: saline soils, erosion processes and natural disasters impact. In the work the following issues are overviewed, namely: I. The climate components regime and their connection with modern ecological processes. In particular, the temperature and precipitation trends and their possible impact on chemical data are researched. The regression relation between global warming intensity and soil chemical data are researched. II. In selecting degraded soils amount of dry residue, the main ion composition for determination of saline soil’s quality, humus and soluble forms of nutrient elements aiming soil fertility definition. III. The mechanical analysis of the soil referring research soil physical properties and salt migration in the land. Research results defined the territories and types of soil degradation. Practical recommendations to improve the soil fertility are created. The received results would promote the socioeconomic development of the Georgian regions and introduce considerable material and economic effects, assist the sustainable management of land resources and alleviation of poverty.
IMPORTANT PLANT AREAS OF THE PERI-NORTH TIEN SHAN SUBPROVINCE AS PERSPECTIVE PROTECTION AREAS OF PHYTOBIODIVERSITY

G. M. Kudabayeva, P. V. Vesselova, M. P. Danilov, B. M. Sultanova
Institute of Botany & Phytointroduction Ministry of Education and Science, Almaty, Kazakhstan,
Email address: kgm_anita@mail.ru (G. M. Kudabayeva), pol_ves@mail.ru (P. V. Vesselova),
michaelpetrovich@mail.ru (M. P. Danilov), sultanovab@mail.ru (B. M. Sultanova)

Abstract
This article describes the identification results of Important Plant Areas within the Peri-Tien Shan botanic-geographic sub-province. It was shown that identification of Important Plant Areas for Kazakhstan territory is the crucial tool for conservation of botanic diversity as well as rare, endemic and relic species. The results of the survey and their compliance with the criteria were shown by the example of three among 32 detected important areas. The botanic value of areas and their phytocoenotic diversity were demonstrated. The rare, endemic and relic species of each area were recorded.
ETHNOBIOLOGICAL STUDY OF SVANETI FUNGI AND LICHENS: HISTORY OF RESEARCH, DIVERSITY, LOCAL NAMES AND TRADITIONAL USE

I. Kupradze¹,*, A. Jorjadze¹, A. Arabidze², T. Beltadze², K. Batsatsashvili², N.Y. Paniagua Zambrana³, R.W. Bussmann⁴

1 Institute of Botany of Ilia State University, Tbilisi, Georgia
2 Institute of Ecology of Ilia State University, Tbilisi, Georgia
3 Herbario Nacional de Bolivia, Universidad Mayor de San Andres, La Paz, Bolivia
4 William L. Brown Center, Missouri Botanical Garden, St. Louis, USA

Email address: Inga.Kupradze@gmail.com (Inga Kupradze)

Abstract

Research about macro-fungi of Svaneti, a historical province of Georgia, started in the 1920th with a botanical expedition of R. Singer, under the auspices of the National Museum of Vienna. At present about 400 species of macro-fungi are known for Svaneti, 67 of which are edible (and used for food in Georgia), and 27 are poisonous. The history of Svaneti lichen research started with analysis of the material collected by H. Lojka and M. Dechy in 1884-1885 made by E. Vainio. As of now, 250 species of lichens are known for the region. In the present study ethnobiological interviews on Svaneti macro-fungi and lichens were conducted in 16 villages of Svaneti. Our analysis shows that the local population uses mainly 22 species of mushrooms for food, 10 of which are used most frequently: Armillaria mellea (Vahl) P. Kumm., Agaricus arvensis Schaeff., A. campestris L., Cantharellus cibarius Fr., Lactarius piperatus (L.) Pers., L. deliciosus (L.) Gray, Macrolepiota excoriata (Schaeff.) Wasser, M. procera (Scop.) Singer, Ramaria flava (Schaeff.) Quel.

A comparison of the vernacular names given in the literature and mentioned in the interviews collected during the present study shows that the population of Svaneti must have had better knowledge of mushrooms in the past. This is evidenced by a much higher number of local names in literature: of about 50 vernacular names of particular species or groups of fungi found in the literature, only 12 are still used by the population. This paper presents various uses of macro-fungi in Svaneti as quoted in literature and based on interview data.

Lichens, particularly, Usnea and Bryoria species, as well as Ramalina thrausta (Ach.) Nyl. are called “Pimpa” or “Pimpous” and “Chach”. The only use of these species was by hunters as field-bedding to keep warm in the cold winters.

In addition, we describe in the present paper how fungi and lichen uses were reflected in the local folklore.
CREATION OF PHYTOREMEDIATION TECHNOLOGY FOR CLEANING ENVIRONMENT POLLUTED WITH ORGANOCHLORINE PESTICIDES

M. Kurashvili, G. Adamia, L. Amiranashvili, T. Ananiashvili, M. Pruidze, T. Varazi, M. Gordeziani, G. Khatisashvili
Durmissidze Institute of Biochemistry and Biotechnology of Agricultural University of Georgia, Davit Agmashenebli Alley 240, Tbilisi, 0159, Georgia; m.kurashvili@agruni.edu.ge

Abstract
Organochlorine pesticides belong to Persistent Organic Pollutants (POPs) as they have high chemical stability and difficulty undergo biotic and abiotic transformations. They easily accumulate in plants and animal tissues and incorporate into the food chain that causing a great danger for health.
The goal of presenting work is the development phytoremediation method targeted to cleaning environment polluted with organochlorine pesticides (Lindane - 1,2,3,4,5,6-hexachlorocyclohexane, DDT – dichlorodiphenyltrichloroethane and PCP - 1,2,3,4,5-pentachlorophenol), based on joint application of plants and microorganisms. Created technology is based on following concept: initial degradation of pesticides carry out by specially selected microorganisms; the forming dehalogenated products easily uptake by the plants and undergo oxidative degradation via plantdetoxification enzymes. This approach can complete degradation of toxicants and their mineralization into nontoxic compounds.
For this aim the plants with high activities of enzymes, directly participating in oxidative degradation of organic pollutants and in conjugation of toxic metabolites, have been chosen. The strains of rhizospheric microorganisms degrading organochlorine pesticides and stimulating plant growth have been selected by screening. According to results of gas chromatographic analyses of residual pesticides in incubation medium after cultivation, the best strains with high pesticide assimilating capacities have been revealed. These strains can degrade organochlorine pesticides from cultivation area and are usable for application in developed phytoremediation technology.
For testing the development technology, the laboratory model experiments for remediation of artificially contaminated soils with pesticides (Lindane, DDT and PCP) by using consortia of Pseudomonas strains and selected plants, have been carried out. After 1 month the soil samples analyses show that content of toxicants in contaminated soils decreased by 60-80%. According to obtained results the created technological approach will be effectively used for cleaning the soils polluted with organochlorine pesticides.
THERMODYNAMIC MODEL OF SOIL MOISTURE SUPPLY FORECAST

E. P. Kvachantiradze
Russian State Agrarian University (MTAA) named after K.A.Timiryazev, Moscow.
E-mail: eteri.kv@yandex.ru

Abstract
A thermodynamic model of soil moisture forecast under the conditions of the climate dynamical change, particularly under the conditions of combined changes in air temperature and humidity, is suggested. Soil porosity is taken into consideration in the model.
EXPERIENCE USE OF WORLD SOIL RESOURCES (WRB) IN GEORGIA ON EXAMPLE OF THE HIGH MOUNTAIN SOILS

T. Kvrivishvili, G. Tsereteli, R. Khakhadze
Agrarian University of Georgia, Sabashvili Institute of Soil Science, Agricultural Chemistry, and Soil Reclamation, all. David Builder 240, Tbilisi, 0131 Georgia,
Emails: t.kvrivishvili@agruni.edu.ge; g.tsereteli@agruni.edu.ge; r.khakhadze@agruni.edu.ge

Abstract
New and previously published data on the soils of high mountain West Georgia are generalized, and traditional soil names are correlated with the units of the World Reference Base for Soil Resources. We studied the most widespread soils of high mountainous Forest Meadow soils and mountainous meadow soils. Soil studies were performed in agreement with the WRB standards. Morphological features and analytical properties of the soils of high mountain of West Georgia were compared with the diagnostic criteria of the World Reference Base for Soil Resources (WRB). Though we failed to find the full identity of the available soil data with the criteria used in the WRB, most of the characteristics of the particular horizons, including their color, structure, the organic carbon content, base saturation, and cation exchange capacity met the criteria of the WRB system. Thus, each of the genetic soil types traditionally distinguished in high mountain West Georgia found its place in this system. Mountainous forest-meadow and meadow soils were classified as Umbrisols with ferric properties in the Forest Meadow soils and with Cambic and Spodic features in the meadow soils.
THE INFLUENCE OF METEOROLOGICAL CONDITIONS ON ATMOSPHERIC POLLUTION IN GEORGIA

L. Lagidze¹, L. Matchavariani², D. Kereselidze³, N. Tsvitsivadze³, N. Paichadze⁴, N. Motsonelidze³, M. Vakhtangishvili⁵

¹ Dept. of Nature Use Management, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia
² Dept. of Soil Geography, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia
³ Dept. of Hydro-Meteorology, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia
⁴ Dept. of Regional Geography, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia
⁵ Dept. of Geography, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia

Email addresses: lagidze_l@rocketmail.com (L. Lagidze), lia.matchavariani@tsu.ge (L. Matchavariani),
davitkereselidze@yahoo.com (D. Kereselidze), nluka1@yahoo.com (N. Tsvitsivadze),
nana.paichadze@yahoo.com (N. Paichadze), nargiz.motsonelidze@tsu.ge (N. Motsonelidze),
maia.vakhtangishvili@tsu.ge (M. Vakhtangishvili)

Abstract
The atmosphere, which is one of the main components of the environment, undergone significant changes in recent decades as a result of anthropogenic impact. The rapid pace of technological processes will significantly increase the anthropogenic load on the environment, which leads to climate change and influence on mankind and ecosystems. The article deals with the dynamics of the aerosols and harmful substance’s emissions, described by regions and cities of Georgia over the 2001-2010 year period. The dynamics of “Greenhouse Gas” emissions distributed from the transport sector are evaluated separately (apart). By 2010, the industrial emissions of harmful substances, induced by the operating plants, located in Georgia, amounted to 30 134 thous. tons for the year. Among them: the solid pollutants constitute 3 658 thous. tons, the liquids and gases amounted to 26 476 thous. tons. The main polluter regions of Georgia are: Imeretia, Qvemo Qartli, Adjaria and some regions of Shida Qartli. This contributes to 89% of the pollution. The most polluted cities include: Batumi, Tbilisi, Gardabani, Rustavi and Kaspi that contributes to 69% of aerosol emission. The most pollutant sources in Georgia include: transportation (44.4%), agriculture (27.4%), energy sector (24.3%) and industry (3.86%). The influence of meteorological conditions on atmospheric pollution is assessed (both, in warm and cold periods). The correlation exists in meteorological elements and atmospheric pollutant ingredients, also between this ingredient only, that plays an important role in the aerosol accumulation process in the atmosphere. The complex physical-geographical (high mountains, closed valleys, rich water resources) as well as meteorological (synoptic processes, inversion, isothermal) conditions in Georgia facilitate aerosol accumulation in soil, because of which, changes in microclimate are possible.
FOREST BIODIVERSITY, ECOSYSTEM CHANGES AND CONSERVATION IN MALAYSIA

A. Latiff, I. Faridah-Hanum
Faculty of Science & Technology, University Kebangsaan, Selangor, Malaysia
E-mail address: latiff@ukm.my

Abstract
Malaysia is endowed with one of the richest tropical biodiversity in the world which is represented by various ecosystems, species and the genetic pools. Species diversity is represented by about 15,000 species of plants. A total of 1.39 million ha (about 7.6%) of the forests of all types have been set aside for biodiversity conservation. The country is yet to define priorities for conservation and sustainable use based on ecosystem and species diversity priorities. Measures for sustainable use in agriculture, forestry, fisheries resources are in place but those in biodiversity prospecting, eco-tourism and impacts of urbanisation on biodiversity are yet to be established. In the absence of concrete data of biodiversity loss in the country it is difficult to ascertain the lists of endangered or otherwise threatened species as the various ecosystems are prone to continuous changes. Efforts to assess and monitor have been initiated through the incepted Biodiversity Country Study and National Policy on Biodiversity 1998. Many factors have contributed to biodiversity loss; among them is the rapid socio-economic development of the country that transformed vast forested lands by logging activities, land openings for agriculture and resettlement and subsequently creating new built-up areas such as urban and industrial areas which are relatively poor in biodiversity. Other factors such as over-harvesting and pollution have also contributed in small part. These activities had led to significant habitat loss, degradation and forest fragmentation. What is needed are frameworks and strategies for biodiversity conservation, some socio-economic strategies for sustainable use and benefit sharing of biodiversity and also some legal measures for protection and conservation of biodiversity and assessment of land-use patterns.
REFLECTION OF CLIMATE CHANGES IN THE MICROFABRIC OF SUBARIDIC SOILS IN THE SOUTHEAST OF EUROPEAN RUSSIA

M. Lebedeva, M. Lebedev
V.V. Dokuchaev Soil Science Institute, 7 Pyzhevskii per., Moscow, 119017 Russia,
E-mail: m_verba@mail.ru

Abstract
In the past 40 years, a definite trend towards increasing the climate humidity and rising the groundwater table has been observed in the southeastern part of European Russia. Stationary studies at the Dzhanybek Research Station located in the north of the Caspian Lowland indicated that these climatic changes have been reflected in soil microfeatures. A comparison of thin sections of solonetz samples taken from the same soils at different times (in the 1950s, 1960s, 1970s, 1982, 2002 and 2013) showed that the soil properties revealed no considerable changes in 1958-1979, when the climatic parameters remained relatively stable. However, in 1989-2013 due to a significant rise in the climatic moistening and the groundwater depth the following changes took place in the soil microfeatures: the activation of humus accumulation and biogenic structuring, the eluviation of the silty clay-humus matter, the development of solodic features, gleyization of the soil mass, and the accumulation of coal-like particles. In salt-affected soils the hydrogenic accumulation of gypsum and carbonates occurred.
PRELIMINARY OUTCOMES OF THE EKI MOUNTAIN KARST-HYDROLOGICAL AND SPELEOLOGICAL STUDY

Z. Lezhava, K. Tsikarishvili, N. Bolashvili, L. Asanidze, N. Chikhradze
TSU, Vakhushti Bagrationi Institute of Geograph,
E-mail: asanidze.lasha@yahoo.com

Abstract
Caves of the Eki Mountain massif in Georgia are mostly developed in the mountain slopes, which are represented in the vicinities of the villages of Sakharbedio, Satsuleiskiro, Saadamio, Sagunio and etc.. The caves are often represented in two or three storeys that passed the vaucluse, temporary water, flow -corridor and dry-corridor stages. Hydrodynamic zones of the fissured-karst waters are fully presented within the Eki Mountain. Here the capacity of the vertical and downward hydrodynamic zone (ventilation zone) varies within 250-300 m. The seasonal fluctuation levels (40-50 m) and full saturation zones are well expressed. Important vaucluse karst springs of the Eki Mountain are related to these zones, which flow from the mountain slopes at a different altitudes and sometimes even from the entrance of the cave. By overcoming the springs siphons it is possible to gain access to the caves, where the watery corridors and dry sections alternate. The most notable is the Satsuleiskiro and Saadamio cave systems. The karst-speleological works as well as the underground and underwater investigations have been conducted in the Senaki municipality (in the villages of Saadamio, Satsuleiskiro, etc.). Together with the Lithuanian speleodivers the watery and dry corridors of the Saadamio and Satsuleiskiro caves were overcome, surveyed and described for the first time. The total length of the investigated corridors exceeded 280 meters. The mentioned discovery is registered in the international database of the new geographical discoveries.
THE TENDENCIES OF MODERN DEVELOPMENT OF THE RIONI – SUPSA INTERFLUVE REGION OF THE SEA SHORE

I. Papashvili¹, G. Lominadze², S. Khorava³

¹ LTD Gamma;
² Iv.Javakhishvili Tbilisi State University, Vakhushti Bagrationi Institute of Geography,
   E-mail: g_lomin@hotmail.com;
³ Batumi Shota Rustaveli State University

Abstract

The Black sea coastal zone of Georgia is mainly (about 90%) of accumulative type. Therefore, in the sediment budget of the coastal zone the basic agent is the river alluvium. The impact of the anthropogenic factor on the dynamics of the sea coast and river banks is well seen in the pattern of the Rioni River sea mouth and its systems. The Poti-Supsa coast can be divided into 3 parts according to its current state of dynamics. According to the today’s evaluation, in the inactivity conditions the retreat will not be terminated until the shoreline gradually changes its azimuth (direction) towards the prevailing roll of the sea. In the 20s of the last century the Grigoleti coast was stable. In the conditions of inactivity the coast wash-out in Grigoleti will last at least for 20-30 years. Meanwhile, the coastline will retreat by about 80-100 m. For maintaining the coast, its azimuth and the river bank from degradation it is necessary to arrange a groin near the old estuary of the Supsa River in perpendicular to the shoreline. In this case, the sediments, moving towards the submarine canyon, will begin accumulating to the north of the groin in the form of the so-called "angle of filling". The length of the groin should be about 600-700 m. Thanks to the "angle of filling" mechanism, the increase in the width of the beaches, necessary for the shore, will be from 100 to 300 m on average at a distance of 3-4 km. The groin activity has a long-term period – minimum 50 years. As it is impossible for estuaries to be returned to the old state, it is necessary to elaborate the scientifically substantiated coastal protection measures.
MONITORING OF CONCENTRATION OF MAJOR POLLUTANTS OF ATMOSPHERE IN BATUMI

N. Lomtatidze, N. Alasania
Batumi Shota Rustaveli State University,
E-mail: Lomtatidze_n@yahoo.com

Abstract
Atmospheric air occupies an essential place among other components of the biosphere and its importance is priceless for the living organisms on Earth. The purpose of our research was monitoring of concentration of main atmospheric air pollutants – nitrogen and sulfur. More specifically the concentration of nitrogen and sulfur dioxide was determined. Methodology is used for determining concentration of nitrogen dioxide in populated areas in the diapason of 0.02-1.4 mg/dm³ in the 5dm³ volume air sample. The method is based on catching the nitrogen dioxide from the air using special sorbent nitrogen-paint which received, through photometric determination of interaction of α-naphtilamine and sulfanilic acid. The concentration determination method of sulfur dioxide is intended for determining it in the atmosphere air of the populated area in 0.08-1.5 mg/dm³ diapason in 80dm³ volume air samples. The method is based on the sulfur dioxide oxidation while catching it from the air with hydrogen peroxide and on photometric determination of sulphate-ions produced with barium chloride.
ISSUE OF THE USE OF WASTES CAUSING QUESTIONS IN SOME ORE MINING COMPLEX

G. Magalashvili
Georgian Technical University

Abstract
Mineral extraction process in a number of cases remains without attention opened "brood", also called between layers "Internal balance of the rocks" and the accompanying ores useful components. For example, the large number of Tkibuli-Shaori coal Ore collected Containing coal mudstones, which may be used with aluminum, aluminum metal, the production of various construction materials. Bentonite clay deposits of the clay covered station Askana famous rock-Trachites the potassium content of the raw material, which was successfully tested for the production of porcelain.
ECOLOGY OF PALEOSOLS

A. Makeev, E. Zazovskaya, E. Kulinskaia
Lomonosov Moscow State University, Moscow, Russia
E-mail: makeevao@gmail.com

Abstract
The role of paleosols in the evolution of bio-geosphere cycles is based on the fact that more than 90% of all living organisms occur in soils. Through geological history of the Earth pedogenesis transformed a major part of terrestrial sediments and metamorphic rocks in geo-biocycles. Pedogenesis determines bio-geosphere cycles from their origin. The most ancient records of terrestrial life and pedogenesis could be traced down to 3800 Ma and wherever we record traces of life we trace paleosols. The pre-Cambrian soils formed under bacterial biosphere had ecological functions similar to soils of Paleozoic or Holocene age. Soils are litho- and clima-sensitive, and supported complicated microbial communities. Microorganisms determined weathering though the whole vadoze zone. Evolution of soils and biota may be understood based on a coexistence approach to biological evolution, where ecosystem as a whole provides frame for evolutionary pathways of separate components. Co-evolution is especially obvious for critical points in the pedosphere evolution, like oxygenation of the atmosphere in the pre-Cambrian, radiation of higher plants in the Devonian and expansion of grass biomes in the Cenozoic. Evolution of ecosystems is a new paradigm of the natural sciences. Ecological functions of paleosols are displayed in line with biological evolution. So paleosols could be regarded as an extended phenotype (Phillips, 2009). In the geological history of the Earth coevolution of life and soil goes as a large-scale biogeochemical succession with an increased role of biological cycles. Paleosols record a broad number of parameters and environmental links of former ecosystems. Paleosols comprise the major record in Quaternary terrestrial archives and are in the center of such multidisciplinary challenges like global climate change, carbon sequestration, cryo-biosphere, etc. Considerable part of present-day pedosphere consists of surface paleosols with their profiles keeping record of final stages of sedimentation and former environments.
BIODIVERSITY OF THE FOULING-EPIFAUNA DISTRIBUTED IN THE SOUTH-WESTERN PART OF THE BLACK SEA

G. Makharadze
Batumi State University, e-mail: guranda_guka@yahoo.com

Abstract
Each year the Black Sea receives about 350 cubic kilometers of river water from a territory covering roughly a third of continental Europe and including substantial parts of eighteen: the littoral states plus Austria, Belarus, Bosnia and Herzegovina, Croatia, the Czech Republic, Germany, Hungary, Moldova, Serbia, Montenegro, Slovakia and Slovenia. The second, third and fourth largest rivers in Europe, the Danube, the Dnieper and the Don, flow into the Black Sea. The Black Sea area is under the influence of two climate zones: the moderate in the north and the Mediterranean in the south. The key to the unique character of the Black Sea and its particularly vulnerable environmental state is in the sea hydrology, especially the peculiarities of the sea’s oxygen and hydrogen sulfide zone [4]. The reduced salinity is the most important environmental factor influencing marine biodiversity in the Black Sea: most marine animals and plants can't survive there. Studying the process of marine resources and their functioning is a necessary condition for gaining the information of ecosystem’s development and its temper being impacted by negative anthropogenic influence. The fouling (hereafter referred to as Epifauna) is a natural content considered as an integral part of hydrosphere life. On the Black Sea coastal zone of Georgia having natural ecosystems (Sarpi, Tsikhisdziri) where two seaports (Batumi, Poti) and oil terminals (Supsa, Kulevi) are functioning, it is very urgent to study Epifauna for identifying the biodiversity and anthropogenic impact as well. In Georgia the investigation of such manner has not been developed so far. That’s why the studying of Epifauna is an essential matter in the Georgian coastal zone. The main object of the research was to identify the Epifauna biodiversity in the Georgian Black Sea coast. Samples were collected seasonally in 2010 on three stations: Tsikhisdziri, Green Cape and Sarpi.
THE PROSPECTS OF USING TREATED WASTEWATER IN AGRICULTURE IN THE REPUBLIC OF ARMENIA

M. Margaryan
National University of Architecture and Construction of Armenia, E-mail: miromargaryan@gmail.com

Abstract
Water is not only the primary life-giving resource but also is vital for industrial and agricultural development and is a source of energy. Human society historically has positioned itself in the areas with locally sustainable water supplies. The population growth and increasing water demand are heavily stressing the water resources of the globe. At the same time pollution of the water bodies limits the water use so that the exploitable resources underlie a double stress, more consumption against the limited potential for use.

Untreated domestic wastewater causes the most impact on the quality of the surface water. At the same time, considering the shortage of water available for irrigation in some of the areas and its impact on agricultural production, it becomes urgent to find efficient solutions for using the treated wastewater for irrigation. This is especially true for a small landlocked country like Armenia, which faces limited availability of water resources and is often prone to droughts.

The methods for desalination of the mineralized water as well as their disadvantages are discussed in the paper, and the authors propose new desalination technology through distillation. The proposed method of mineralized wastewater treatment suggests that the water is provided to the evaporation cell by sprinkler, which allows the water to evaporate at the temperatures below 100°C, thus saving considerable energy. The evaporation cell is heated by the liquid with temperature up to 250°C, which in its turn is heated in the focus of the parabolic surface mirror device. The energy of water vapor generated in the cell is used to heat a new portion of wastewater provided through the sprinkler.
SILYBUM MARIANUM AND PARTHENIUM HYSTEROPIHORUS: THREAT TO BIODIVERSITY AND COP PRODUCTION

K. B. Marwat
SBB University Sheringal Upper DIR, KP, Sheringal, Pakistan
E-mail: kbmarwat@yahoo.com

Abstract
Invasive weeds are posing the major threat to the biodiversity and crop production globally, including Pakistan. Among several other invasive weeds, Silybum marianum and Parthenium hysterophorus have invaded Agricultural as well as non-cropped areas in many parts of Northwest Pakistan. Due to climatic change, the growth and reproduction of Silybum marianum has been increased by many folds. Thus many farmers use it as fuel and others collect its seed for sale in the market. This way the seeds are inadvertently disseminated to the far flung areas, therefore the plant has taken the shape of invasive weed in Pakistan. Similarly, Parthenium hysterophorus is used in bouquets as cut flower by the farmers and cut flower industry as a source of income. In addition to causing allergy, both the weeds are allelopathic and release toxic materials into the soil and surrounding environment. In addition to the fore-mentioned uses and abuses, both the weeds are threat to biodiversity and will result into monoculture by replacing our desired flora. Experimental data and survey suggest that the spread of these plants should be prevented and farmers should be made aware of the threat posed by such weeds.
INTENSITY, DISTRIBUTION AND ROLE OF PROFILE-FORMING PROCESSES IN PEDOGENESIS OF GEORGIA

L. Matchavariani
Department of Soil Geography, Faculty of Exact & Natural Sciences, Iv Javakhishvili Tbilisi State University, Tbilisi, Georgia
E-mail: lia.matchavariani@tsu.ge

Abstract
The main parameters for soils of Georgia were investigated. The comparative analysis of micromorphological parameters between rather close on morphochemical properties of soils – Vertisols and Mountain Chernozems, Brown Forest and Cinnamonic, Red Soils and Terra-rossa, Yellow Soils and Subtropical Podzols – has shown specificity of their microstructure. For revealing basic geographical features of classification for soils of Georgia, the special importance was given to micromorphological diagnosing of main soil formation processes (humification, argillization, lessivage, gleying, ferrugination, calcareousness). The groups of processes for each type of soils are allocated most typical. In particular, general parameters for Vertisols, Cinnamonic, Meadow Cinnamonic is the group of processes humification-gleying-calcareousness, for Grey Cinnamic, Meadow Grey Cinnamonic, Salt Soils (Solonetz, Solonchak) and Raw Humus Calcareous – calcareousness with attributes gleying and lessivage; for Yellow Soils, Subtropical Podzols and Subtropical Gley Podzols – lessivage-gleying-ferrugination; for Red Soils and Alluvial Soils – lessivage-ferrugination; for Mountain Chernozems – humification-argillation; for Brown Forest – argillation with attributesferrugination and lessivage; in Mountain Meadow Soils are allocated lessivage, partially gleying. The cartographical material is created which reflects the distribution of the main profile formation processes in soils of Georgia using the ArcView GIS. The correlation of the given material with types of landscapes of Georgia (humid, arid, semi-humid, semi-arid), has shown a rather original picture. The precise ratio was marked rather only semi-arid of landscapes, where dominate process are humification, calcareousness and argillation. Soils are the special component of a landscape, which not always submits to the certain rules. In formation some soils quite often any factor can play a main role and known process soil-formation, based on complex influence of the factors, sometimes can drop out of general geographical peculiarity. Therefore, in the names of landscapes the soil appears in the smallest level.
FORMS AND EXTENT OF FERRUGINATION IN SOILS OF GEORGIA

L. Matchavariani¹, D. Nikolaishvili²
¹ Department of Soil Geography, Faculty of Exact & Natural Sciences, Iv Javakhishvili Tbilisi State University, Tbilisi, Georgia
² Department of Geomorphology & Cartography, Faculty of Exact & Natural Sciences, Iv Javakhishvili Tbilisi State University, Tbilisi, Georgia
Email address: lia.matchavariani@tsu.ge (L. Matchavariani), dali.nikolaishvili@tsu.ge (D. Nikolaishvili)

Abstract
Ferruginization as one of the most characteristic processes in soils of Georgia, has been investigated both qualitatively and quantitatively mainly micropedologically, by polarizing microscopy on thin sections. A study was undertaken to determine some of pedological factors affecting the genesis of Fe-formations in soils series of West and East Georgia. This process is diagnosed by the presence of different forms of ferrous formations, concentration level or iron crystallization, ferruginized micro-zones of plasma impregnation with ferric hydroxides, etc. A map showing the distribution of the ferrugination process in the soils of Georgia was created.
WORLDS UNIQUE KOLKHETI MIRES: GLOBAL AND REGIONAL CLIMATE REGULATION

I. Matchutadze¹, H. Joosten, M. Tsinaridze
¹ Institute of Phytopathology and Biodiversity at Batumi Shota Rustaveli State University, Batumi
E-mail: izo.muho@gmx.net

Abstract
Peatlands are most efficient terrestrial ecosystem while covering 3% of the world's land area their peat contains as much carbon as all terrestrial biomass, twice as much as all global forest biomass, and about the same as in atmosphere. In the constantly accumulating peatlands preserve a unique record of their own development as well as past changes in regional vegetation and climate. Degradation of peatland a major and growing source of anthropogenic greenhouse gas emissions. Carbon dioxide emissions from peatland drainage, fires and exploitation are estimated to currently be equivalent at last 3,000 tones per annum or equivalent to more than 10% of the global fossil fuel emission. Conservation, restoration and wise use of peatlands are essential and very cost effective measures for long term climate change mitigation and adaptation as well as biodiversity conservation. In Kolkheti province both in lowland and in high mountain there are still pristine oscillation-percolation Sphagnum mires which is exclusively fed by rainwater. Pristine peatland emit methane and nitrous oxide. Peat formation processes is strongly influenced be climatic conditions, but mire themselves also affect the global climate. The main feature of mires is their ability to absorb carbon dioxide from the atmosphere and to transform it into plant biomass which is eventually accumulated as peat. As carbon dioxide is an important greenhouse gas, mires function as a sort of global cooling device. They guard us against global warming and resulting changes.
PECULIARITIES OF CLIMATE PARAMETERS CHANGES IN GEORGIA

L. Megrelidze, L. Kartvelishvili
The National Environmental Agency of Ministry of Environmental Protection and Natural Resources of Georgia/Head of Meteorology and Climatology Bureau, l_megrelidze@hotmail.com
The National Environmental Agency of Ministry of Environmental Protection and Natural Resources of Georgia/Head of Division of General and Applied Climatology, lianakartvelishvili@yahoo.com

Abstract
The expected climate change may have significant influence as from an ecological as well as from a material point of view on different natural ecosystems and also on the development of the most branches of economy. For mitigation of mentioned impact preliminary assessment of possible changes in climate elements, as well expected influences of these changes on various systems is needed and adaptation measures should be planned, which implementation would avoid or mitigate negative impact of climate change.
For the assessment of current climate change in Georgia climate extremes statistical analysis has been done based on the last 50-years period data of Georgian Hydrometeorological network 20 stations. Extreme climate indices as well temperature return values have been calculated and regularities of annual and seasonal tendencies of air temperature and atmospheric precipitation extremes magnitude, frequency and intensity have been defined. For the improvement of reliability of the obtained results the mentioned parameters have been estimated by two methods, for each parameter linear trends has been revealed and their statistical significance has been estimated as well comparison of two 25-years periods corresponding values have been carried out.
IMPACT OF GLOBAL WARMING ON THE VEGETATION DURABLE AND DISTRIBUTION AREA OF CROPS IN THE HUMID SUBTROPICAL AND MOUNTAINOUS REGIONS OF GEORGIA

G. Meladze, M. Meladze
Institute of Hydrometeorology at the Georgian Technical University, Tbilisi, Georgia
E-mail address: meladze.agromet@gmail.com (G. Meladze); meladzem@gmail.com (M. Meladze)

Abstract
The surface air temperature in the Eastern and Western parts of Georgia in conditions of global warming, has increased by 0.2-0.5°C, respectively. By 2030-2050, the average increase in the annual temperature may reach 1-2°C. Therefore, the preliminary evaluation of the impact of such an increase on the agrarian sector is important. The increasing and decreasing trends of the duration of the vegetation period and sums of active temperatures and atmospheric precipitations were revealed for the vegetation period in humid subtropical zone of Adjara in West Georgia and mountainous regions of Samtskhe-Javakheti in East Georgia, according to the trend. The increasing trend of the sum of temperatures in the humid subtropical zone of Adjara has reached 52°C for half a century (1956-2005). In terms of such a temperature increase, the sum of active temperatures is going to exceed 100°C by 2050 what will be beneficial for the ripening of citrus fruits and high productivity of other crops in terms of moderate soil productivity. The increasing trend for the sum of active temperatures in Samtskhe-Javakheti region in the above-said period reached 125°C according to the trend, and may double by 2050 reaching 3192°C. The given sum of active temperatures will improve the productivity of cereals, fruit-trees, vegetables, vine (early, with moderate ripeness) and other crops, in terms of relevant irrigation. According to the current (basic) and future scenario (2020-2050) in Adjara region, by considering 1°C increase in air temperature, there are four micro-zones allocated (up to 500 m a.s.l.) to grow appropriate crops. For Samtskhe-Javakheti region Under the current (basic) and future scenario, the increase in temperature by 2°C, there are four micro-zones allocated (by 500 m gradation), to grow appropriate crops.
NORTH AMERICAN MULTI-PURPOSE DEAR INTRODUCENT PLANTS IN WESTERN GEORGIA HUMID SUBTROPICAL CONDITIONS

M. Metreveli\textsuperscript{1,2}, A. Meskhidze\textsuperscript{1}, F. Tchaidze\textsuperscript{2}, J. Jakeli\textsuperscript{2}, D. Beridze\textsuperscript{1}

\textsuperscript{1} Institute of Phytopathology and Biodiversity, Batumi Shota Rustaveli State University, Batumi, Georgia
\textsuperscript{2} Batumi Botanical Garden, Batumi, Georgia
E-mail address: metrevelim@list.ru (M. Metreveli), meskhidze.a@gmail.com (A. Meskhidze), feride_tchaidze@mail.ru (F. Tchaidze), juli.jakeli@mail.ru (J. Jakeli), dalidali59@gmail.com (D. Beridze)

Abstract: The article deals with bioecological peculiarities and application of exotic plants \textit{Liquidambar styraciflua} \textit{L.}, \textit{Liriodendron tulipifera} \textit{L.} and \textit{Magnolia grandiflora} \textit{L.} introduced in Adjara or the South Colchis Black Sea littoral in the conditions of Transcaucasia, namely, Western Georgia humid subtropics. Namely, the following has been studied peculiarities of growth and development, adaptation, reproduction and natural rehabilitation, Antimicrobial Action of Extracts Obtained from Leaves. The multifold application recommendations are given on.
APPLICATION OF ENTROPY AS CHARACTERISTICS OF INFORMATION DIVERSITY OF BULK COMPOSITION OF MOUNTAIN SOILS IN THE MIDDLE URALS

F. D. Mikailsoy¹, I. A. Samofalova²
1 Igdir University, Turkey, E-mail: samofalovairaida@mail.ru
2 Perm State Agricultural Academy, Perm, Russia

Abstract
In recent years, as a result of destruction of the natural environment on the vast territory, the preserves are gradually transformed into semi-isolated areas of nature with varying degrees of preservation. The basis of diversity of organisms is the variability of soil properties, which is formed as a result of the evolution and dynamics of soil cover. A statistical entropy S is an index of diversity of soils. The purpose of the research is to identify a diversity of bulk composition of mountain soils in the Middle Urals using S. Maximum S values in the Middle Urals were recorded in the accumulative-organic soils in the upper horizons and in the whole profile: 1.66-1.73. This indicates a weak differentiation of oxides in soils and the predominance of soil formation processes over weathering. In brown soils, entropy values are somewhat lower due to the greater differentiation of oxides. In soils developing in more severe conditions the entropy decreases to 1.36-1.37. Variation of entropy trough the profile is insignificant. Only in eluvial soil entropy <1.0. Using entropy it was found that differentiation of profile in structurally-metamorphic soils is due to Fe distribution, which is involved in brown soils pedogenesis. In the organic-accumulative soils entropy is greatly associated with the distribution of Na2O and secondary with the contents of sesquioxides. We have homogeneity of horizons within the soil profile (slight variation of entropy), which indicates the absence of podzolization processes. The rate of change of entropy within the profile allows to diagnose processes of humus accumulation, eluviation, illuviation, gley pedogenesis, brown soils pedogenesis. The entropy of the chemical composition of mountain soils below the entropy of the lithosphere indicates the expression of various combinations of soil formation processes. It is characterized by a variety of soils in the Middle Urals, which in its turn is the basis for preserving the diversity of living organisms on the conservation area.
ROLE OF GEORGIA (IMERETI REGION) IN GREENHOUSE GAS (GHG) EMISSION REDUCTIONS

D. Mikautadze, M. Kvaberidze
Akaki Tsereteli State University, Kutaisi, dalimiqautadze@yahoo.com; magdakovabziridze@mail.ru

Abstract
The ultimate objective of the United Nations Framework Convention on Climate Change is the stabilization of greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference. Due to the complexity of its location and terrain of Georgia it is a classic example of poly-climatic countries, that’s why climate change affects different regions differently. Our country works accordingly in compliance with the convention to meet all the demands and obligations. In this respect the paper represents Georgia’s endeavor to work out special greenhouse gas emission reduction strategies at the example of transport and solid waste sectors. One of the most important functions of our state is transit function. A significant part of the International Transport Corridor (ITC) passes through the territory of the Imereti region because of its geopolitical location. The Huger is traffic certainly the more pollutants are emitted in the air. The major environmental problem lies in the fact that solid waste management in any endeavor requires serious attention as optimal management guarantees greenhouse gas emission reduction and in this regard actions to mitigate emissions are planned to be taken.
THE THREATS-BIOLOGICAL INVASION OF BIODIVERSITY OF XXI CENTURY

I. Mikeladze¹, G. Bolkvadze¹, M. Metreveli¹, R. Chagalidze¹, M. Davitadze², D. Beridze²
¹ Batumi Shota Rustaveli State University; Institute of Phytopathology and Biodiversity, Kobuleti;
² Batumi Shota Rustaveli State University, Batumi, Georgia;
E-mails: ika_1978@mail.ru; giabatumi@yahoo.com; metrevelim@list.ru; gomarduli1@gmail.com; murmdavitadze43@mail.ru; dalidali59@gmail.com

Abstract
The data discussed in this research deals with the main results caused by the foreign invasive species in the world. There is given also the characteristic features of non-local organism spread in Georgia. We have studied species content of Achara adventive plants and expecting threats in relation to biodiversity is analyzed. Biodiversity is a diversity of landscapes, ecosystems, natural diversity of species as well as genetic diversity of inner species within the certain territories. Therefore, biodiversity is the variety living forms existing on the earth on the basis of ecosystems, species and genes. The maintenance of such variety is important in the context of economic prosperity, safety and health.
In the modern world, one of the most threats to the biodiversity is adventive – invasive species.
RELATIONSHIP BETWEEN TOURISM AND CULTURAL HERITAGE PROTECTION AND TOURISM DEVELOPMENT: EVIDENCE FROM BULGARIA

S. Mileva
Faculty of Economics and Business Administration, Sofia University “St. Kliment Ohridski”, Bulgaria
smileva@feb.uni-sofia.bg

Abstract
It is recognized that often there is a conflict between tourism development and cultural heritage protection. Current paper aims to evaluate the municipal practices and efforts to protect cultural heritage along with local tourism development. The research issues the Bulgarian experience after the accession of the country in the EC (2007-2014) and tries to address the main problems and concerns for effective cultural heritage protection and relationship with Tourism sustainable development.
INFLUENCE OF THE MOBILE PHOSPHORUS CONTENT AND POTASSIUM ON BIOLOGICAL ACTIVITY OF THE SOIL IN THE PREDURAL’E

N. Mudrykh¹, I. Yashinina¹, A. Sami Erol²
¹Department of Agrochemistry, Faculty of Soil Science, Agrochemistry, Ecology and Commodity research, Perm State Agricultural Academy, Russia, e-mail:nata020880@hotmail.com
²Selcuk University, Turkey

Abstract
The biological activity of the soil is one of the criteria of an assessment of an orientation of processes of soil formation and allows about judge a condition of fertility of the soil. Microbiological activity depends on the type of soils, properties and many other factors. Anthropogenic loading in bigger or smaller intensity can cause suppression of the functions which are carried out microorganisms that leads to violation of their activity. In Perm Krai sod-podzolic soils of heavy granulometric composition occupy 69.6 % of the area of an arable land. Features of these soils – sour reaction of the environment, the relative poverty in elements and organic substance, is poorly expressed by structure, the availability of the inert podzolic horizon, and also flushing type of the water mode. All it determines the low level of biological activity of this type of soils. Besides in these soil nitrogen this is the element which limiting the level of productivity of crops. Therefore, it is very important to make an observation for the nitrogen nutrition of the cultivated cultures and to eliminate a deficiency of nitrogen or prevent its surplus, thereby helping plants to form the high and full-fledged crop. We have investigated the change in the biological activity of sod-podzolic soils with different content of available phosphorus and potassium. Mathematical processing of experimental results, testifies the direct dependencies of content of mineral nitrogen in the soil on the content of available phosphorus and potassium. Studies have shown that sod-podzolic soils of heavy granulometric composition have low biological activity. However, when creating the optimal conditions for microbial, their activity increases. Thus, on soils with medium, high, and high content of phosphorus, low and average content of potassium accumulates sufficient of the quantity of mineral nitrogen for the initial growth and development.
CURRENT CLIMATE CHANGE OF COASTAL ZONE OF THE BLACK SEA (WITHIN THE TERRITORY OF GEORGIA)

D. Mumladze, N. Lomidze, N. Suknidze
TSU, Vakhushti Bagrationi Institute of Geography, ninako.lomidze@gmail.com

Abstract

Studying the climate of the coast regions is very important in modern times, when global warming (one of the manifestations of modern climate change) threatens as a „Sword of Damocles” especially in sea coast zones. Some scientists [1] assume that global warming can cause flooding of large territories of the coast, which will be followed by eco-migration processes in a background of economical losses. There is no measure yet how quickly this process will run against the integrity of the Black Sea coastal zone of the Georgian (Kolkheti lowlands), but we can presume it is under danger of such presumable ecological catastrophe. The Black sea is quite far from the ocean. It is connected to the ocean by the narrow Bosporus strait and it is apparently the water exchange between them is very weak. This high inert eco system reacts very weakly on such global processes such as eustasy, which maybe assumed to be a cause of global warming. It is a quite reasonable idea that the rising of the Black Sea level can be explained by anthropogenic and tectonic processes. This territory being studied is one of the most significant regions of Georgia. Here at least four western parts of historical-geographical regions are represented - Adjara, Guria, Samegrelo, and Aphkhazeti, with their ports and health resorts. For sustainable development of the nature and welfare of the population here, it is necessary to estimate the effect of global warming by detailed characteristics and quantitative criteria. This gives opportunities to plan more effectively the use of the natural resources of the region for the improvement of the social conditions of the population. Scientific interests towards current global climate changes are very high. They are related to an increase in the frequency of natural and hydro-meteorological catastrophes (flooding, drought, et.al). This adversely affects the economy of the country as well as its ecosystems.
EVALUATION OF LANDSCAPES’ SENSITIVITY IN GEORGIA ACCORDING TO GEOMORPHOLOGIC AND EDAPHIC FACTORS

D. Nikolaishvili, L. Matchavariani
Iv. Javakhishvili Tbilisi State University, Geography Department
E-mail: lia.matchavariani@tsu.ge

Abstract
Evaluation of the landscapes’ modern condition and sensitivity is one of the most important tasks of geographical research, because with its help is possible, on the one hand, the identification of the landscape’s natural-resource potential, on the other hand, the identification of their ongoing trends. This enables determining the degree of sustainability of the landscapes to the different natural and anthropogenic impacts. And also allows to identify how “anthropogenic pressure” could endure to migrate in general. Such studies provide an opportunity to create a scientific basis for sustainable environmental management and environmental oriented spatial planning. This paper deals with the evaluation of landscape sensitivity based on the analysis of geomorphologic and edaphic factors and some methodological aspects of these assessments were developed. The main geomorphologic and edaphic parameters that have a huge impact on the sensitivity of the landscape were analyzed: surface slope, migration regime, the level of relief dissection, the density of the parent rocks, as well as the structure and texture of the soil. The sensitivity of the Georgia’s landscapes was estimated for each of these parameters individually and comprehensively. Based on different units of measurement and the inability of comparisons between them, it was considered appropriate to use the method of mathematical statistics, such as: ways of balancing data. Based on GIS, the overlay of different thematic maps were made. Landscape sensitivity evaluation was carried out on the basis of the concept of spatio-temporal analysis and synthesis of NTC (N. Beruchashvili). The smallest unit of classification is a genus of landscape. Analysis of geomorphologic and edaphic factors showed that Georgia’s landscapes vary in sensitivity, which is the logical result. This difference is evident at all classification levels of landscapes - class, subclass, type, subtype, and genus. Moreover, in each landscape one of the indicators has a key role; however, in some cases decisive is not one, but several indicators together at the same time. Thus, as a result of the study:
- Criteria of landscape sensitivity the with respect to geomorphologic and edaphic factors were developed;
- The level of sensitivity in Georgia’s territory were installed (highly sensitive, sensitive, medium-sensitive, low-sensitive, very low-sensitive);
- Classification of Georgia’s landscape sensitivity was developed and a series of thematic maps were compiled;
- Features of territorial distribution of Georgia’s landscape sensitivity were identified.
COMPLEX EVALUATION OF DIFFERENT FACTORS ON GROWTH OF GRAPE IN GEORGIA

D. Nikolaishvili¹, D. Sartania², L. Matchavariani¹

¹ Iv. Javakhishvili Tbilisi State University, Geography Department
² Iv. Javakhishvili Tbilisi State University, Museum, PhD in History.

Abstract

One of the most important issues in contemporary geographical studies is an evaluation of agri-resource potential of each territory. Such research presents an opportunity to create the basis for rational use of natural resources, also for territorial planning and environmental protection. It’s important to evaluate different territories, according of distribution of the vine. The main goal of the study is to evaluate the agri-resource potential of the entire territory of Georgia in this regard. Using various data (geographical, ethnographical, cartographic, etc.), the degree of agri-resource potential of Georgia was established and certain specific features of the spatial-territorial distribution of this potential was revealed. Particular attention was paid to multi-factor analysis, particularly, the mutual analysis between of different parameters and revealing the spatial-temporary features. A relation between the viticulture and nature/anthropogenic factors is shown. In line with the research goals, it is necessary to evaluate a variety of factors. Natural and cultural factors - both of them are considered as the main driving forces of distribution and productivity of the vine. Among the natural factors the most important are topography, climate and edaphic features. From the view of anthropogenic factors a lot of parameters are important too, such are: tradition of viticulture, distance between vineyards, rules of winemaking, etc. These questions are less studied in scientific works. There is a great difference between the Regions of Georgia, according to traditional viticulture and winemaking. So, on the basis of complex and multi-factor analysis, zoning of Georgia was completed according to viticulture and winemaking. So, five categories of potential of were determined. A map of Viticulture of Georgia was compiled on the base of GIS.
BATUMI AND POTI PORTS PHYTOPLANKTON BIODIVERSITY

S. Nikolaishvili, Ts. Gvarishvili
Shota Rustaveli State University, Batumi, Georgia
E-mail address: sofo.nikolaishvili@gmail.com

Abstract
Changes in ecosystem of Black Sea wastewaters are increasingly being linked with anthropogenic load. (oil import and export infrastructure, construction industry, agriculture and etc), which causes changes in taxonomic biodiversity, number and distribution at eutrophic (light) zone of ecosystem among micro- hydrophytes in trophic chain of planet’s biocenose and actively participate in water quality formation. Separate groups and individuals present biological indicators of water quality. As is known they are representing a necessary component in formation of trophic chains of biocenose. In order to research phytoplankton we selected two stations: Batumi and Poti ports water areas. Periodicity of sampling – seasonal (spring, summer), at each station samples - from following depths: 0m, 3m, 5m. Samples took by Nansen bottle of 1 liter capacity. Then samples concentrated on the 30-50 sm3 with method inverse filtering by the nylon filters. The filters calls diameters were 1.09 millimicrons. (I. Sarokin, 1979). We take small amount of concentrated sample to Nageotte chamber (capacity 0,05 ml) by dropper. Water plants species detection and identification is implemented with appliance of microscope (Cruz system) and via special determinants for different group and species of water plants. For species identification is determinants for seas and inner waters used modern and old editions of foreign authors. On the basis of the results we have dominant species, toxic forms and indicators of water quality for assessment of its environmental condition.
ALGA SPECIES DIVERSITY OF THE NATURAL PARK “BOROVOYE”

S. Nurashov, E. Sametova
Institute of Botany & Phytointroduction Ministry of Education and Science, Almaty, Kazakhstan,
Email address: nurashs@mail.ru (S.B. Nurashov), elyasam@mail.ru (E. Sametova)

Abstract
The work was carried out within the project “Algae-flora of lake systems of Koks-hetau-Borovoye, development of the recommendations about fighting against species of micro- and macro-algae causing oozing and “blossoming” of ponds in mass people recreation zones”. Sample collecting was made during the expedition trips at summer season from the lakes Akkol, Lebedinoye and from the several region lakes such as Borovoye, Schuchiye, Bolshoye and Maloye Chebachye, Lebyazhiye, Maybalyk, Katarkol and Shalkar. As a result of cameral processing and preliminary identification of the collected material more than 231 alga species were defined: Bacillariophyta – 151; Chlorophyta – 46; Cyanophyta – 16, Dinophyta – 4; Charophyta – 6; Euglenophyta – 7 and Chrysophyta – 1. Alga species and their distribution by systematic groups were determined. They belong to 71 genera, 39 families, 24 orders, 11 classes and 7 departments. The greatest species variety was belonged to Bacillariophyta and Chlorophyta alga species. Often seen, dominating and causing water “blossoming” alga species of all departments were revealed in lakes Akkol and Bolshoye Chebachye. Mass development was demonstrated by the species Anabaena flos-aquae Breb. ex Born. et Flah. and species of the genus Oscillatoria Vau-ch. ex Gom. On the stones there were revealed mucilaginous yellow-brown fouling of Bacillariophyta algae such as Gomphonema, Synedra and Melosira. Reasons of mass development of the activators of blossoming and oozing of the ponds were revealed. They were caused by: increase of the content of nitrates, phosphates and other nutrients in the water; washouting the non-organic fertilizers from the nearest hills and fields; sedimentary waters coming into the ponds. The abstract and the biological description of the alga species (231 species of 7 departments) revealed in the lakes of the studied territories were made. Among found algae the perspective species of Chlorophyta and Charophyta algae for purification of the polluted waters were marked out.
E3 – ECOLOGY, ECONOMY, ENVIRONMENT

M. Öztürk
Botany Department, Science Faculty, Ege University, Izmir, Turkey
E-mail: munirozturk@gmail.com

Abstract
Ecology means thinking about our soils, waters, air, plants, animals and all their relationships. Its major aims are; balancing of physical, biological and human dimensions. We are dependent on their resources but do not have a dominion over them. Sustaining desired ecological, economic and social conditions in the system is a big challenge.
Economy has different appeal and significance to people of contrasting cultural backgrounds, socio-history and geographical location. Just as countries economy can be swamped by global economic forces, its environment can be threatened. The threats may be severe enough to jeopardize further sustainable development. Economists think that industrial culture is the only acceptable model for progress and development. However, application of this model to financial and technological systems all over the planet results in the destruction of habitats, extinction of species, biodiversity loss and destruction of indigenous cultures.
Environment is effected by different factors which can be dealt through the principles of ecowisdom. Self-realization is the most important of these. One way is to practice extending our care and affection. This can be named as transpersonal ecology. What is inconsistent is refusing to recognize the inherent worth of other beings to the extent that we allow unmerciful exploitation and destruction of life forms purely for our profit. Concern for personal wealth has replaced concern for society.
As ecologists we have stewardship; a need for an emphasis on “ecolacy”. Man’s dominion cannot be understood as license to abuse, spoil, squander or destroy. Future cultures will be able to reach their potential if we in this generation remember: Sustainable land use is combination of ecology, economics, social justice and depends on world peace - world trade. Without equity, social justice, and community stability for poor people, the quest for sustainable land use is doomed and will fail.
INLAND WATERS OF ADJARA AS A POWER RESOURCE AND THEIR ECOLOGICAL CONDITION

N. Paghava, N. Palavandishvili
Batumi Shota Rustaveli State University
E-mail: pagava63@mail.ru

Abstract
Rivers of Adjara occupy a significant place among the other natural resources of the region. The possible potential electricity generation of all rivers of Adjara (charged by kWh) has been calculated by the Small Energy Specialists Association. In the case of entering a market some trout farms of a cascade type, which won’t cause any negative ecological impact on the environment, can be arranged at such rivers of Adjara as the Tchorokhi, Kintrishi, Chakvistskhali, Matchakhlistskhali, Adjaristskhali and its tributaries. The best example of such a trout farm arrangement is a fish farm, located on a bank of the Kintrishi river ( vil. Kokhi), which has its own micro Water-Power Station (WPS). However some rivers of Adjara are heavily polluted, although there are no WPS built on them. The main reason of the river pollution is an anthropogenic influence. As a research has shown the following rivers suffer of ammonium pollution: the Khorolistskhali, Kubastskhali and the Bartskhanistskhali. The concentration of ammonium is low in clean rivers and lags far behind the indicators of MPC (Maximum Permissible Concentration). A surfeit of MPC is frequently fixed in polluted rivers. Despite of the different ammonium concentration, both clean and polluted investigated rivers have had in common the indicators of ammonium minimum concentration (from the late autumn to the mid-spring) and maximum concentration (from the late spring to the first months of autumn). This circumstance verifies the fact, that a concentration dynamics of the investigated rivers is first of all caused by the household wastewater contents and dimension. Unpurified household and waste water, getting into rivers even with a slight excess of water, may cause irreversible processes sooner or later. Inaction in such a situation could face the transformation of the Kubastskhali and Bartskhana rivers into a sewage channel. The investigated rivers flow into the sea, therefore, the usage of the zone of rivers confluence for recreation goals may pose a potential threat for human health. It is necessary to take measures on water protection in order to solve problems of small rivers degradation, to weaken anthropogenic influence and to regulate water quality in storage reservoirs.
NAVIGATION IN GEOGRAPHICAL SPACE AS A FACTOR OF DEVELOPMENT OF CIVILIZATIONS

A. Paranina, R. Paranin
Herzen State Pedagogical University of Russia, St. Petersburg, Russia
E-mail: galina_paranina@mail.ru

Abstract
The concept of author of civilizations ecology on the first place among factors of development of society puts the information resources of geographical space connected with navigation – the movement and orientation in space time. Throughout the millennia information on space time ensured health and safety as a guarantee of an order, the reliable forecast and rational behavior. Situation in space time represents universal opportunities for designation of objects of world around. Therefore navigation signs and knowledge became a modeling basis. In social ecology the information models of the world (IMW) are considered as one of types of adaptation – adaptive response of the person and a social organism (civilization) to influence of environment. IMM includes language, signs, knowledge, scientific and sociocultural paradigms, traditions and innovations. Factors of differentiation of territorial systems are allocated (V.I. Paranin, 1990, 1998): 1. Orientation reflection by the sun in the organization of territorial systems from local and regional level to subcontinents – the countries of light; 2. A role of the international division of labor in distribution of functions between regions; 3. Influence of cyclic rhythms of natural processes on the pro-accuracy of territorial systems and identification of their models created during different eras. Our researches of ways of receiving, use and saving of information on space time in material and non-material culture of civilizations allow to allocate basic elements of IMM and to characterize development stages from the Stone Age till a post-industrial era (Paranina, 2010). In general, the principle of pro-accuracy of systems finds confirmation – “the stream will organize space”, and in a sustainable development of civilizations the defining role of the factors providing the movement of substance, energy and information comes to light.
ECOLOGICAL PROBLEMS OF ECOTOURISM IN ADJARA

M. Phutkaradze, N. Gorgiladze
Batumi State University, Department of Geography
E-mail: merabi_fu@mail.ru

Abstract
Different types of tourism are developed in Autonomous Republic of Adjara and it is distinguished with its touristic and recreational resources in Georgia. In recent years the development of ecotourism, that is based on exotic landscapes, various historical and cultural heritages, was quite intensive. Nowadays, rural tourism, wine tourism and bird watching are prevailing from different kinds of ecotourism.

The main purpose of the work is the study of the dynamics of ecotourism development and its ecological influence on the natural environment of Adjara, which is known for its less sustainability because of specific landscapes, a heavy rainfall and agricultural influence. Therefore the main purpose of the research is the determination of the ecological influence results of ecotourism and planning preventing actions.

The research made it clear that the ecologic conditions in Adjara were changed as a result of ecotourism development. However, there is not a large correlation between ecological tourism and the process of changing the natural environment or local values. As a result, we have found that only a small portion of the population had a negative attitude about developing ecotourism. Though tourist facilities are plentiful, the amount of tourists in Adjara will not cause damage to the natural environment. Therefore, the development of ecotourism in Adjara is not as important as the extent of ecological damage to the environment. Improvement of the current situation is highly dependent on the future implementation, and management of ecotourism.
THE COMPANY LOW COST HIGH VALUE NAU! AND THE COLLABORATION WITH THE LEAGUE FOR THE ENVIRONMENT

E. Querci
Insubria University, Department of Economics, Italy,
E-mail: elena.querci@uninsubria.it

Abstract
Companies that choose to adopt Low Cost/High Value strategies produce goods or services with characteristics which are important for customers like design, environmental safeguards and easy access, for more natural, ecological environmental products. Nau! manufactures and sells prescription eyeglasses, sunglasses and contact lenses, high levels of design, choice of low impact frames using re-cycled materials, closely attuned to the trends and habits of their patrons. This company has chosen Legambiente as a partner; the association, which works to protect the environment. Legambiente has an original and innovative approach to the issue of the economy and employment. Their aim is to promote and enhance the large variety of production activities (local typical products, cultural heritage, technical innovation and urban and land maintenance) that are able to improve the quality of the environment and give more competitiveness to Italy. Nau! presented on the market Relight-Up is a collection of leaders in sustainable and renewable materials such as corn, soybean, algae and organic cotton, non-petroleum-based and are created without chemical treatments, while protecting the environment. The project Relight-Up door the signature of Relight Group, a key player in the European market for renewable energy. Part of the proceeds raised will be donated to the non-profit company to fund projects that safeguard our environment.
TOWARDS SUSTAINABLE LAND USE: NEW METHODS FOR ASSESSING THE ECOLOGICAL STATE OF ARMENIAN GRASSLANDS

A. Saghatelyan, Sh. Asmaryan, V. Muradyan, G. Tepanosyan
Center for Ecological-Noosphere Studies National Academy of Science, Yerevan, Armenia
E-mail: ashuk@ecocentre.am

Abstract
The terrain of Armenia is well known for altitudes (375-4090 m), which complicates the development of the territory especially when they have an extensive character. The most part of the territory occupied by farmlands. A long-term, unplanned and unregulated use of these farmlands entailed intense washout of upper soil horizon, which subsequently provoked intense development of erosion and degradation of lands. A practicable solution to this problem is a scientifically and methodically grounded assessment of ecological state of farmlands and economically “competent” planning and management of agricultural resources. With the view of developing animal husbandry and managing pastures/hayfields, in 2011-2012 the Center for Ecological-Noosphere Studies NAS RA (CENS) carried out assessment of ecological state of farmlands in frame of the program coordinated by the Government of the Republic of Armenia and aimed at economically “competent” planning and management of agricultural resources of Armenia. The goal of the Program is ceasing a trend to overgrazing and degradation of close-to-village sites, using remote pastures/hayfields in the best effective manner, improving feed production and animal feeding networks, and promoting a growth in animal feed production volumes. Based on field observations and tests the overall state of natural pastures and the level of degradation was assessed using GIS tools remote sensing data. In the result the huge database of thematic layers were created for more than 60 rural communities of Armenia. CENS has also a strong national role in delivering environmental geospatial datasets. Considering the needs of the efficient delivery of information and data sharing CENS apply the spatial data infrastructure (SDI) deployed recently. This new improved analytical information system provides new tools for on-line geospatial data processing and an easy access to the geospatial datasets to the external stakeholders (rural communities).
COMPARATIVE STUDIES ON EFFECTS OF SILICON AND NANO-SILICON ON TWO TOMATO CULTIVARS

M. S. Sakçah, A. Ablazov, S. Smajlović
Suleyman Demirel University, Isparta, Turkey
E-mail: mehmetsakcali@sdu.edu.tr

Abstract
Silicon is the element that is found to be very important in plant life since it is required in number of metabolic and physiological activities. The effects of silicon (as Na2SiO3) and nano-silicon (as SiO2 nanopowder 10-20nm sized) on two genotypes of tomato plants (Lycopersicum esculentum cv. Volovsko srce and Novosadski jabucar) were investigated in the present study by means of seed germination and root elongation experiments. The effects on root elongation and seed germination varied between silicon (Si) and nanosilicon (N-Si) and two tomato species. The tested Si and N-Si concentrations were 500, 1000, 2000 and 4000 mg/l and germinated for a week. When it comes to seed germination, among the treatments, only 2000 mg/l of nanosilicon applied on Volovsko srce and 4000 mg/l of nansilicon applied on Novosadski jabucar improved percent seed germination of those two tomato species. A suspension of 2000 mg/l and 4000 mg/l of silicon inhibited the seed germination completely of Novosadski jabucar. The rest of the suspensions had also inhibitory effect on seed germination of both tomato species. Similar effect was reported from the root elongation studies. A suspension of 500 mg/l of nSiO2 applied on Novosadski jabucar and 1000 mg/l of nanosilicon applied on Volovsko srce were beneficial for root elongation of these two tomato species while the three remaining suspensions had all inhibitory effect. All of the four suspension of silicon (500, 1000, 2000 and 4000 mg/l) applied on Volovsko srce and Novosadski jabucar had inhibitory effect on the root elongation of these plants. Additionally, 2000 and 4000 mg/l of silicon applied on Novosadski jabucar did not let the seeds germinate at all. In further research, we are planing to investigate antoioxidant enzymes, furthermore, random amplified polymorphic DNA (RAPD) assay to detect possible DNA damage and mutations caused by silicon and nanosilicon.
STUDIES ON THE TRACE ELEMENTS IN SOIL-PLANT SYSTEM AROUND MURGUL COPPER MINE IN TURKEY

S. Sakçali¹, E. Altundağ, M. Küçük, M. Öztürk²
¹ Suleyman Demirel University, Isparta, Turkey
² Botany Department, Science Faculty, Ege University, Izmir, Turkey
E-mail: mehmetsakcali@sdu.edu.tr

Abstract

Before closing down in 1993, Murgul Copper factory has been operating in Artvin State of Turkey since 1951. The species diversity of the area has suffered a lot during these 42 years. An attempt was thus made to investigate the status of trace elements such as Al³⁺, Cu²⁺, Zn²⁺, Pb²⁺, Ni²⁺, Co²⁺ and Cd²⁺ of soils and plants by atomic absorption spectrophotometry. The collection sites were in the vicinity of the factory 500-600m, around the ore extraction site 1000m and in the forest zone at about 1400m altitudes respectively. The aboveground herbaceous parts and foliage ash of plant taxa like; Rhododendron ponticum, R.luteum, Smilax excelsa, Dorycnium pentophyllum, Trifolium pratense, Silene compacta, Equisetum sp., Alnus glutinosa, Tussilago farfara, and Sedum pallidum were investigated for the said elements. Species showed considerable differences in their ability to accumulate or exclude the various elements. Except for Silene compacta (0.5ppm) at 500m and Tussilago farfara (0.5, 1ppm) at 500-600m, no traces of Cadmium were detected in other samples. The percentage values of trace elements varied between the species and even in the same species at different sites. Highest and lowest values were Al³⁺8985-20; Cu²⁺347.5-7.5; Zn²⁺221-13; Pb²⁺46-2; Ni²⁺16.5-15, and Co²⁺5.5-0.5ppm, respectively. Silene compacta proved to be a high accumulator of these trace elements and flourished well. This was followed by Trifolium pratense, Dorycnium pentophyllum, Sedum pallidum, and Tussilago farfara. The trace element values at 1400 m were the lowest compared to the sites around the factory. As a result, this area had a look of a healthy ecosystem as compared to the sites around the factory at 500 and 600 m altitudes. No trace of Cadmium was detected from soil samples taken from A-horizon, but these samples were quite rich in trace elements such as Al³⁺, Cu²⁺, and Zn²⁺ having values 457-33; 89-0.1 and 20-4ppm respectively.
GENETIC CHARACTERISTICS OF BROWN FOREST SOILS ON THE MIDDLE URALS

I. Samofalova
Perm State Agricultural Academy, The Faculty of Soil Science, Agrochemistry, Ecology and Commodity research, Perm, Russia
Email address: samofalovairaida@mail.ru

Abstract
Feature of mountain soil formation is that the soils on the mountain slopes are formed in different bioclimatic and orogeomorphological conditions. The purpose of research is to study genetic properties of the brown forest soils in the Middle Urals. Features of the morphological structure: truncated profile (35-75 cm), weakly expressed in the differentiation of the soil profile into individual Horizons, detritus (20-65%), loamy fine earth, the signs of podzolization in the soil profile is not found. Feature granulometric size distribution of the soil - a gradual increase in weight on the profile into Sandy Loam to Silty Clay and Clay, the dominant factions are either big Silt or Sand. Soils are characterized by a very acidic environment and high hydrolytic acidity. The soils are enriched in organic matter and humus profile characterized by prolixity. Group composition humus shows mobility, high degree of humification of organic substances to fulvic acids. Gross composition shows that the processes of soil formation on Mount, North Basegi aren’t leading to a distinctly different profile. Coefficients of geochemical accumulation, subsurface weathering, eluviation, oxidation calculated and helped define the features of the gross composition of soils. Character of distribution in profile and correlation of forms of iron help to diagnose physical processes of weathering and soil formation (burozemric pedogenesis et al.); signs Podzolization not revealed. Weathering and soil formation processes that occur with varying intensity, creating a diversity of soil cover and the spatial heterogeneity of soils, even within the same type. Thus, in the mountains of the Middle Urals brown forest soils form a number of subtypes: raw organic (900 m) - ferruginized (655 m) - metamorphosed (590 m) - clay-illuvial (577 m) - eluvial (565 m) - clay-illuvial (315 m).
TRADITIONAL CULTURE OF NATURE MANAGEMENT IN SAMTSKHE-JAVAKHETI

D. Sartania
Museum of Iv. Javakhishvili Tbilisi State University, Georgia

Abstract

The work describes the traditional culture of nature management in Samtskhe-Javakheti. In Georgia, Samtskhe-Javakheti is the region with one of the most diversified natural conditions, as well as ethno-cultural and ethno-confession peculiarities resulting in the diversified forms of the nature management in the region. However, this question is not duly studied at present. Therefore, it is important to study, analyze and introduce the traditional culture of nature management, ensuring highly developed agriculture in this corner of Georgia. In addition, such a traditional culture was the real guarantee for maintaining the ecological balance. The study was based on the relevant sources and the results of field observations and questioning of the local people. The study showed that the tradition of land protection and cultivation was one of the most important segments of nature management. For example, on the territory of Samtskhe, where it is virtually impossible to provide farming plots as vast and open as in Javakheti due to the widely spread averagely or steeply inclined or gullied relief, people used to treat every plot of land with a particular care. An inclined surface is naturally at risk of surface washout. This risk is particularly high in the areas used for farming, and erosive processes are more intense, as well. In order to avoid such negative impacts, the population of Samtskhe has developed a system of soil protection and efficient cultivation since the ancient times. A principal example is terracing the sloping surfaces. It is established that terracing by considering the degree of the surface inclination, was of two types. So, the work focuses on the peculiarities of the natural environment serving as a basis for the development of terrace agriculture in Samtskhe-Javakheti.
International Conference
"APPLIED ECOLOGY: PROBLEMS, INNOVATIONS"

BIOGEOPHYSICS OF SOILS IN ČUMRA REGION OF CENTRAL ANATOLIA IN TURKEY

E. V. Shein¹, S. A. Erol², E. Yu. Milanovskiy¹, N. V. Verhovtseva¹, F. D. Mikailsoy³, F. Er⁴, S. Ersahin⁵
¹ Faculty of Soil Science, Moscow State University, Leninskie gory, Moscow, Russia
² Çumra Higher Educational College, University of Selcuk, Çumra/Konya, Turkey
³ Department of Soil Science and Plant Nutrition, University of Iğdır, Konya, Turkey
⁴ Çumra College of Applied Sciences, University of Selcuk, Çumra/Konya, Turkey
⁵ Department of Forest Engineering, School of Forestry, Cankiri Karatekin University, Cankiri, Turkey

Abstract
Some physical (bulk density, coefficient of filtration, particle size composition, etc.) and chemical (contents of carbonates, organic carbon, nitrogen, etc.) properties of an alluvial calcareous soil were studied in Central Anatolia (Konya province, Çumra region). These heavy textured (medium clay) soils with a low organic carbon content (less than 1%) have favorable biogeophysical properties due to the stable structure of the pore space. The favorable structure of the pore space was attributed to high richness and diversity of the soil biota. Four phyla were dominant in the microbiological composition of the studied soils and Actinobacteria was the dominant one. The composition of this phylum was dominated by the elevated number of both higher (Streptomyces) and lower (three species of Rhodococcus) actinobacteria. The high biodiversity of bacteria against the background of their great total number and the developed tropics interactions in the microbial community promoted the well balanced production of specific metabolites, including gaseous ones (CO₂, H₂). This circumstance allows this clayey soil to function rather actively while protecting the pore space against compaction and maintaining the optimal density, porosity, and hydrological properties.
MODERN METHODS IN PHYSICS OF NATURAL DISPERSE SYSTEMS: THE LASER DIFRACTION AND SEDIMENTATION METHODS

E. Shein, E. Milanovskiy, N. Sheina, A. Yudina
Lomonosov Moscow State University, Soil Science Faculty, Department of Soil Physics and reclamation. Moscow 119991. RUSSIA email: evgeny.shein@gmail.com

Abstract
Dispersion of natural systems involves two qualities, - particle size and surface properties of the solid phase. Assessment of particle size distribution (granulometric composition) - this is a problem of present and future soil science is related to use the different methods (laser diffraction, sedimentometric methods, etc.) of sample pretreatment and instrumentation of new generation. The diversity of soils and the significant differences in the mechanisms of soil aggregation provide for the situation when none of the existing pretreatment methods can be recommended as a single standard. Dispersion of soil samples by pyrophosphate method does not ensure the complete destruction of microaggregates. Differences between sedimentometric and laser diffraction methods are caused by (1) non-sphericity of particles, (2) the presence of organic matter and (3) the heterogeneity of the particle. After removal of the organic substances or at low content of silt the differences between the methods became minimal. Dispersion of soil suspension by ultrasound is mandatory pre-processing.
STUDY AND PRESERVATION OF WILD RELATIVES OF CULTIVATED PLANTS OF THE NORTHERN TIEN SHAN (WITHIN KAZAKHSTAN)

G. Sitpayeva
Institute of botany and phyto introduction, Almaty, Kazakhstan
Email address: sitpaeva@mail.ru

Abstract
Modern biodiversity declining, including wild relatives of cultivated plants (WRCP) is caused by anthropogenic pressure and represents a serious threat to the world community. Since 2013 in the Institute of Botany and Phyto introduction CS MES RK the state scientific and technical program: “Botanical variety of wild relatives of cultivated plants of Kazakhstan as a source of enrichment and preservation of the agrobiodiversity gene pool for realization of the Food programme” has been realized. In 2014 the WRCP species of the natural flora of the mountain regions of Southeast Kazakhstan were the objects of researches within 4 floristic areas – the southern hillside of the Zhungar, Ile and Kungey Alatau; Ketmen, Terskey Alatau and Shu-Ile mountains. Results of researches: the Northern Tien Shan botanical diversity was revealed; mobilization of reproductive material was made; features of species structure of WRCP were studied, their phytocenosis characteristics were obtained; resource and breeding-genetic assessment of WRCP was made; their phytopathogens were revealed; passports of species of WRCP of the studied territory were made. The ridges of the Northern Tien Shan belong to the regions possessing a rather high degree of botanical diversity and due to it, they are considered to be the important objects of WRCP’ concentration in Kazakhstan. The taxonomical analysis demonstrated that WRCP of the studied regions are presented by 46 families with 148 genera including 269 series. The greatest species variety of WRCP was presented in the following families: Poaceae Barnhart – 66 species; Rosaceae Juss. – 38, Fabaceae Lindl. – 28 species. The hierarchical order of the first three leading is Poaceae, Rosaceae, Fabaceae. In 2014 the species share of 5 families increased: Asteraceae, there were 11 representatives and it became 17, Lamiaceae (9 – 13), Alliaceae (8 – 9), Caprifoliaceae (4 – 7), Polygonaceae (5 – 12).
STUDY AND APPROBATION OF EX SITU CONSERVATION METHODS FOR PRESERVATION OF THE BIODIVERSITY OF WILD RELATIVES OF CULTIVATED PLANTS OF KAZAKHSTAN

G. Sitpayeva, T. Murzatayeva, S. Inerbayeva, K. Makhmudova
Institute of Botany and Phytointroduction, Ministry of Education and Science of Kazakhstan, Almaty, Kazakhstan
E-mail: m.tansara@mail.ru

Abstract
Researchers of the laboratory of seed growing and plant protection of RSE “Institute of Botany and Phytointroduction” CS MOS RK are in the process of studying the techniques of the leading seed banks of the world, of their assessment and approbation using seed samples of wild relatives of the cultivated plants of Kazakhstan at their placing for storage. At the Institute of botany and Phytointroduction of the Ministry of Education and Science of the Republic of Kazakhstan within the scientific-technical program “Botanical variety of wild relatives of cultivated plants of Kazakhstan as a source of enrichment and preservation of the agrobiodiversity gene pool for realization of the Food programme” for 2013-2015 the work on creation of seed bank of wild relatives of cultivated plants (WRCP) of Kazakhstan is being carried out. Since 2013 the employees of the Institute carry out collecting seed material of WRCP. In the present work the results of positive germinating test of seeds of caper grassy (Capparis herbacea Willd.) collected in the Turkestan region of the Southern Kazakhstan area are presented.
A STUDY OF LOAMY SOIL'S MICROSTRUCTURAL CHANGES DURING SWELLING AND SHRINKAGE USING X-RAY MICROTOMOGRAPHY

E. B. Skvortsova¹, E. V. Shein², A. V. Dembovetsky², K. N. Abrosimov¹, N. A. Shnyrev³, K. M. Gerke¹, K. A. Romanenko¹, A. B. Skvortsov¹
¹ V. V. Dokuchaev Soil Science Institute, Moscow, Russia, eskvora@mail.ru
² Moscow State University, Soil Science Faculty, Moscow, Russia, evgeny.shein@gmail.com

Abstract
The aim of the research is to characterize the structure of the pore space of the main genetic horizons of sod-podzolic soil and to identify changes in the soil pores in the process of swelling and shrinkage. The object of this study is the clay loam sod-podzolic soils developed on the canopy covering loam mixed birch-spruce forest 90-100 years old. Profile Formula: AY-AEL-EL-BEL-BT1-BT2-BC. The structure of cylindrical soil monoliths of different genetic soil horizons at field moisture, at capillary saturation and air-dry conditions were studied on the X-ray microtomography SkyScan-1172 (Bruker, USA). The diameter of the monolith was 3 cm, height was about 4 cm. Scanning was performed with a beam energy of 100 keV and a resolution of 9 microns per pixel. The moistening-draining processes uniquely affect the pore space distributions at different horizons. In horizons AEL and BT1 with moistening the soil mass is "swimming", most rounded and low indented pores are disappeared. When soil dried rounded pores are not reversed, this increases the amount cracked rugged and elongated pores. In the horizon VT2 is more powerful "swimming" and after draining soil pore space does not restore the previous level, even at the expense of fracture. In the horizon BEL processes of swelling-shrinkage less noticeable, which is associated with less clay particle size in granulometric composition and abundance of rounded closed pores, which do not participate in the capillary saturation.
SUSTAINABLE USE OF ECOTOURISM AND NATURE TOURISM AREAS IN BALIKESIR (NW TURKEY)

A. Soykan, R. Efe, I. Curebal, S. Sönmez
Balikesir University, Department of Geography, Faculty of Arts and Science, Balikesir, Turkey
E-mail: soykana@gmail.com

Abstract
Natural settings have lately intrigued tourists who want to travel to different destinations. Balikesir is, in this aspect, in possession of a number of natural attractions, some of which are the caves. This study aims to research the tourism potential of the caves in Balikesir and their contribution to nature tourism. The study is based on field and literature reviews. Field work was conducted to locate the caves and find out about their features. In the light of the incoming data, ArcGIS Desktop v.9X and a topographical map with a scale of 1/100,000 were used to mark the spots on the Balikesir city map. The topographical map was scanned to the computer, and then the features of the caves were organized in a table form. The caves were grouped according to their potentials. Accordingly, those eligible for tourism were determined. Only 4 out of 33 detected caves were specified as suitable for tourism, and comprehensive studies were carried out for them. The number of the natural caves examined and mapped in Balikesir totals 22. There are 11 natural caves that are unexamined but known to exist. 4 out of 33 caves have tourism potential. These include Bigadiç Meyvalı, Gönen Dereköy, Havran İnbogazı, and Kepsut Ulupınar. One in particular, namely Ulupınar, can be used for ecotourism activities in line with the principles of international cave tourism and under the control of scientific and technical projects.
TRADITIONS OF THE “GREEN” MENTALITY IN YEZIDI (KURDISH) CULTURE

N. Stepanyan-Gandilyan
Institute of Botany, National Academy of Sciences of Republic of Armenia, Research Scientist
E-mail: ninastep@rambler.ru

Abstract
One of the basic factors determining the success of ecological programs is the consciousness of individuals, the understanding of the significance and the barest necessity of maintaining ecological balance. A vast number of educational programs, trainings, expensive ecological campaigns, social advertising and other resources are aimed at the formation of such consciousness, the so called “green” mentality. Taking into account the importance of such campaigns, it is worth noting that there also exists another way, namely recalling the traditions of caring attitude towards the nature, a subsisted knowledge that had existed and had been initially mastered by humans. In this regard, the study of the culture of the peoples, the most conservative and cautious towards their traditions, could be particularly useful. Exactly to such ethnic group belong Yezidis (here we introduce the general term these people use in referring to themselves in Armenia, sometimes they also call themselves Kurds). Yezidis are ethno-confessional group worshiping the Sun as their main deity (Shams). Alongside with that, other features of animatisms are characteristic of the Yezidi religion: worship of water, stones, trees, animals, etc. Similar notions certainly contribute to the careful attitude towards the nature. The mode of living of Yezidis is itself closely related to nature; nowadays the basic occupations of Yezidis of Armenia are farming and cattle-breeding. During centuries the transfer of knowledge about the environment, habits relating to household activities, as well as the standards of interpersonal relations, bases on the attitude to the world and to the nature, occur among the members of current ethno-confessional group, and many of the mentioned qualities are worth studying.
STRATEGIC ENVIRONMENTAL ASSESSMENT OF ARAGVI RIVER BASIN

N. Sulkhanishvili
1 Tbilisi State University (FACULTY OF EXACT AND NATURAL SCIENCES), Tbilisi, Georgia
2 ECOVISION – The Union for Sustainable Development, Tbilisi, Georgia
Email address: Nino.sulkhanishvili@tsu.ge (author name)

Abstract
Integrated Watershed Management System will be gradually introduced in Georgia, according to the EU Association Agreement signed on 27 June, 2014 in Brussels.

Integrated Watershed Management System will be based on European principles of river basin management. This paper includes a survey of the Aragvi river basin and deals with the possible environmental, cultural and socio-economic impacts, which might be observed in the basin due to development of small and medium hydro power plants.

EU Association Agreement also obliges countries to implement Strategic Environmental Assessment (SEA) for relevant projects and fields. The given paper represents summary of the first in Georgia Strategic Environmental Assessment (SEA) of Aragvi river basin, which aims at supporting governmental policymakers, planners and private investors in the energy sector and other related sectors to make better-informed decisions in order to ensure that national sustainable development policies are addressed in strategic sectoral decision making.

The study is closely linked to the regional and energy development plans for promotion of renewable energy in Georgia. As set out in the SEA Directive, it will ‘contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development’.

To achieve this overall aim the study has the following key objectives:
- To provide the environmental dimension to these plans and thus to contribute to the overall decision making process, which will shape the development of the region as such and more specifically the development of hydroelectric facilities within the region.
- To provide a basis for the subsequent development and appraisal of specific investment projects in the hydroelectric sector in the region;
- To provide a forum for stakeholders, particularly local residents affected by any hydroelectric development, to participate in the development process;
- To provide potential future investors with information for the most appropriate location and type of hydroelectric facilities and any limitations and conditions which should be met and may be part of the permitting process;
- To provide the authorities with assistance in the appraisal of project proposals put forward by developers.

The SEA on Aragvi River Basin was commissioned by the European Bank for Reconstruction and Development (EBRD) and carried out by a Consortium consisting of Pöyry Energy GmbH (Consortium Leader), Hydrophil Consulting & Knowledge Development GmbH, and ECOVISION – The Union of Sustainable Development.
SATELLITE TECHNOLOGIES IN FOREST ECOLOGICAL MONITORING

M. Tatishvili, M. Meladze, I. Mkurnalidze, M. Kaisauri
Institute of Hydrometeorology at Georgian Technical University, Tbilisi, Georgia
Email address: marika.tatishvili@yahoo.com

Abstract
The one of Earth Observing System (EOS) program component is investigation of influence of Earth vegetation on large-scale global processes. The most applicable product from satellite observation is Normalized Difference Vegetation Index that is used in observation on vegetation. Vegetation index is important ecosystem variable widely used in variety of bio-geophysical applications. The use of NDVI in forest ecological monitoring in Georgia is reviewed in presented article.

NATURAL HYDROMETEOROLOGICAL EVENTS IN GEORGIA UNDER GLOBAL CLIMATE CHANGE BACKGROUND

M. Tatishvili, I. Mkurnalidze, R. Meskhia
Institute of Hydrometeorology at Georgian Technical University, Tbilisi, Georgia
Email address: marika.tatishvili@yahoo.com

Abstract
Modern global climate change and anthropogenic activities mismanagement led to a sharp intensification of natural disasters. This problem is especially urgent for Georgia where natural hydrometeorological disasters are preconditioned by the landscape-climatic state. Following phenomena have been investigated flooding, heavy shower, hail, lighting, sea storm. Using meteorological observation data statistical analysis has been performed. The results are given in corresponding tables and diagrams. They allow identifying risk areas for developing preventive protection measures against some hydrometeorological disasters.
DYNAMICS OF THE GLACIERS IN THE KODORI RIVER BASIN (ABKHAZIA, GEORGIA) IN 1911-2014

L. Tielidze, L. Gadrani, M. Tsitsagi, N. Chikhradze
Vakhushti Bagrationi Institute of Geography at Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia
Email address: levan.tielidze@tsu.ge(L. G. Tielidze), levan_tielidze@yahoo.com (L. G. Tielidze)

Abstract
This paper considers the last one century’s dynamics of the glaciers in the Kodori River basin, which is located on the southern slope of the Great Caucasus in Georgia. The latest statistical information is also given about the glaciers located in the individual river basins; their morphological types, exposition and the dynamics are considered according to the individual years. In our research, we used the Catalogue of the glaciers of Georgia compiled by K. Podozerskiy in 1911. We also used the military topographic maps with the scale of 1:25 000 and 1:50 000 drawn up in 1960, where there are mapped in detail the glaciers and the ends of their ice tongues on the southern slope of Great Caucasus of those times. We also used the remote sensing method, which is the best modern way for the study of the dynamics of glaciers and this method is remarkable by a quick obtaining of results. The spectral images of the Landsat TM (Thematic Mapper) (USGS) received from the “Landsat” artificial satellite are the necessary materials for our study. Then we used the Composite Bands function with the help of ArcGIS and we put the images with the following order: 7-4-2. As a result of the use of this method, we have identified the dynamics of the glaciers in the Kodori River basin.
IMPORTANCE OF INTEGRATED WATER RESOURCES MANAGEMENT IN FLOOD AND FLASH FLOOD MANAGEMENT

N. Tkhilava
Department of Environmental Policy and International Relations, Ministry of Environment and Natural Resources Protection, Tbilisi, Georgia
Email address: Nino.tkhilava@moe.gov.ge

Abstract
Water resources management setup and practices in Georgia are relied on administrative approaches. Gradual introduction and implementation of the river basin based Integrated Water Resources Management (IWRM) will require corresponding legal and institutional adjustment as well as significant capacity building. The IWRM model for Georgia is intended to address prioritized concerns regarding water resource management, based on extensive consultations with stakeholders from a wide range of agencies and institutions related to water issues. Managing water efficiently, balancing conflicting uses of water resources, eliminating the results of catastrophic floods causing loss of human lives and damages to infrastructure and settlements and ensuring environmental stability of the river basins are critical issues which should be solved through ecosystem-based Integrated Water Resource Management approaches. The manuscript briefly reviews why the issue of shifting to IWRM is a priority for Georgia, what actions are needed to be implemented, and what are the sequences of these actions.
MAIN PRINCIPLES OF ECOLOGIZATION OF FERTILIZATION SYSTEMS FOR SUBTROPICAL CULTURES

V. Tsanava¹, A. Meskhidze², Sh. Lominadze², E. Tsanava¹
¹ Institute of Tea, Subtropical Cultures and Tea Industry of Georgian Agrarian University,
² Batumi Shota Rustaveli State University.

Abstract
The article deals with the impact of nitrogen fertilizers norms and forms used under tea and citrus fertilized in long-term experiments in red and yellow soil conditions in the West Georgia subtropical zone on the productivity of these cultures and obtaining ecologically pure products. At the same time, using 15N nitrogen stable isotope, the relocation of nitrogen fertilizer is studied in the system “soil-plant-fertilizer-atmosphere”.

¹ Institute of Tea, Subtropical Cultures and Tea Industry of Georgian Agrarian University,
² Batumi Shota Rustaveli State University.
SOME ASPECTS OF THE METHODOLOGY OF DISASTER GEOLOGICAL PROCESS HAZARD AND RISK MAPPING ON THE EXAMPLE OF GEORGIA

E. Tsereteli$^{1,2}$, G. Gaprindashvili$^{1,2,3}$, T. Donadze$^3$, T. Nanobashvili$^3$
O. Kurtsikidze$^{1,3}$

1 National Environmental Agency, Department of Geology, E-Mail: gaprindashvili.george@gmail.com
2 Vakhushti Bagrationi Institute of Geography, E-Mail: emiltsereteli@gmail.com
3 Ivane Javakhishvili Tbilisi State University, E-Mail: george.gaprindashvili@tsu.ge

Abstract
In the second half of the XX century Geological Hazards in Georgia have extreme character, which caused great economic loss, human casualties and tens of thousands of families moved to another place. For reduction of hazard risk it was necessary to set the causal connection of formation and reactivation of natural processes and identified "crisis" situation and the "conflict" situation of the spaces and the permissible limit of anthropogenic loads, as well as objects that could threaten by geological disasters. Protection of population from the disaster, for effective management of spatial adaptation and utilization it was necessary to identify all geological hazards in a regional scale, observation of the processes "behavior" and development tendency of the triggering factors.

Multi factors that determine the scales of exo-geological process formation-reactivation, character and intensity of the development we rely mainly on three major deterministic and stochastic properties of the group-in numbers and characteristics, such as: 1. Rock composition within the geological environment, properties, condition, and their sensitivity to various geological processes; 2. The energy potential of the relief; 3.

The role of climate (so-called "temporary zone"), discussed in certain geographical space, not as a statistic based on the weather conditions, during which the processes taking place within the boundaries of the baseline regime, but also a time of changing meteorological element deviation from average annual norm. Furthermore, it should be taken into consideration the values of the modern tectonic movements, earthquakes are related to the intensity and repeatability, as well as the anthropogenic loading and its tolerability criteria of geological setting. Based on these principles Georgia is zoned $1: 500 000$ and $1: 200 000$ scale, while more than 60% of territory is done in $1: 25 000$-$1: 10 000$ scale.
MEASURES OF DRINKING WATER SUPPLY RESERVOIRS ECOLOGICAL PROBLEMS SOLUTION

Department of Geography, Iv. Javakhishvili Tbilisi State University

Abstract
Drinking and recreational water quality improvement is a difficult and complex task of the water supply and environmental protection organizations. At present, in the world, the problem has gone beyond the private interests of a single entity, as it includes, as a daily fulfillment of the population requirements and its health protection, as well as the countries’ most important issues of security and sustainable economic development.

Problem urgency in Georgia has become over the last decades due to increment of diseases frequency and rates of infectious diseases of unknown origin, infant and young child mortality, reduction of life expectancy etc. Taking into the consideration the water reservoirs poor ecological state, drinking water supply infrastructure current state, method and type of technology used in country for water disinfection, can be said that, neither medical scientists nor doctors, and most importantly, the health authorities have been paid no attention to the required level yet. In the presented article the results of drinking water supply main reservoir, so called “Tbilisi Sea” ecological state research are discussed. During the scientific survey particular attention has been paid to different kind of algae production in reservoir, polluting drinking water and causing its organoleptic characteristics changes, during the eutrophication process. For the latter’ negative impact neutralization, the recommendations- methods and technical means are proposed.
DETERMINATION OF CHLORINE SAFE DOSE FOR DRINKING WATER DISINFECTION

N. Tsvitsivadze, E. Khatiashvili, L. Lagidze, N. Motsonelidze
Department of Geography, Iv. Javakhishvili Tbilisi State University
E-mail: nluka1@yahoo.com

Abstract
An attempt of definition of safe for human health dose of chlorine, for usage in drinking water treatment station, in the condition of both chemical and organic contaminants existence in reservoir water has been studied. Since the ancient time it is well known, that water renders huge influence on population live ability, therefore the problem of submitted water quantity and quality play the important role in people health preservation. So the main question of its consumers is connected with the issue how safety the drinking water is for them? Nowadays, more than half of Georgian population is compelled to use the water not corresponded to established by WHO sanitary-and-hygienic requirements. The most part of potable water in country cities and settlements move from the reservoir replenished by the rivers, or from the lakes acting as collectors of rain, snow or glaciers melted waters. Basically, it consisted of several chemical substances for example: heavy metals, dioxin, four-chloride carbon, different chlorine products, benzene, chloroform, free chlorine, pesticides, etc. caused yearly aging and life expectancy mitigation at least at 30%. It also contains live pollutants, organic substances of bacteria and the microorganisms causing intestinal diseases. For bacteria level reduction WHO recommended water chlorination process. An advantage of which, as a powerful disinfectant is its low price, and in comparison with other substances, waters simple and inexpensive treatment process. However, chlorine is strong halogen and can react with the various organic substances presented in water, forming chemical compounds. These substances do not leave from the water as it is a very expensive process. On the one hand, chlorine has released a civilization from the constant danger of the disease epidemics transmitted through water. On the other hand, the same chlorine creates in the water cancerogenic, cardiovascular and other not less harmful disease causing substances.
PHYSICAL AND CHEMICAL PROPERTIES OF RECENTLY DEPOSITED SEDIMENTS IN THE RESERVOIR OF THE BORCKA DAM IN ARTVIN, TURKEY

B. Turgut, M. Ozalp, B. Kose
Artvin Coruh University, Artvin, Turkey
E-mail: bturgut@artvin.edu.tr

Abstract
The aim of this study conducted within the Borcka Dam reservoir was to estimate some physical and chemical properties of deposited sediment including grain size distribution, penetration resistance, water stable aggregate, moisture content, organic matter content and pH at two depths (0 - 10 cm and 10 - 20 cm). Another objective was to analyze the distribution of these properties across the sampling site. For this purpose, one of the aforementioned sediment deposition areas, approximately 3.6 ha, was designated as the study site that was divided into intersecting transects of 10 m x 50 m. The penetration resistance values were determined in the field and 182 sediment samples were taken at 91 intersection points of transects, both from the surface (0 - 10 cm) and subsurface (10-20 cm) layers for laboratory analysis. Data gathered were evaluated using descriptive statistics and ANOVA while geostatistical analyses were used for calculating spatial variability in the data. Results indicated that the most common texture classes were loam in the surface 0-10 cm and silty loam in the 10-20 cm subsurface layer. Moreover the penetration resistance values, sand content and water stable aggregate values in the surface layer were significantly higher than in the subsurface layer, and moisture content, clay and silt content, pH and organic matter were significantly (P<0.01) higher in the subsurface layer than in the surface layer. Geostatistical analyses showed that all properties were described by isotropic variogram and the ranges were lower in the subsurface layer than in the surface layer. The results of this study revealed that the analyzed physical and chemical properties of the recently deposited sediments showed significant differences between the layers.
IMPACTS OF RECREATIONAL USAGE

S. Uzun, H. Muderrisoğlu, O. Yildiz, N. Aksoy, M. Sarginci, B. Toprak
Duzce University, Duzce, Turkey
E-mail: seriruzun@duzce.edu.tr

Abstract
National parks have high tourism and recreational values. However, recreational activities may in turn negatively affect the conditions of the parks. The aim of this study is to compare the impacts of different recreational activities via changes in soil structure, utilization density and vegetation cover of the sites. The study site is one of the most preferred winter-recreational destination, Uludağ National Park. The mountain series in which the park is situated is located on south of Bursa city in the north-western part of Turkey. Five picnic and camping areas and a tourism development skiing site in the park have been designated for the study. The temporal changes of vegetation cover were analyzed via satellite views and air photos. For the field study, soils from top 20 cm were sampled for bulk density and organic matter content. Litter layer were analyzed from randomly selected 5 spots on each sampling sites to estimate the litter-mass. To compare the vegetational changes plant samples were taken on the sampling units and adjacent control sites during summer of 2010. Some of the field observation data were recorded for three years to compare the temporal changes within each usage type. Analysis of the photos and field study revealed that building infrastructures and roads have been increasing steadily on the park against meadow cover. There is not enough evidence to claim any significant changes on forest covers. Intensively used areas had lower vegetation cover, lower litter mass on the floor, but higher soil bulk density values on top soil layers due to the compactions from pedestrian traffics.
NUTRIENT TURNOVER STUDIES ON THE MONUMENTAL PLATANUS ORIENTALIS TREES FROM ÇANAKKALE-TURKEY

I. Uysal¹, E. Yücel, S. Gücel, M. Öztürk²
¹ Çanakkale Onsekiz Mart University, Faculty of Science & Arts, Canakkale, Turkey
² Botany Department, Science Faculty, Ege University, Izmir, Turkey
E-mail: bturgut@artvin.edu.tr

Abstract
This investigation covers studies on the nutrient turnover of 400-800 years old Platanus orientalis monumental trees. The specimens were collected during the month of August from five stations distributed within the borders of Çanakkale-Biga-Kırkçeşit hotwater springs. The soils were analysed to determine the texture, percentage CaCO₃, pH, total salt and organic matter contents. In the plant specimens percentage nitrogen, phosphorus (ppm), potassium (ppm), sodium (ppm), calcium (ppm), magnesium (ppm), iron (ppm), manganese (ppm), zinc (ppm), and copper (ppm) were determined. The results obtained were analysed statistically using Friedman test to find out the interrelations among the soils and plants, whereas Dunnet multiple-comparative test was used to find out the correlations between the soils and plants as well as determine different groups. The results revealed that in the uptake of soil nitrogen bark, leaves and root; for phosphorus leaves, young shoots and roots; for potassium uptake leaves, young shoots and root; for calcium bark, old stems, roots and leaves; in the case of magnesium bark, old and young stems, root and leaves have an immense impact. For an uptake of sodium from the soils mainly roots, bark, old-young stems, and leaves; for iron roots and bark; for manganese roots, leaves and bark; for zinc roots, young shoots, leaves and bark; for copper uptake roots, young shoots, leaves, and bark play an important role. The results have been discussed in the light of these findings.
A NEW APPROACH AND TOOLS FOR PERFECTING PHYTOREMEDIATION TECHNOLOGY

T. Varazi¹, M. Kurashvili¹, M. Pruidze¹, G. Khatisashvili¹, N. Gagelidze¹, G. Adamia¹, G. Zaalishvili¹, M. Gordeziani¹, M. Sutton²

¹ Durmishidze Institute of Biochemistry and Biotechnology of Agricultural University of Georgia, David Agmashenebli Alley 240, Tbilisi, 0159, Georgia
² Chemical Sciences Division, Lawrence Livermore National Laboratory, California 94550 USA; sutton18@llnl.gov

Email address: t.varazi@agruni.edu.ge, m.kurashvili@agruni.edu.ge, m.pruidze@agruni.edu.ge, g.khatisashvili@agruni.edu.ge, n.gagelidze@agruni.edu.ge, g.adamia@agruni.edu.ge, g.zaalishvili@agruni.edu.ge, m.gordeziani@agruni.edu.ge, sutton18@llnl.gov

Abstract

The development of methods for soil remediation for removal of chemical contaminants is a large and challenging problem. A new phytoremediation technology, given in the present work, is based on joint application of natural sorbents, microorganisms and plants. The method aims at prevention of chemical contamination of soils. It has the potential to restore a polluted environment and prevent dissemination of toxic compounds from hotbeds of pollution for a considerable length of time. The presented complex biotechnology is important from the viewpoint of prevention. This technology can be applied to soils contaminated with heavy metals, oil hydrocarbons, explosives, pesticides and other pollutants.

The main purpose of the carried out work is the development of a novel approach to the provision of ecological safety. The approach is based on using natural minerals composites which are comprised of natural mineral rocks, microorganism strains with high detoxification abilities and plants-phytoremediators. In this composite material, the function of a sorbent is to uptake and to trap pollutants thus restraining their emission in the environment. The role of the microorganisms is to accomplish the first stage of biodegradation of organic contaminants and then to apply phytoremediation as a unique cleanup strategy. Natural sorbent can be applied during the initial stage of cleaning up of contaminated soil, followed by application of a phytoremediation technology through purposeful planting of selected plants. This results in the total assimilation and complete mineralization of pollutants and/or their intermediates or in their partial transformation by microbes.

Following contaminants were used in the present work: explosive – 2,4,6 trinitrotoluene (TNT), oil hydrocarbon (hexadecane) and Wax (long chain hydrocarbons). Special attention was paid to enhancement of soil fertility, which improves microorganism and plant growth conditions and is important for bioremediation processes providing total rehabilitation of soil.
SEASONAL DYNAMIC OF MACROZOOBENTOS, OF THE GEORGIAN BLACK SEA COAST ZONE

M. Varshanidze¹, E. Mikashavidze²
¹ WEFRI, e-mail: varshanidzem@yahoo.com
² Fisheries and Black sea monitoring division of natural environmental agancy, e-mail: eteri-mikashavidze@rambler.ru

Abstract
The present state of the Black Sea south-east coastline (Gonio, Kobuleti and Poti) macrozoobenthos has been studied. Field works were carried out within the EU funded project "PERSEUS". Data on bentho fauna diversity, the number and biomass seasonal dynamics was received. The aim of research is the following: collection of benthic organisms, conservation, species identification, number and biomass determination. Identification of dominant groups and species. All the above indexes are essential for ecosystem state assessment. Zoobenthos was collected widely known, so-called Borutsky’s method. Data was collected by Van Veen Grab Sampler, simultaneously, the sediments were visually observed. Benthos samples were washed on deck through two-layered stainless metal 1-1, 5 mm mesh-made benthos washing set. The material was fixed in 96 % alcohol and 4% formalin, put into containers and labeled. The samples were treated in a corresponding laboratory. Identification was conducted according to identification keys, up-to-date “Leica” binocular and microscope. Quantity and biomass were identified in total samples and transferred per square meter. For biomass identification we used Borutsky’s precise weight method, using torsion and electric scales. Large organisms were dried by filter paper. After research carry out on the Black sea south-east coastline, in macrozoobenthos samples were identified Polycheta, Mollusks and Crustaceans, also their seasonal dynamic, quantity and biomass. Dominant speciese of this bottom settlement are: N. Cirrosa, from mollsca Ch.gallina and C. cornea, arthropods C.pestai and B. improvisus.
ECOLOGICAL IMPACTS AND SUSTAINABLE TOURISM DEVELOPMENT IN NATURAL PROTECTED AREAS (THE CASE OF BULGARIA)

M. Vodenska¹, N. Popova²
¹ Sofia University, Bulgaria, mvodenska@yahoo.com
² International Business School, Bulgaria, popova.nikolina@acad.ibsedu.bg

Abstract
For many years now the investigation, evaluation, forecasting and management of tourism impacts all over the world has been one of the main tasks of tourism practitioners and academics. It is believed that tourism impacts and their management are the fundamentals of tourism policy.
This paper aims at revealing the generation and manifestation of tourism impacts. Following a brief discussion of tourism impacts’ various classifications the paper goes on to reveal the characteristics of one type of tourism impacts - namely the ecological factors.
The authors make an attempt at classification of these impacts dividing them by various criteria and introducing various viewpoints regarding the difference between manifestation and evaluation. One of the major methodological obstacles in this field of research is the difficulty of comparing tourism impacts manifested in diverse environments.
One possible approach is to evaluate tourism impacts by the attitude of local residents towards their manifestation. The paper discusses the results obtained in a survey conducted across Bulgaria using structured questionnaires.

Further on the paper continues to discuss the role of various ecological impacts in natural protected areas (NPA). An attempt is made to forecast the role of some ecological tourism impacts and the contemporary trends in their manifestation and evaluation in sustainable tourism development in some Bulgarian natural protected areas.
EFFECTS OF GYPSUM AND SULFUR AS SOIL AMENDMENTS ON AFFORASTATION SUCCESS IN INLAND PART OF ANATOLIA: EARLY RESULTS

O. Yildiz, E. Altundağ, B. Çetin, Ş. T. Güner, İ. Gursoy, M. Sarginci, B. Altunay, B. Toprak, Ö. Mutlu
Düzce University, Forestry Faculty, Düzce, Turkey
E-mail: oktayyildiz@duzce.edu.tr

Abstract
The objective of the current study is to investigate the reclamation of sodic soils via chemical amendments in erosion control sites located in Central Anatolia. Randomized block design is used for the experiment. In the summer of 2012, four abandoned afforestation sites with sodic-saline soils were designated for the study. From the results of the earlier trials and experience in the region, three promising plant species, salt cedar (Tamarix), Russian-olive (Elaeagnus angustifolia) and silver poplar (P alba) were chosen for the experiment. For each species in each block, there are 1 gypsum + 1 sulfur application plots with a control plots adjacent to them. Based on soil analysis, approximate amount of gypsum and sulfur were applied to the soil surface as treatments. After the applications of amendments, 30 cm of water was given to the each experimental unit for three times with 8 hour intervals to drain the excessive sodium.
In the fall of 2013, three years old seedlings were planted by 1.5 X 1.5 m spacing on each plots. The survival rates were determined and height and diameter were measured at the end of September 2014.
At the end of the first growing season, survival rates of the silver poplar in control sites were about 30 % less than those of the gypsum and sulfur sites (P-value = 0.0001). Seedling of the silver poplar had about 30 % shorter heights than those of the gypsum and sulfur sites (P-value = 0.0001). Russian olive has shown about % 20 less diameter growth on control sites comparing to those of the treated sites (P-value = 0.002).
Comprehensive analysis of the treatments on soil reclamation and plant growth will be conducted after second and third year of the experiment. However, early results imply that the treatments may have positive effects on seedling survival and growth rates.

Acknowledgement
This study is funded by TÜBİTAK (The Scientific and Technological Research Council of Turkey) through a project no: 113O793 and titled as “İç Anadolu Sodik Sahalarında Jips ve Kükürt Uygulamasının Ağaçlandırma Başarısına Etkisi”.
BIOMONITORING OF HEAVY METALS BY USING TRANSPLANTED LICHEN, PSEUDEVERNIA FURFURACEA, IN ÇANKIRI CITY, TURKEY

A. Yıldız, A. Aksoy, Ç. Vardar, E. Ünal
Ankara University, Faculty of Science, Department of Biology, Ankara, Turkey
E-mail: atilayildiz66@gmail.com; ayildiz@science.ankara.edu.tr

Abstract
In this study lichen explants and airborne particulates were analyzed for Zn, Cd, Pb, Ni, Mn and Cu content in the province of Çankırı. Thalli of the fruticose lichen Pseudevernia furfuracea was collected from an unpolluted region and exposed for using bag (transplantation) technique. The results confirmed that the presence of the heavy metals in particulates is important to assess contamination levels of the certain areas. The significant correlation between most of the heavy metals accumulated by lichens and the heavy metal air concentrations shows a good proof of their ability to represent atmospheric contamination. Also the results supported that lichens can be used as biomonitors and bioindicators for heavy metals pollution. The objective of this study was to determine the air pollution level of Çankırı and to generate the air pollution map of this city by using Pseudevernia furfuracea (L.) Zopf, as a bio-monitor and bioindicator. The lichen samples were collected from unpolluted area at Yapraklı Mountains, Çankırı in July 2002 and transplanted to 6 different stations in Çankırı. Lichen samples were re-collected in two different periods, 3 and 6 months later, respectively. Heavy metal contents Cd (Cadmium), Cu (Copper), Mn (Manganese), Ni (Nickel), Pb (Lead) and Zn (Zinc) were determined by using Inductively Coupled Plasma Spectrometry (ICP). The chlorophyll a and b contents were determined by using DMSO method. The air pollution in Çankırı was obtained according to the results of heavy metal analysis in Pseudevernia furfuracea. It was obvious that reasons of pollution in the stations of Çankırı were heating activities, vehicular and industrial pollution.
USING OF PSEUDEVERNIA FURFURACEA (L.) ZOPF BIOINDICATOR FOR HEAVY METALS

A. Yıldız, A. Aksoy, Ç. Vardar
Ankara University, Faculty of Science, Department of Biology, Ankara, Turkey
E-mail: atilayildiz66@gmail.com; ayildiz@science.ankara.edu.tr

Abstract
The objective of this study was to determine the air pollution level of Nevşehir and to generate the air pollution map of this city by using Pseudevernia furfuracea (L.) Zopf, as a biomonitor. The lichen samples were collected from unpolluted area at Yapraklı Mountains, Çankırı in July 2002 and transplanted to 4 different stations in Nevşehir. Lichen samples were re-collected in two different periods, 3 and 6 months later respectively. Heavy metal contents (Cd, Cu, Mn, Ni, Pb and Zn) were determined by using inductively coupled plasma spectrometry (ICP-OES). The chlorophyll a and b contents were determined by using DMSO method. According to the results of heavy metal analysis Pseudevernia furfuracea worked well as a biomonitor, and indicated the presence of air pollution in Nevşehir especially in the city center which was caused mostly by heating activities and traffic.
DETERMINATION OF AIR POLLUTION BY PSEUDEVERNIA FURFURACEA (L.) ZOPF IN AN URBAN AREA

A. Yıldız, A. Aksoy, Ç. Vardar
Ankara University, Faculty of Science, Department of Biology, Ankara, Turkey
E-mail: atilayildiz66@gmail.com; ayildiz@science.ankara.edu.tr

Abstract
Air pollutants and heavy metals are considered as one of the major cause of problem in living environment. These environmental problems also affect the living organisms in many ways. Heavy metals and pollutants can alter the composition and fluidity of cellular structures, inhibiting water and nutrient uptake in plant and lichen species. Contaminants negatively affect the organisms by transferring to animals and humans via the food chain. Machine and Chemistry Industrial areas in Turkey are mainly located in Kırıkkale Province. Also the urban motorway is also set up in the same area. Due to the traffic and industrial areas the heavy metals have been concentrated in plants, mosses and lichens in that Province. Lichen thalli easily can accumulate heavy metals through their membranes hence they can be used in biomonitoring of environmental pollution. Compared to other vascular and non vascular plants, lichens are more sensitive to environmental stress. The objective of this study was to determine the air pollution levels of Kırıkkale and to generate the air pollution map of this city by using Pseudevernia furfuracea (L.) Zopf lichen samplings as biomonitor organisms. Lichen samples were re-collected at two different periods in three month intervals. Heavy metal, copper (Cu), cadmium (Cd), manganese (Mn), nickel (Ni), lead (Pb) and zinc (Zn), contents were determined by using inductively coupled plasma spectrometry (ICP). According to the heavy metal analysis results of Pseudevernia furfuracea, air pollution in Kırıkkale due to the industrial activities, heating and traffic showed a variety of changes in different stations and periods studied. Heavy metal concentrations in various stations showed obvious differences based on the determination methods applied in the experiments. The results indicated that lichens had a considerable potential of biomonitoring capacity.
MOLECULAR CHARACTERIZATION OF BUCKWHEAT LANDRACES OF NORTHERN AREAS OF PAKISTAN

H. F. Zakir, A. Sajid, Farhatullah
The University of Agriculture, Peshawar, Pakistan
E-mail: drfarhat@aup.edu.pk

Abstract

Buckwheat landraces from the Himalayan and Karakorum ranges of Pakistan was characterized with SSR markers in the present study. A set of 36 landraces collected from Gilgit Baltistan along with two genotypes from China were used for molecular characterization. A total of 20 SSR markers were used for molecular genotyping of the tested Buckwheat landraces. The SSR data was analyzed to infer on the population structure, considering the species collected from different geographical locations. The number of alleles, linkage disequilibrium among loci and observed and expected heterozygosity were estimated. Buckwheat germplasm showed variable number of alleles per locus. The level of divergence between species was analyzed using the Factorial Correspondence Analysis (FCA), construction of phylogenetic tree and estimation of FST values. On overall basis genetic diversity was observed for different markers ranging from the maximum for Fes-1585(0.82) while the lowest for GB-FE-191(0.12). The overall diversity, in terms of expected heterozygosity, was high in the tartary species (0.489) than the common species (0.437). The difference in the observed and expected heterozygosity revealed lack of any inbreeding or clonality in the two species. Similarly, an overall high genotypic diversity of common species was 1.000 while low for the tartary species was 0.870.
PECULIARITIES OF MICROCLONAL PROPAGATION OF THE PLANTS

N. Zarnadze, S. Manjgaladze, Ts. Bolkvadze
Batumi Shota Rustaveli State University, e-mail: z_nana@mail.ru

Abstract
The present work deals with the reviews on the peculiarities of microclonal propagation of plants in vitro culture. A special attention is paid to the advantages of the practical appliance of this method in comparison with the traditional ones. It is described here the classification of micro propagation methods: the issues on creating apical meristem and adventive sprouts on the explant tissue, regeneration of sprouts on callus, the induction peculiarities of somatic embryogenesis in explant cells and callus, as well as the issues on rooting and acclimatization of microclones.

S. Zeynalova
National Academy of Sciences, Baku, Azerbaijan
E-mail: saida-z@yandex.ru

Abstract
The increase of the anthropogenic impact on geosystems leads to disturbance of the corresponding ecological systems. Accordingly, the necessity of forecasting of the landscape dynamics is increasing as well. This article deals with questions of indication and prognosis of landscape dynamics. The main emphasis is given to the research based on the indication of the past stages of development of landscapes which have lead to its present condition. This retrospective analysis is followed by an attempt to forecast the future development of the landscape dynamics.
<table>
<thead>
<tr>
<th>NAME</th>
<th>COUNTRY</th>
<th>NAME</th>
<th>COUNTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABDALADZE Otar</td>
<td>Georgia</td>
<td>BARINOVA Sophia</td>
<td>Israel</td>
</tr>
<tr>
<td>ABLAIKHANOV Elhat</td>
<td>Kazakhstan</td>
<td>BASILASHVILI Tsisana</td>
<td>Georgia</td>
</tr>
<tr>
<td>ABLAZOV Abdugaffar</td>
<td>Turkey</td>
<td>BATSATSASHVILI Ketevan</td>
<td>Georgia</td>
</tr>
<tr>
<td>ABROSIMOV K.</td>
<td>Russia</td>
<td>BEKIRISHVILI Nargiz</td>
<td>Georgia</td>
</tr>
<tr>
<td>ACAR Cengiz</td>
<td>Turkey</td>
<td>BELTADZE Tornike</td>
<td>Georgia</td>
</tr>
<tr>
<td>ADAMIA George</td>
<td>Georgia</td>
<td>BERIDZE Dali</td>
<td>Georgia</td>
</tr>
<tr>
<td>AK M. Kıvanç</td>
<td>Turkey</td>
<td>BERITASHVILI Bakur</td>
<td>Georgia</td>
</tr>
<tr>
<td>AKSOY Ahmet</td>
<td>Turkey</td>
<td>BERUCHASHVILI Nikoloz</td>
<td>Georgia</td>
</tr>
<tr>
<td>AKSOY Necmi</td>
<td>Turkey</td>
<td>BERUCHASHVILI Levan</td>
<td>Georgia</td>
</tr>
<tr>
<td>AKSU Yasar</td>
<td>Turkey</td>
<td>BILASHVILI Kakhaber</td>
<td>Georgia</td>
</tr>
<tr>
<td>ASKURAVA Zaal</td>
<td>Georgia</td>
<td>BLIADZE Teimuraz</td>
<td>Georgia</td>
</tr>
<tr>
<td>ALASANIA Nargiza</td>
<td>Georgia</td>
<td>BOLASHVILI Nana</td>
<td>Georgia</td>
</tr>
<tr>
<td>ALAVRDAVSHVILI Merab</td>
<td>Georgia</td>
<td>BOLKVADZI Gia</td>
<td>Georgia</td>
</tr>
<tr>
<td>ALEKSIDZE Tamar</td>
<td>Georgia</td>
<td>BOLKVADZE Tsiala</td>
<td>Georgia</td>
</tr>
<tr>
<td>ALESKEROVA Fidan</td>
<td>Azerbaijan</td>
<td>BOYNAGRYAN Vladimir</td>
<td>Armenia</td>
</tr>
<tr>
<td>ALIZADE Valida</td>
<td>Azerbaijan</td>
<td>BREGVADZE Giorgi</td>
<td>Georgia</td>
</tr>
<tr>
<td>ALPENIDZE Melor</td>
<td>Georgia</td>
<td>ÇAKICIERA Nevzat</td>
<td>Turkey</td>
</tr>
<tr>
<td>ALTAY Volkan</td>
<td>Turkey</td>
<td>ÇAKIR Günay</td>
<td>Turkey</td>
</tr>
<tr>
<td>ALTUNAY Burak</td>
<td>Turkey</td>
<td>ÇELIK Ali</td>
<td>Turkey</td>
</tr>
<tr>
<td>ALTUNDAĞ Ernaz</td>
<td>Turkey</td>
<td>ÇELİK Jale</td>
<td>Turkey</td>
</tr>
<tr>
<td>AMIRANASHVILI Avtandil</td>
<td>Georgia</td>
<td>CETIN Bilal</td>
<td>Turkey</td>
</tr>
<tr>
<td>AMIRANASHVILI Lia</td>
<td>Georgia</td>
<td>CHAGALIDZE Ramaz</td>
<td>Georgia</td>
</tr>
<tr>
<td>ANANIASVILI Tamar</td>
<td>Georgia</td>
<td>CHARGAZIA Khatuna</td>
<td>Georgia</td>
</tr>
<tr>
<td>APCIAURI Gulnara</td>
<td>Georgia</td>
<td>CHIKHLADZE Victor</td>
<td>Georgia</td>
</tr>
<tr>
<td>ARABIDZE Anri</td>
<td>Georgia</td>
<td>CHIKHRADZE Nino</td>
<td>Georgia</td>
</tr>
<tr>
<td>AREFIEVA Valeria</td>
<td>Russia</td>
<td>CHITANAVA Jana</td>
<td>Georgia</td>
</tr>
<tr>
<td>ASANIDZE Lasha</td>
<td>Georgia</td>
<td>CİCEK Emrah</td>
<td>Turkey</td>
</tr>
<tr>
<td>ASLANIPOUR Behnaz</td>
<td>Turkey</td>
<td>CÜREBAL Isa</td>
<td>Turkey</td>
</tr>
<tr>
<td>ASMARYAN Shushanik</td>
<td>Armenia</td>
<td>DANILOV M. P.</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>AVKOPASHVILI Guranda</td>
<td>Georgia</td>
<td>DAVITADZE Murman</td>
<td>Georgia</td>
</tr>
<tr>
<td>AYTIN Ayhan</td>
<td>Turkey</td>
<td>DAVITAIA Eteri</td>
<td>Georgia</td>
</tr>
<tr>
<td>NAME</td>
<td>COUNTRY</td>
<td>NAME</td>
<td>COUNTRY</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------</td>
<td>---------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>DEMBOVETSKY A.</td>
<td>Russia</td>
<td>GAZZOLA Patrizia</td>
<td>Italy</td>
</tr>
<tr>
<td>DEMIRARSLAN K. Onur</td>
<td>Turkey</td>
<td>GEGECHKORI Arnold</td>
<td>Georgia</td>
</tr>
<tr>
<td>DIASAMIDZE Inga</td>
<td>Georgia</td>
<td>GELADZE Vakhtang</td>
<td>Georgia</td>
</tr>
<tr>
<td>DIMEYYEVA Liliya</td>
<td>Kazakhstan</td>
<td>GEMEIJIYEVA Nadezhda</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>DOLIDZE Ketevan</td>
<td>Georgia</td>
<td>GERKE K.</td>
<td>Russia</td>
</tr>
<tr>
<td>DONADZE Tsetsili</td>
<td>Georgia</td>
<td>GIGAURI Khatuna</td>
<td>Georgia</td>
</tr>
<tr>
<td>DONICA Alia</td>
<td>Moldova</td>
<td>GOGITIDZE Vazha</td>
<td>Georgia</td>
</tr>
<tr>
<td>DUMBADZE Guguli</td>
<td>Georgia</td>
<td>GOKHELASHVILI Nino</td>
<td>Georgia</td>
</tr>
<tr>
<td>DZADZAMIA M.</td>
<td>Georgia</td>
<td>GÖKTÜRÜK Temel</td>
<td>Turkey</td>
</tr>
<tr>
<td>EFE Recep</td>
<td>Turkey</td>
<td>GÜNER Ş. Teoman</td>
<td>Turkey</td>
</tr>
<tr>
<td>EL-SARAG Eman I.</td>
<td>Egypt</td>
<td>GONGADZE Merab</td>
<td>Georgia</td>
</tr>
<tr>
<td>ELIZBARASHVILI Nodar</td>
<td>Georgia</td>
<td>GORDEZIANI Marlen</td>
<td>Georgia</td>
</tr>
<tr>
<td>ENTZEROTH Rolf</td>
<td>Germany</td>
<td>GORGILADZE Nestan</td>
<td>Georgia</td>
</tr>
<tr>
<td>ER Fatih</td>
<td>Turkey</td>
<td>GÖRK Mehmet Güven</td>
<td>Turkey</td>
</tr>
<tr>
<td>ERMIS Ahmet</td>
<td>Turkey</td>
<td>GRIGOLIA Guram</td>
<td>Georgia</td>
</tr>
<tr>
<td>EROĞLU Engin</td>
<td>Turkey</td>
<td>GUCEL Salih</td>
<td>Cyprus</td>
</tr>
<tr>
<td>EROL Ahmet Sami</td>
<td>Turkey</td>
<td>GULASHVILI Zaza</td>
<td>Georgia</td>
</tr>
<tr>
<td>EŞEN Derya</td>
<td>Turkey</td>
<td>GUNYA Alexey</td>
<td>Russia</td>
</tr>
<tr>
<td>FARHATULLAH</td>
<td>Pakistan</td>
<td>GURSOY İsmail</td>
<td>Turkey</td>
</tr>
<tr>
<td>FARIDAH-HANUM Ibrahim</td>
<td>Malaysia</td>
<td>GVARISHVILI Nani</td>
<td>Georgia</td>
</tr>
<tr>
<td>FELIX-HENNINGSSEN Peter</td>
<td>Germany</td>
<td>GVARISHVILI Tsiuri</td>
<td>Georgia</td>
</tr>
<tr>
<td>FENSKE A.</td>
<td>Georgia</td>
<td>HAKEEM Khalid Rehman</td>
<td>Malaysia</td>
</tr>
<tr>
<td>FRANGISHVILI Tinatin</td>
<td>Georgia</td>
<td>HAMBARYAN L.R.</td>
<td>Armenia</td>
</tr>
<tr>
<td>GABAIDZE Shorena</td>
<td>Georgia</td>
<td>HANIG S.</td>
<td>Germany</td>
</tr>
<tr>
<td>GAD Abd-Alla</td>
<td>Egypt</td>
<td>HERKEN Emine N.</td>
<td>Turkey</td>
</tr>
<tr>
<td>GADRANI Lela</td>
<td>Georgia</td>
<td>IANKOVA Katia</td>
<td>UK</td>
</tr>
<tr>
<td>GAGELIDZE Nino</td>
<td>Georgia</td>
<td>IBADULLAYEVA S. Jamshid</td>
<td>Turkey</td>
</tr>
<tr>
<td>GAGUA Givi</td>
<td>Georgia</td>
<td>INERBAYEVA S.</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>GAKHOKIDZE Ramaz</td>
<td>Georgia</td>
<td>ISLAMGULOVA Anastasia</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>GAKHUTISHVILI Marina</td>
<td>Georgia</td>
<td>IVANOV George</td>
<td>Georgia</td>
</tr>
<tr>
<td>GAPRINDASHVILI George</td>
<td>Georgia</td>
<td>JAKELI Eteri</td>
<td>Georgia</td>
</tr>
<tr>
<td>NAME</td>
<td>COUNTRY</td>
<td>NAME</td>
<td>COUNTRY</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------</td>
<td>-----------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>JAKELI Julieta</td>
<td>Georgia</td>
<td>KHOMERIKI Giorgi</td>
<td>Georgia</td>
</tr>
<tr>
<td>JAMASPISHIVILI Neli</td>
<td>Georgia</td>
<td>KHORAVA Sasha</td>
<td>Georgia</td>
</tr>
<tr>
<td>JGENTI Lali</td>
<td>Georgia</td>
<td>KHUKHUNAISHVILI R.</td>
<td>Georgia</td>
</tr>
<tr>
<td>JOLOKHAVA Tamar</td>
<td>Georgia</td>
<td>KHUPENIA Nestan</td>
<td>Georgia</td>
</tr>
<tr>
<td>JOOSTEN Hans</td>
<td>Germany</td>
<td>KIKAVA Antaz</td>
<td>Georgia</td>
</tr>
<tr>
<td>JORJADZE Angelina</td>
<td>Georgia</td>
<td>KIKNADZE Darejan</td>
<td>Georgia</td>
</tr>
<tr>
<td>KACHARAVA Tamar</td>
<td>Georgia</td>
<td>KIKNADZE Nino</td>
<td>Georgia</td>
</tr>
<tr>
<td>KADIS Kostas</td>
<td>Cyprus</td>
<td>KIKNADZE Marina</td>
<td>Georgia</td>
</tr>
<tr>
<td>KAIASURI Manana</td>
<td>Georgia</td>
<td>KIKVIDZE Mariam</td>
<td>Georgia</td>
</tr>
<tr>
<td>KALANDADZE B.</td>
<td>Georgia</td>
<td>KOKAIA Nana</td>
<td>Georgia</td>
</tr>
<tr>
<td>KALIN Arzu</td>
<td>Turkey</td>
<td>KORDZAKHIA George</td>
<td>Georgia</td>
</tr>
<tr>
<td>KAN Elena</td>
<td>Uzbekistan</td>
<td>KORIDZE Marina</td>
<td>Georgia</td>
</tr>
<tr>
<td>KANDEMIR Nezhat</td>
<td>Turkey</td>
<td>KORKUT Suleyman</td>
<td>Turkey</td>
</tr>
<tr>
<td>KAPANADZE Naii</td>
<td>Georgia</td>
<td>KOSE Bahtiyar</td>
<td>Turkey</td>
</tr>
<tr>
<td>KARAHAN Faruk</td>
<td>Turkey</td>
<td>KUCHAVA Gulchina</td>
<td>Georgia</td>
</tr>
<tr>
<td>KARALASHVILI T.</td>
<td>Georgia</td>
<td>KÜÇÜK Mahir</td>
<td>Turkey</td>
</tr>
<tr>
<td>KARTVELISHVILI D.</td>
<td>Georgia</td>
<td>KUDABAYEVA Gulmira</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>KARTVELISHVILI Liana</td>
<td>Georgia</td>
<td>KULAÇ Semsettin</td>
<td>Turkey</td>
</tr>
<tr>
<td>KERESE Lidze</td>
<td>Georgia</td>
<td>KULINSKAIA Elena</td>
<td>Russia</td>
</tr>
<tr>
<td>KARZHAUBKEKOVA Zh.Zh.</td>
<td>Kazakhstan</td>
<td>KUPRADZE Inga</td>
<td>Georgia</td>
</tr>
<tr>
<td>KEZEVADZE Nino</td>
<td>Georgia</td>
<td>KURASHVILI Maritsa</td>
<td>Georgia</td>
</tr>
<tr>
<td>KHACHATRYAN Susanna</td>
<td>Armenia</td>
<td>KVABZIRIDZE Magda</td>
<td>Georgia</td>
</tr>
<tr>
<td>KHAKHADZE Rusudan</td>
<td>Georgia</td>
<td>KVACHANTIRADZE Eteri</td>
<td>Russia</td>
</tr>
<tr>
<td>KHAMZINA Asia</td>
<td>Uzbekistan</td>
<td>KVIRKVELIA Nana</td>
<td>Georgia</td>
</tr>
<tr>
<td>KHAN Muhammad Azim</td>
<td>Pakistan</td>
<td>KVRIVISHVILI Tamari</td>
<td>Georgia</td>
</tr>
<tr>
<td>KHARCHILAVA Jumber</td>
<td>Georgia</td>
<td>LAGIDZE Lamzira</td>
<td>Georgia</td>
</tr>
<tr>
<td>KHATIASHVILI Elizbar</td>
<td>Georgia</td>
<td>LAMERS John</td>
<td>Uzbekistan</td>
</tr>
<tr>
<td>KHATISASHVILI Gia</td>
<td>Georgia</td>
<td>LATIF Abdul</td>
<td>Malaysia</td>
</tr>
<tr>
<td>KHIZREVANIDZE Ciuri</td>
<td>Georgia</td>
<td>LAZARASHVILI Josef</td>
<td>Georgia</td>
</tr>
<tr>
<td>KHMALADZE Otar</td>
<td>Turkey</td>
<td>LEBEDEVA Marina</td>
<td>Russia</td>
</tr>
<tr>
<td>KHOETSYAN Ashot</td>
<td>Armenia</td>
<td>LEBEDEVA Mikhail</td>
<td>Russia</td>
</tr>
<tr>
<td>NAME</td>
<td>COUNTRY</td>
<td>NAME</td>
<td>COUNTRY</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------</td>
<td>-----------------------</td>
<td>---------</td>
</tr>
<tr>
<td>LEBLEBICI Zeliha</td>
<td>Turkey</td>
<td>MILEVA Sonia</td>
<td>Bulgaria</td>
</tr>
<tr>
<td>LEZHAVA Zaza</td>
<td>Georgia</td>
<td>MKURNALİDZE Irina</td>
<td>Georgia</td>
</tr>
<tr>
<td>Lomidze Nino</td>
<td>Georgia</td>
<td>Motsonelidze Nargiz</td>
<td>Georgia</td>
</tr>
<tr>
<td>Lominadze George</td>
<td>Georgia</td>
<td>Muderrisoğlu Haldun</td>
<td>Turkey</td>
</tr>
<tr>
<td>Lominadze Shota</td>
<td>Georgia</td>
<td>Mudrykh Natalya</td>
<td>Russia</td>
</tr>
<tr>
<td>Lomtadize Nino</td>
<td>Georgia</td>
<td>Mumladze Dali</td>
<td>Georgia</td>
</tr>
<tr>
<td>Machavariani Nino</td>
<td>Georgia</td>
<td>Muradyan V.</td>
<td>Armenia</td>
</tr>
<tr>
<td>Magalashvili Giorgi</td>
<td>Georgia</td>
<td>Murzatayeva Tansara</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>Makeev Alexander</td>
<td>Russia</td>
<td>Mutlu Özgüll</td>
<td>Turkey</td>
</tr>
<tr>
<td>Makharadze Guranda</td>
<td>Georgia</td>
<td>Nagevadze Marina</td>
<td>Georgia</td>
</tr>
<tr>
<td>Makhmudova K.</td>
<td>Kazakhstan</td>
<td>Najafiha B.</td>
<td>Armenia</td>
</tr>
<tr>
<td>Manjgaladze Sopiko</td>
<td>Georgia</td>
<td>Nakhutsrishvili Gia</td>
<td>Georgia</td>
</tr>
<tr>
<td>Margaryan Mihran</td>
<td>Armenia</td>
<td>Nalbandyan Marine</td>
<td>Armenia</td>
</tr>
<tr>
<td>Marwat Khan Bahadar</td>
<td>Pakistan</td>
<td>Nanobashvili Tinatin</td>
<td>Georgia</td>
</tr>
<tr>
<td>Matchavariani Lia</td>
<td>Georgia</td>
<td>Nikolaishvili Dali</td>
<td>Georgia</td>
</tr>
<tr>
<td>Matchutadze Izolda</td>
<td>Georgia</td>
<td>Nikolaishvili Elene</td>
<td>Georgia</td>
</tr>
<tr>
<td>Megrelidze Lia</td>
<td>Georgia</td>
<td>Nikolaishvili Sophia</td>
<td>Georgia</td>
</tr>
<tr>
<td>Mehtiyeva Naiba</td>
<td>Azerbajian</td>
<td>Nurashov S.B.</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>Meladze Giorgi (Sr.)</td>
<td>Georgia</td>
<td>Ozalp Mehmet</td>
<td>Turkey</td>
</tr>
<tr>
<td>Meladze Giorgi (Jr.)</td>
<td>Georgia</td>
<td>Ozbayram Ali Kemal</td>
<td>Turkey</td>
</tr>
<tr>
<td>Meladze Maia</td>
<td>Georgia</td>
<td>Özdede Sinem</td>
<td>Turkey</td>
</tr>
<tr>
<td>Memlük Yalçın</td>
<td>Turkey</td>
<td>Öztürk Müünir</td>
<td>Turkey</td>
</tr>
<tr>
<td>Meskhaia Ramaz</td>
<td>Georgia</td>
<td>Paghava Nazibrola</td>
<td>Georgia</td>
</tr>
<tr>
<td>Meskhidze Avtandil</td>
<td>Georgia</td>
<td>Paichadze Nino</td>
<td>Georgia</td>
</tr>
<tr>
<td>Metreveli Mariam</td>
<td>Georgia</td>
<td>Palavandishvili Nani</td>
<td>Georgia</td>
</tr>
<tr>
<td>Mikhashavidze Eteri</td>
<td>Georgia</td>
<td>Papashvili Iralki</td>
<td>Georgia</td>
</tr>
<tr>
<td>Mikautadze Dali</td>
<td>Georgia</td>
<td>Paranin Roman</td>
<td>Russia</td>
</tr>
<tr>
<td>Mikayilov Fariz D.</td>
<td>Turkey</td>
<td>Paranina Alina</td>
<td>Russia</td>
</tr>
<tr>
<td>Mikladze George</td>
<td>Georgia</td>
<td>Popova Nikolina</td>
<td>Bulgaria</td>
</tr>
<tr>
<td>Mikladze Irakli</td>
<td>Georgia</td>
<td>Phutkaradze Merab</td>
<td>Georgia</td>
</tr>
<tr>
<td>Milanovskiy Evgeny Yu.</td>
<td>Russia</td>
<td>Pruidze Marina</td>
<td>Georgia</td>
</tr>
<tr>
<td>NAME</td>
<td>COUNTRY</td>
<td>NAME</td>
<td>COUNTRY</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------</td>
<td>---------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>QUERCI Elena</td>
<td>Italy</td>
<td>TEPANOSYAN G.</td>
<td>Armenia</td>
</tr>
<tr>
<td>QURTSIKIDZE Otar</td>
<td>Georgia</td>
<td>TIELIDZE Levan</td>
<td>Georgia</td>
</tr>
<tr>
<td>ROMANENKO K.</td>
<td>Russia</td>
<td>TKHILAVA Nino</td>
<td>Georgia</td>
</tr>
<tr>
<td>ROZI Mohamed</td>
<td>Malaysia</td>
<td>TOLORDAVA Revaz</td>
<td>Georgia</td>
</tr>
<tr>
<td>SAGHATELYAN A.</td>
<td>Armenia</td>
<td>TOPRAK Bulent</td>
<td>Turkey</td>
</tr>
<tr>
<td>SAJID Ali</td>
<td>Pakistan</td>
<td>TRAPAIIDZE Vazha</td>
<td>Georgia</td>
</tr>
<tr>
<td>SAKCALI M. Serdal</td>
<td>Turkey</td>
<td>TROFIMENKO Lidia</td>
<td>Georgia</td>
</tr>
<tr>
<td>SAMETOVA Elmira</td>
<td>Kazakhstan</td>
<td>TSANAVA Eka</td>
<td>Georgia</td>
</tr>
<tr>
<td>SAMOFALOVA Iraida</td>
<td>Russia</td>
<td>TSANAVA Valerian</td>
<td>Georgia</td>
</tr>
<tr>
<td>SARGINCİ Murat</td>
<td>Turkey</td>
<td>TSERETELI Emil</td>
<td>Georgia</td>
</tr>
<tr>
<td>SARTANIA Davit</td>
<td>Georgia</td>
<td>TSERETELI Giuli</td>
<td>Georgia</td>
</tr>
<tr>
<td>SEPERTELADZE Zurab</td>
<td>Georgia</td>
<td>TSIKARIISHVILI Kukuri</td>
<td>Georgia</td>
</tr>
<tr>
<td>SHARASHENIDZE Manana</td>
<td>Georgia</td>
<td>TSINARIDZE Merab</td>
<td>Georgia</td>
</tr>
<tr>
<td>SHAVLIA SHVILI Lali</td>
<td>Georgia</td>
<td>TSINTSADZE Nunu</td>
<td>Georgia</td>
</tr>
<tr>
<td>SHEIN Evgeny</td>
<td>Russia</td>
<td>TSITSAGI Mariam</td>
<td>Georgia</td>
</tr>
<tr>
<td>SHEINA Natalia</td>
<td>Russia</td>
<td>TSIVTSIVADZE Nodar</td>
<td>Georgia</td>
</tr>
<tr>
<td>SHELIA Iamze</td>
<td>Georgia</td>
<td>TSKITISHVILI Eka</td>
<td>Georgia</td>
</tr>
<tr>
<td>SHENGELIA Larisa</td>
<td>Georgia</td>
<td>TSKVARADZE Maia</td>
<td>Georgia</td>
</tr>
<tr>
<td>SHVANGIRADZE Marina</td>
<td>Georgia</td>
<td>TURGUT Bulent</td>
<td>Turkey</td>
</tr>
<tr>
<td>SITPAYEVA Gulnara</td>
<td>Kazakhstan</td>
<td>TURMANIDZE Nazi</td>
<td>Georgia</td>
</tr>
<tr>
<td>SKVORTSOV Alexander</td>
<td>Russia</td>
<td>TVAURI Gena</td>
<td>Georgia</td>
</tr>
<tr>
<td>SKVORTSOVA Elena</td>
<td>Russia</td>
<td>ÜNAL Ediz</td>
<td>Turkey</td>
</tr>
<tr>
<td>SMAJLOVIĆ Samira</td>
<td>Turkey</td>
<td>UYSAL Ismet</td>
<td>Turkey</td>
</tr>
<tr>
<td>SÖNMEZ Suleyman</td>
<td>Turkey</td>
<td>UZUN Serir</td>
<td>Turkey</td>
</tr>
<tr>
<td>SOYKAN Abdullah</td>
<td>Turkey</td>
<td>VARAZI Tamar</td>
<td>Georgia</td>
</tr>
<tr>
<td>STEPANYAN Nina</td>
<td>Armenia</td>
<td>VARDAR Çığdem</td>
<td>Turkey</td>
</tr>
<tr>
<td>SUKNIDZE Nika</td>
<td>Georgia</td>
<td>VARSHANIDZE Madona</td>
<td>Georgia</td>
</tr>
<tr>
<td>SULKHANISHVILI Nino</td>
<td>Georgia</td>
<td>VARSHANIDZE Natela</td>
<td>Georgia</td>
</tr>
<tr>
<td>SVANADZE David</td>
<td>Georgia</td>
<td>VERKHOVTSEVA N.V.</td>
<td>Russia</td>
</tr>
<tr>
<td>TATISHVILI Marika</td>
<td>Georgia</td>
<td>VESSELOVA P.V.</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>TCHAIDZE Feride</td>
<td>Georgia</td>
<td>VODENSKA Maria</td>
<td>Bulgaria</td>
</tr>
<tr>
<td>NAME</td>
<td>COUNTRY</td>
<td>NAME</td>
<td>COUNTRY</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
<td>---------------------</td>
<td>---------</td>
</tr>
<tr>
<td>YASHININA Irina</td>
<td>Russia</td>
<td>YUDINA Anna</td>
<td>Russia</td>
</tr>
<tr>
<td>YAYLA Fatih</td>
<td>Turkey</td>
<td>ZAALISHVILI George</td>
<td>Georgia</td>
</tr>
<tr>
<td>YALÇİN ÇELİK Beste</td>
<td>Turkey</td>
<td>ZAKIR Hussain Facho</td>
<td>Pakistan</td>
</tr>
<tr>
<td>YARCI Celal</td>
<td>Turkey</td>
<td>ZARNADZE Nana</td>
<td>Georgia</td>
</tr>
<tr>
<td>YILDIZ Atila</td>
<td>Turkey</td>
<td>ZAZOVSKAYA Elya</td>
<td>Russia</td>
</tr>
<tr>
<td>YILDIZ Oktay</td>
<td>Turkey</td>
<td>ZEYNALOVA Saida</td>
<td>Azerbaijan</td>
</tr>
<tr>
<td>YUCEL Ersin</td>
<td>Turkey</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
International Conference "APPEL: Problem Innovation".

Barinova, Sophia – University of Haifa, Israel
Bilashvili, Kakhaber – Tbilisi State University, Georgia
Dinu, Mihaela – Romanian-American University, Romania
Efe, Recep – Balikesir University, Turkey
Felix-Henningsen, Peter – Justus Liebig University Giessen, Germany
Gad, Abd – Environmental Studies & Land Use Division, NARSS, Egypt
Gazzola, Patrizia – Insubria University, Varese, Italy
Hayde, László G. – UNESCO-IHE Institute for Water Education, The Netherlands
Iankova, Katia – University of Greenwich, London, UK
Lioubimtseva, Elena – Grand Valley State University, USA
Makeev, Alexander – Lomonosov Moscow State University, Russia
Manoharan, Maragatham – Tamil Nadu Agricultural University, India
Matchavariani, Lia – Tbilisi State University, Georgia
Nikolaishvili, Dali – Tbilisi State University, Georgia
Otte, Anette – Justus Liebig University Giessen, Germany
Ozturk, Munir – Ege University, Turkey
Paranina, Alina – St. Petersburg RSPU of A.I. Herzen, Russia
Patiarechti, Charita – Western Australia University, Australia
Skvortsova, Elena – Moscow V. Dokuchaev Soil Institute, Russia
Shein, Evgeny – Prof., Lomonosov Moscow State University, Russia
Tsivtsivadze, Nodar – Tbilisi State University, Georgia
Vodenksa, Maria – Sofia University, Sofia, Bulgaria