



manggha

*Polish*  
**Journal of Environmental Studies**



**DZIENNIK POLSKI**

**przyroda**polska



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## PROGRAMME

**18<sup>th</sup> September** (Monday) Centre of the Japanese Art and Technology – Manggha, Konopnickiej 26

**9.00 – 9.45 – Opening Ceremony** (addresses by the members of the Honorary Committee)

**9.00 - 9.10** – Welcome address by the Rector of the AGH University of Science and Technology – Prof. Antoni TAJDUŚ

**9.10 – 9.20** - The President of the Polish Academy of Sciences, Cracow Branch – Prof. Jerzy HABER

**9.20 – 9.35** - The President of the Federation of the Regional Association of Municipalities and Districts of the Republic of Poland – Kazimierz BARCZYK, M.L.

**9.35 – 9.45** - Prof. Jan W. DOBROWOLSKI (AGH-UST, Chair of Environmental Biotechnology and Ecology, Cracow, Poland) - Main Purposes of the 11<sup>th</sup> International Conference on Sustainable Development. Common Action for Better Quality of Human Life.

**9.45 – 13.20 – Plenary Sessions**

**9.45 – 9.55** - Prof. Kenichi MIYAMOTO (Emeritus Professor, Osaka City University, Former President of JEC) - Towards a Sustainable Society - From the Lesson of Japanese Environmental Problems

**9.55 – 10.05** - Prof. Shunichi TERANISHI (Graduate School of Economics, Hitotsubashi University, Secretary-general of JEC, Japan) - A Brief Introduction: History and Activities of Japan Environmental Council; Towards Interdisciplinary and International Cooperation in Asia

**10.05 – 10.20** - Prof. Hidenobu JINNAI - (Graduate School of Engineering, Hosei University) Urban Regeneration of Tokyo as a Water City

**10.20 – 10.35** - Prof. Yoshimitsu SHIOZAKI (Graduate School of Engineering, Kobe University, Directorial Board Member of JEC) - Replacement Project of Elevated Highway and Urban Environment. Case Study in Korea, USA and Japan

**10.35 – 10.50** - Dr. Naoto NAKAJIMA (Research Associate, Graduate School of Engineering, University of Tokyo) - Possibility for Regeneration of Historic Town through Traditional Festival in Japan- Community, Townscape, Tourism

**10.50 – 11.05** - Prof. Kazuko GOTO (Faculty of Economics, Saitama University) - Cultural Policy and Sustainable Cities - How Cultural Policy Works for Sustainability in Japan?

**11.05 – 11.20** - Prof. Yayoi ISONO YOKOYAMA (Faculty of Law, Tokyokeizai University, Vice President of JEC) - Ecotourism in Japan - From a legal aspect.

**11.20 - 11.35** - Prof. Osamu ABE (Faculty of Sociology, Rikkyo University) - The Status of ESD (Education for Sustainable Development) in Japan

**11.35 – 11.55** - Break

**11.55 – 12.15** - Professors J. MÉLINE, S. WICHEREK, W. CHEŁMICKI, H. GEROYANNIS, B. J.-LAFERRIÈRE, K. KRZEMIEŃ, C. PIOTROWICZ, R. RAGALA, R. TWARDOSZ, J.-P. OUDINET (Université Paris IV Sorbonne CNRS, Centre de BioGéo, Institute of Geography and Spatial Management – UJ, Cracow, EHESS/CNRS, Paris) - Assessment of Urban Heritage Degradation and Adverse Health Effects Related to Environmental Air Pollution: The Case Study of Cracow (Poland)

**12.15 – 12.45** – Prof. Andrzej KADŁUCZKA (Institute for History of Architecture and Preservation of Monuments, Cracow University of Technology, Poland) - Idea of Sustainable Development and Issues of Preservation of Historic Heritage in Cracow and Florence

**12.45 – 13.00** – Dir. Richard FENOLLO, M.Sc. (President of UdTdR), Rachel GAUTIER, M.Sc. (Union des Terres de Rivieres, France) – presentation of the Union des Terres de Rivieres  
**13.00- 13.20** – Short discussion

**13.20 – 14.15** – Visiting the Manggha Centre

**15.00 – 16.00** – Lunch – AGH University of Science and Technology

**16.15** – start of the Plenary Session – Building D11 (Kawiory 26 A; room 216)

**16.15 - 17.15** – Round Table Discussion on the future cooperation, related to linkage between promotion of sustainable development in different regions, focus on global cooperation, with the participation of the panel of experts, including: Prof. Takehisa AWAJI (Graduate School of Law, Rikkyo University, President of JEC), Prof. Hiroji ISOZAKI (Faculty of Law, Meijigakuin University, Executive Director of JEC), Prof. Fimikazu YOSHIDA (Graduate School of Public Policy, Hokkaido University, Directorial Board Member of JEC), Prof. Kazuhiro UETA (Graduate School of Economics, Kyoto University, Directorial Board Member of JEC), Prof. Noriko Okubo DATE (Graduate School of Law, Osaka University, Executive Director of JEC).

**17.15 – 17.30** – Paolo DEL BIANCO, M.Sc. – (President of Fondazione Romualdo Del Bianco, Italy) - Historical Heritage and Cross cultural communication

**17.30 – 17.45** - Drs Claudio FAGARAZZI, Chiara FRANCIOSI, Roberto FRATINI, Francesco RICCIOLI (Department of Agricultural and Land Economics, University of Florence, Italy) - Territorial analysis method of socio-economics conflicts between human development and environmental conservation.

**17.45 – 18.00** – break

**18.00 – 18.15** - Professors J. DOMINIK, D. VIGNATI, J.-L. LOIZEAU and R. ZONTA (Institut F.-A. Forel and Centre d'études en sciences naturelles de l'environnement, Université de Genève, Switzerland, Istituto di Scienze Marine – CNR, Venezia, Italy) - Summer Schools in the Venice lagoon: a lesson in preservation of nature and culture.

**18.15. – 18.30** - Prof. Jan W. DOBROWOLSKI, Dr. Aleksandra WAGNER, Małgorzata ŚLIWKA, M.Sc., Robert MAZUR, M.Sc., Mateusz JAKUBIAK, M.Sc. (AGH)- Polish long-term interdisciplinary co-operation of scientists, youth and local communities for the promotion of ecotourism and sustainable development of regions of particular natural and cultural values in Poland, Spain and Italy.

**18.30 – 18.45** - Dr. Adam BOROŃ, Dr. Wojciech DRZEWIECKI, Dr. Sc. Beata HEJMANOWSKA, Prof. Józef JACHIMSKI (AGH). The 3D and 4D information for the most efficient management and appealing promotional activity in protected areas

**19.15.** Supper (including a concert of folk music)

**19<sup>th</sup> September** (Tuesday)

**9.00 – 13.50 - 3 Parallel Sessions**

**Session I - Sound Tourism in Historical Cities and Ecotourism in Protected Regions** (room 216 Building D11 - Kawiory 26 A)

**9.00 – 9.15** - Prof. Manuela Silvia CAMPANINI (International Association of Panarctic Culture, Reykjavik, Iceland and Milano, Italy) - Qualified tourism. Transforming the Icelandic experience in a flexible approach.

**9.15 – 9.30** - Professors David CROWTHER (De Montfort University, UK), Helena MITEWA (University of Tasmania, Australia) - Education for sustainability: tourism and the conservation of natural resources

**9.30 – 9.45** - Prof. Zygmunt WNUK (Rzeszów University, Poland) Tourism in Protected Areas

**9.45 – 10.00** - Prof. Zbigniew MYCZKOWSKI (Cracow University of Technology) Sustainable Development and Integrated Protection of Identity of Landscape as Base for Sound Tourism in Monumental Towns

**10.00 - 10.15** - Prof. Krzysztof CETNAROWICZ, Drs. Jarosław KOŻŁAK, Bartosz PIEC, Piotr POWROŹNIK, Izabela SULIŃSKA, Przemysław WIKTOR (Dep. of Computer Science, AGH UST, Poland) - Application of a decentralised information system for managing special tourism and management of a balanced development of historical cities

**10.15 – 10.30** - Dr. Piotr BÓRAWSKI (The University of Warmia and Mazury in Olsztyn, Chair of Agribusiness and Environmental Economics, Poland) - Eco-tourism development in Poland

**10.30 – 10.45** - Break

**10.45 – 11.05** - Dr. Jacek CZUBIŃSKI (Institute of History of Architecture and Monuments Preservation, Faculty of Architecture, Cracow University of Technology, Poland) - Tradition of Sustainable Development in Historical Kamieniec Podolski as a Potential Factor of Tourism.

**11.05. – 11.20** - Dr. Aleksandra MACHNIK (Katedra Ekologii Człowieka, Wydział Turystyki i Rekreacji AWF Poznań, Poland) - Ecotourism in protected areas

**11.20 – 11.35** - Dr. Rafał KURCZEWSKI (Zakład Zagospodarowania Turystycznego, AWF Poznań) Where is ecotourism heading for in Poland?

**11.35 - 12.20** - Barbara SYPOSZ-ŁUCZAK, M.Sc., Dr. Elżbieta PIETRZYK-SOKULSKA (Polish Academy of Sciences, Cracow Branch) - Cracow as a Balneotherapeutic Centre

**12.20 – 12.35** - Dr. Alicja J. KICIŃSKA-ŚWIDERSKA (AGH, Faculty of Geology, Geophysics and Env. Protection, Dep. of General Geology and Env. Protection, Kraków, Poland) Development of Ecotourism in the Beskid Sądecki Mts.

**12.35 – 12.50** - Discussion

**Session II The Monitoring and Protection of Human Environment** (room 106 Building C-4, – Al. Mickiewicza 30)

**9.00 – 9.15** - Prof. Fátima DAVID and Prof. Rute ABREAU (Escola Superior de Tecnologia e Gestão da Guarda, Portugal) - The Accountability Effect of Forests Fires

**9.15 – 9.30** - Joanna TARGOŃSKA, M.Sc., Prof. Ewa PANEK (AGH) - Spatial Distribution of Heavy Metal (Cd, Cr, Cu, Ni, Pb, Zn) Concentration in Roadside Plants between Kraków and Zakopane

**9.30 – 9.45** - Dr. Uwe KRÜGER (Entropy Consulting, Germany) - Optical and olfactory sensors as tools to support sustainable development

**9.45 – 10.00** - Prof. Antonina CEBULSKA-WASILEWSKA (Environmental and Radiation Biology Dep., H. Niewodniczański Inst. of Nuclear Physics, Polish Academy of Science) - Gene Mutation Assay in *Tradescantia* Stamen Hair as a Bioindicator of Ambient Air Quality in Urban Areas

**10.10 – 10.15** - Prof. Katarzyna JUDA-REZLER (Institute of Environmental Engineering Systems, Warsaw University of Technology, Nowowiejska 20, 00-653 Warsaw, Poland) - Assessing the winter time air pollution in the Krakow area in relation with possible influences on human health and cultural monuments.

**10.15 – 10.30** - Dr. Sylwester SMOROŃ and Dr. Antoni KUŹNIAR (Institute for Land Reclamation and Grassland Farming at Falenty, Malopolska Research Centre in Krakow, Poland) - The seasonal  
**10.30 – 10.45** - Dr. Marek KOPACZ and Prof. Stanisław TWARDY (Institute for Land Reclamation and Grassland Farming at Falenty, Malopolska Research Centre in Krakow, Poland) Spatial and structural transformations in the Carpathian protected areas, against a background of qualitative changes of the water environment changes of a surface water quality in the tourist areas of the Podhale (the Western Carpathians)

**10.45 – 11.05** - Break

**11.05 – 11.20** - Professors B. RIBAS OZONAS, J. GONZÁLEZ RODRÍGUEZ, A. EL HADRI and E. L. B. NOVELLI (Institute of Health Carlos III, Ministry of Health and Consume, Madrid, Spain. Institute of Biosciences, Campus de Botucatu, UNESP, Sao Paulo, Brasil) Risk Factors in Urban Environment and Possible Mechanism of Action of Electromagnetic Fields

**11.20 – 11.35** - Prof. Jacek WALCZEWSKI (Institute of Meteorologic and Water Management, Section Cracow) Estimation of the input of the distant emission sources to the air quality in cities

**11.35 – 11.50** - Iwona NOWAKOWSKA, M.Sc., (National Institute of Telecommunications, Warsaw, Poland) - Sustainable energy systems

**11.50 – 12.05** - Prof. Irena NORSKA-BORÓWKA, Dr. M.E. KEMPA, Dr. J. BACIA-WOJCIESZCZYK, Dr. E. MIZGAŁA (Silesian Medical Academy) Etiology of cancer in epidemiologic studies concernig: nutrition, disturbances of immunologic system, deficit of microelements and some other phenomena such as viral infections

**12.05 – 12.20** - Prof. Irena NORSKA-BORÓWKA, Dr. M.E. KEMPA, Dr. J. BACIA-WOJCIESZCZYK - The long time prognosis for psycho-intellectual development of children living in different parts of the very polluted town Piekary Śląskie, Upper Silesia District of Poland.

**12.20 – 12.35** - Dr. Maria MARKIEWICZ (Institute of Environmental Engineering systems, Politechnika Warszawska) - Contribution to the Methodology of the evaluation of hazard to human health and environment, related to the heavy gas releases to the atmosphere

**12.35 – 12.50** - Discussion

**Session III Perspectives of Sustainable Development** (Building C-4 – Al. Mickiewicza 30)

**9.00 – 9.15** - Professors Isabel GALLEGO, Luis RODRIGUEZ-DOMINGUEZ (Departamento de Administración y Economía de la Empresa, Facultad de Economía y Empresa, University of Salamanca, Spain) - Environmental Information and Sustainable Development: An Analysis of Spanish Firms from Different Sectors

**9.15 – 9.30** - Professors Isabel M. GARCIA-SANCHEZ and José M. PRADO-LORENZO (University of Salamanca, Spain) - Environmental Management Systems in European Municipalities

**9.30 – 9.45** - Prof. Kazimierz GÓRKA (Cracow University of Economics, Department of Industrial and Environmental Policy) - The Earmarked Funds as a Basic Economic Instrument of Environmental Policy in Poland

**9.45 – 10.00** - Prof. Stanisław MIKLASZEWSKI (University of Economics in Krakow, Chair of Makroeconomic Relationships, Poland) - Lisbon Strategy and Sustainable Development - Myths and Facts.

**10.00 – 10.15** - Prof. Leszek PREISNER and Dr. Tadeusz PINDÓR (AGH, Faculty of Management) - Idea of “Green Lungs” of Poland in Context of Sustainable Development

**10.15 – 10.30** - Justyna KOBYLARCZYK, M.Sc. (Chair of Residential Development Instytut, Faculty of Architecture Cracow University of Technology, Poland) - Significance of central zone for sustainable development of a historical city, on an example of Jarosław

**10.30 – 10.45** - Prof. Krystyna A. SKIBNIEWSKA, Dr. Monika RADZYMINSKA, Paweł BOJANOWSKI, M.Sc. (University of Warmia and Mazury, Olsztyn, Poland) - Extent of Union Funds Gained by Firms of Hotel and Catering Line in Warmia and Mazury Voivodeship.

**10.45 – 11.05** - Break

**11.05 – 11.25** - Dr. Antonina SEBESTA (Pedagogic Academy, Cracow) and Dr. Michal SICIŃSKI (AGH, Cracow) - New Chances of Ecotourism and Educational Tourism in Neighbouring Mountain Regions of Poland, Germany, the Czech Republic and Slovakia

**11.25 – 11.40** - Dr. Maciej MROWIEC (Politechnika Częstochowska, Instytut Inżynierii Środowiska) - Sustainable development of urban drainage systems

**11.40 – 11.55**. Prof. Włodzimierz WÓJCIK (AGH, IKiOŚ) - Quantification of sustainability

**11.55 – 12.20** - Dr. Krzysztof KULEZA, Dr. Tomasz WALCZYKIEWICZ (ImiGW, Kraków) - Reference Conditions according to Water Framework Directive 2000/60/EC The Base for Ecological Valuation of River Valleys for the Management of Tourist Policy

**12.20 – 12.35** - Dr. Aleksandra WAGNER (AGH, WGGiŚ, KBŚiE) The role of water reservoirs in historical cities – case study in the Cracow region

**12.35 – 12.45** - Discussion

**13.00 – 14.00** - Lunch

**14.15 – 15.30** - **Poster Session** (Building C-4, Big Room on the 3<sup>rd</sup> Floor)

**15.30 – 15.50** - Break

**15.50 – 17.10 - Plenary Session** (Building D-11, room 116)

**15.50 – 16.05** - K. OCHNIK, M.Sc., Prof. Anton STASCH, (The John Paul II Catholic University of Lublin, Faculty of Social Sciences Stalowa Wola, Poland) Application of resonant absorption of radiation energy to the protection of environment

**16.05 – 16.20** - W. BOCHYNSKI, M.Sc., Prof. A. STASCH (The John Paul II Catholic University of Lublin, Faculty of Social Sciences Stalowa Wola, Poland) - Management of Research and Development of Renewable Solar Energy Technologies

**16.20 – 16.35** - Prof. Stanislaw WICHEREK and Prof. Jean-Paul OUDINET (Université Paris IV Sorbonne CNRS - Centre de BioGéo, Centre d'Analyse et de Mathématique Sociales - Paris) – Periurban Forests and Sustainable Development in France

**16.35 – 16.50** - Prof. Elmar A. STUHLER (TuTech, Germany, the Chairman of WACRA EUROPE) - Teaching and Learning About Sustainable Life Through Case Research

**16.05 – 17.10** - Géza NAGY, M.Sc., (Head of an Environmental Protection Association, Hungary), Péter ERDÖDI, M.Sc., (Municipality of Törökszentmiklós, Hungary) - The role of habitats in Middle-Tisza Region in the development of eco-tourism

**17.10-18.00 - Closing Discussion**

(Moderators in the discussion: PROFESSORS: J W. DOBROWOLSKI, J. DOMINIK, R. FENOLLO, K. MIYAMOTO, A. STASCH, S. TERANISHI S. WICHEREK)

**18.15.** Supper

**LIST OF POSTERS**

1. Nedal ALBEJ, M.Sc. (Dep. of Ecology, National Mining University, Dnepropetrovsk, Ukraine, former Ph.D. student of Cracow University of Technology, Poland) - Monitoring of pollution in the atmosphere by motor vehicle exhaust in territories with objects of historical value
2. Prof. Eugenia ALOJ (Sannio Univ. and Regional Centre of Competence Benecon –Italy) Sabina MARTUSCIELLO (Second Univ. of Naples and RCC, Benecon), Mariagrazia DE CASTRO (Sannio Univ.), Nino GUARINO (Suor Orsola Benincasa University, Italy), Anna ZOLLO (Sannio Univ. and RCC, Benecon) - Benecon project for the territory of Cilento (Italy) as model for sustainable development and synthesis among cultural heritage and natural peculiarities
3. Prof. Eugenia ALOJ, Nino GUARINO, Mariagrazia DE CASTRO, Anna ZOLLO - The phenomenon of transumanza : from a historical phenomenon to opportunity for new tourism.
4. Prof. Eugenia ALOJ, Nino GUARINO, Mariagrazia DE CASTRO, Anna ZOLLO - Caudina Valley (Italy) a model of cities network between historical heritage and possible opportunity of sustainable tourism
5. Dr. M ANGIEL (Inst. Geografii i Gosp. Przestrzennej, Uniwersytet Jagielloński), Dr. A. GMIĄT (Małopolski Ośrodek Doradztwa Rolniczego w Karniowicach), Prof. P. PATOCZKA (Pracownia Kompozycji Krajobrazu, Inst. Architektury Krajobrazu, Wydz. Architektury PK), Dr. M. PIETRZAK (Instytut Geografii i Gospodarki Przestrzennej UJ) - The Initiative Carried out for The Purpose of Saving the Cultural Heritage Of Carpathian Foothills around Brzesk



6. Prof. Andrea CONTIN, Dr. Diego MARAZZA, Dr. Vittoria BANDINI, Dr. Nurra MASSIMILIANO (University of Bologna, Italy) - Gesta Environmental Management Group. Inter-Department Centre for the Environmental Research University of Bologna
7. Dir. Grzegorz DĄBROWSKI, M.Sc., Patrycja OGRODNIK, M.Sc. (Graminex, Piotrków Trybunalski, Poland), Maria ZIELIŃSKA, Eng. (AGH) - Activities of the Graminex company – Research developing studies on the laser stimulation of rape (*Brassica napus*) and flax (*Linum usitatissimum*) seeds
8. Dr. Dariusz FOSZCZ, Dr. Tomasz NIEDOBA, Dr. Jarosław SIEWIOR, Prof. Tadeusz TUMIDAJSKI (Faculty of Mining and Geoengineering, AGH University of Science and Technology, Provincial Inspectorate of Environmental Protection, Department of Inspection, Katowice, Poland) - Applications of dust and gas air pollutants spreading stochastic models
9. Prof. Florian GAMBUŚ, Dr. Jerzy WIECZOREK (Department of Agricultural Chemistry, Agricultural University in Krakow, Poland) - Cadmium and lead concentrations in various body parts of wild animals in the Małopolska region
10. Katarzyna GOWIN, M.Sc. (Chair of Environmental Biotechnology and Ecology, AGH, Kraków), Prof. Katarzyna SAWICKA-KAPUSTA, Dominika RUS, M.Sc. (Department of Environmental Monitoring, Institute of Environmental Sciences, UJ, Kraków) - Assessing Level of the Air Pollution by Sulfur Dioxide in Polish National Parks
11. Agnieszka GRUSZECKA, M.Sc. (AGH University of Science and Technology, Faculty of Geology, Geophysics and Environmental Protection, Cracow, Poland) - Environmental impact assessment of the selected heavy metals in the vicinity of the industrial waste sites at the example of Bukowno (Poland) and Mansfeld (Germany)
12. Dr. Beata GRYGIERZEC (Department of Grasslands Science, Agricultural University of Cracow, Faculty of Agriculture and Economics), Katarzyna GOWIN, M.Sc. (AGH) - The influence of mineral fertilization on fluorescence of chlorophyll in leaves of some cultivars *Poa pratensis*.
13. Dr. Beata GRYGIERZEC, Katarzyna GOWIN, M.Sc., Marcin MATYSEK, M.Sc. - Floral biodiversity in the Beskid Średni Mts. after three and ten years from discontinuation of use
14. Mateusz JAKUBIAK, M.Sc. (AGH, WGGiŚ, KBŚiE) - The application of laser biostimulation to increase the tolerance on salinity and reclamation efficiency of willows (*Salix* sp.)
15. Prof. Tsuneo KAMATA (Jumonji University, Japan), Masato YAMAGUCHI, Hiroshi MEGURO (Tohoku Fukushi University, Sendai, Japan) - Highly Sensitive Assay of Metallothionein in Human Plasma by HPLC-NAM Fluorometry
16. R. KAWECKI, M. Sc., Eng. (Europäische Akademie für Führungskräfte/ Bundesverband polnischer Ingenieure und Techniker in Deutschland, Weissach, FRG), A. STASCH (Catholic University, Lublin, Poland) Management of Research and Development of Renewable Solar Energy Technologies
17. Dr. Alicja J. KICIŃSKA-ŚWIDERSKA (AGH-University of Science and Technology, Faculty of Geology, Geophysics and Environment Protection) - Spa – A Symbol of Luxury or a Chance for Health Resorts of the Beskid Sądecki Mts.?
18. Drs. A. KLASA, E. S. SAZALSKA (UWM Olsztyn), M. SLONIEC, W. KNAST (AGH) - New perspective of use of laser photostimulation of some plants (*Salix* sp, *Miscantus* sp.) to improve phytoremediation of some elements from soil.

19. M. KUŹNIAKOWSKA, M.Sc., Prof. E. HELIOS-RYBICKA (AGH-UST, Faculty of Geology, Geophysics and Environmental Protection) - Heavy metals in the water-soil system at the industrial landfills surrounding of the Nitric Plant in Tarnów
20. Tomasz LAMORSKI, M. Sc. (Babia Góra National Park) - Public participation in preparation of the project "Conservation and Sustainable Use of Biodiversity through Sound Tourism Development in Biosphere Reserves in Central and Eastern Europe" – case of the Babia Góra Biosphere Reserve.
21. Dr. Piotr LEWICKI (AGH-UST and WSEI, Cracow) The Application of the Methods of the Computer Image Analysis in the Biotest Based on Common Duckweed *Lemna minor*.
22. Dr. Jan MACUDA, Prof. Ludwik ZAWISZA, Prof. Stanisław NAGY (AGH, University of Science and Technology) - Applicability of Biotechnology for Remediation of Grounds Contaminated with Hydrocarbons from City Areas
23. Dr. Mariola MARSZAŁEK (AGH-WGGiOŚ) - Damage of stone in some monuments in Cracow
24. Robert MAZUR, M.Sc. (AGH, WGGiŚ, KBŚiE) - Embryo-tests
25. Professors J. MÉLINE, S. WICHEREK, W. CHEŁMICKI, H. GERROYANNIS, B. J.-LAFERRIÈRE, K. KRZEMIEN, C. PIOTROWICZ, R. RAGALA, R. TWARDOSZ, J.-P. OUDINET (Université Paris IV Sorbonne CNRS, Centre de BioGéo, Institute of Geography and Spatial Management – UJ, Cracow, EHESS/CNRS, Paris) - Towards a multidisciplinary and integrated strategy in the assessment of adverse health effects related to air pollution : The case study of Cracow (Poland) and asthma.
26. Sabina MICHALSKA, M.Sc. (AGH) - Measurements of Green House Gases Concentration in the Urban Area in Krakow
27. Tomasz MIKLASZEWSKI, M.Sc. (Poland) - The Role of the EXPO World Exhibition in Promoting Historical Cities and Sound Tourism.
28. Dr. Agnieszka NAWIRSKA, Joanna Więclaw, M.Sc. (Wyższa Szkoła Handlowa we Wrocławiu) - Perspectives and Limitations of Development in Agro-tourism in the Commune of Chojnów.
29. Tomasz NOWAKOWSKI, Piotr ZANIEWSKI (Students Academic Club of Environmental Protection Faculty of Mining Surveying and Environmental Engineering AGH University of Science and Technology, MSOŚ Students Academic Club, Inter-faculty Study Programme in Environmental Protection Warsaw University) - Biodiversity of lichens in the west part of the Pilicka Forest. Project of the protection of rare and endangered lichen species in region.
30. Dr. M. PIETRZAK (Instytut Geografii i Gospodarki Przestrzennej, Uniwersytet Jagielloński, Kraków) Landscape Changes And Protection Of Polish Carpathian Mts. With The Usage Of Historical GIS
31. Prof. Edward F. SKORKOWSKI, Katarzyna GRZYB, Anna BIEGNIIEWSKA, Jadwiga GRONCZEWSKA, Marek ZIĘTARA (Gdańsk University Biological Station, Laboratory of Ecotoxicology, Gdansk-Sobieszewo, Poland) - Effect of Environmental Pollution on Enzymes Activities in Fish
32. 29. Magdalena SITKO, M.Sc. (AGH), Dr. Beata GRYGIERZEC (AR, Krakow) , Katarzyna GOWIN, M.Sc. (AGH) - Influence of the diode laser light on the germination ability of some cultivars of the *Poa pratensis* seeds

33. Małgorzata ŚLIWKA, M.Sc. (AGH, WGGiŚ, KBŚiE) - The application of laser biostimulation for more efficient sewage treatment process and phytoremediation
34. Mr. Forbang TEWARRA (Global Fight Against Poverty and Ignorance – GLOFAPI, Cameroon) - Exemplary practices in small ecotourism businesses
35. Professors Masato YAMAGUCHI, Hiroshi MEGURO (Tohoku Fukushi University, Kunimi, Japan), Tsuneo KAMATA (Jumonji University, Japan), Kazuaki AKASAKA, Hiroshi OHRUI (Graduate School of Life Sciences, Tohoku University, Japan) Application of HPLC- N-(9-Acridinyl) maleimide (NAM) fluorometry of sulfite to marine sediment
36. Prof. Ludwik ZAWISZA, Dr. Jan MACUDA, Prof. Stanisław NAGY (AGH, University of Science and Technology) - Protection of Urbanized Mining Areas in the Mine's Closing Processes
37. Dr. Agnieszka ZIELIŃSKA-LOEK (Department of Environmental Biotechnology and Ecology, Wydz. GGiS AGH, 30-059 Kraków, Poland) - The perspectives of application of laser stimulation of plants for minimization of negative effects of motorized tourism in historical cities
38. Dr. Urszula ŻUREK-PYSZ (Technical University of Koszalin, Poland) - Beauty Must Be Protected - Environment and Nature of Middle Pomerania, Northern Poland
39. Dr. Urszula ŻUREK-PYSZ (Technical University of Koszalin, Poland) Protection of the Baltic Sea in West Pomerania, Northern Poland

## PLENARY SESSIONS (OPENING)

JAN W. DOBROWOLSKI \*

### THE MAIN PURPOSES OF THE 11<sup>TH</sup> INTERNATIONAL CONFERENCE ON INTERDISCIPLINARY CO-OPERATION FOR THE SUSTAINABLE DEVELOPMENT OF HISTORICAL CITIES AND PROTECTED AREAS. PERSPECTIVES OF SOUND TOURISM

International community of scientists has a **special mission focused on knowledge-based society** in the **UNESCO Decade of Education for Sustainable Development**. I believe that exchange of experiences during this Conference, followed by interdisciplinary and international pilot projects, will be a proper way for the development of **mission to make our life more reasonable and our civilization more human-oriented**. Let me refer to the basic concept I introduce at the starting points of National and International Summer Schools on the Human Environment in 1967 as well as at beginning of series of the International Conferences on Sustainable Development in 1989.

**The basic principle is linkage between interdisciplinary research and problem solving training, supplemented by education of whole society as important partners to experts. The key word for success is integration** of all age and professional groups for common action focused on better quality of life. From our 1<sup>st</sup> School in 1968 we recognized as necessary linkage between learning about different (social, natural, technical etc.) aspects of **global problems of the protection of the Biosphere and integrated action on local scale**. The basic subject of this Conference - sound tourism seems to be really useful for the **integration of education** of local community and tourists **focused on common action for the promotion of sustainable development of regions**, offering valuable nature and culture heritage. We are facing similar problems and exchange of **good practice of cooperation of experts, society and decision-makers on regional scale and managers** of enterprises may be useful in many countries. One of these problems is **reduction of negative effects of motorized tourism in relation to more successful protection of human health** (against direct and indirect risk factors), **biodiversity, old architecture**, monuments, etc. Important is not only **wide-scale introduction of innovative technologies** and system of management but also change of **behaviour of both tourists and local inhabitants**. Common responsibility and partnership in relation to sound tourism may be a good **promotion of sustainable development** in other fields of human activity.

The forthcoming conference will refer to the co-operation of experts and decision makers - from local self-governments and administration - in the area of sustainable development of historical cities and protected areas (national parks, nature reserves, landscape parks) and health resorts. This co-operation has an interdisciplinary character, and a particular reference point will be perspectives of the development of different forms of environmentally sound tourism (eco-tourism and cultural tourism) in the regions of highest cultural and/or natural values.

This also includes the role of distance education (e.g. learning with the application of technical innovations) regarding the education of knowledge-based society and the integration of experts in natural, medical, technical, social and economic sciences and the most creative students (including NGOs) as well as local residents including decision-makers, remaining in compliance with the recommendations of the EU.

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#### Main Topics of the Conference:

- Methods of interdisciplinary studies on the influence of pollution on cultural monuments, works of art and health of the residents (including the use of modern environmental monitoring).
- Education of different age groups for eco-tourism and the organisation of qualified tourism.
- The application of computer techniques (including the Internet), photogrammetry, remote sensing and GIS for the promotion of cultural and natural values of specially protected areas.
- Perspectives of the application of new achievements of environmental engineering (innovative biotechnology in particular) for more efficient protection of natural environment, connected with the development of balneotherapy, hiking, cycling, horse-riding, canoeing etc.
- Health aspects of eco-tourism and naturotherapy
- Eco-tourism as the promising area of sustainable development on regional and international scale (review of experience from different countries)
- The experience of the Association des Terre des Rivieres as the example of the promotion of the co-operation of experts and decision-makers for the sustainable development of river regions in different countries.

The Conference will be a good opportunity to extend the co-operation of scientists (e.g. in the area of education, computer science, economy, organization of tourism, biotechnology and environmental engineering) and specialists from local administration as well as companies making infrastructure for eco-tourism on international scale. The promotion of innovative solutions created at universities and useful for small and medium business is planned, in the aspect of the promotion of their implementations in different regions. The Conference should also contribute to the development of inter-regional co-operation of self-governments and local administration with universities and business. Like previous conferences it will promote European co-operation for sustainable development and help in generating new projects

Wider cooperation would be useful for all the inhabitants of indivisible Biosphere. Development of international cooperation in this field is of crucial importance. Let me refer to **our 33 years interdisciplinary cooperation with eminent experts of the Japan Environmental Council.**

Complementary experiences are very useful not only for early detection of risk factors but also for more **effective prevention at the sources against deterioration of the Human Environment.** Tragic experiences of Japanese victims of incurable diseases of contemporary civilization make the best motivation for common action of scientists, engineers, managers as well as local and international society. **Good examples of international solidarity in this field could be e.g. 1<sup>st</sup> International Congress Scientists for Better Human Environment in Kyoto in 1975** as well as at present so called Kyoto Convention. This nice opportunity that we have at this Conference is also the **presence of highly reputed experts from different countries is our hope of development similar activity on wider scale.** Let me wish you real satisfaction with “the brain storming” during the Conference as well as with **interesting and useful projects as output of meeting** of people of different ages and background but with common interest in **creative contribution to the game how to use progress in science and technology for better quality of life for all!**

KENICHI MIYAMOTO \*

## **TOWARDS A SUSTAINABLE SOCIETY - FROM THE LESSON OF JAPANESE ENVIRONMENTAL PROBLEMS**

### **1. From serious pollution to environmental problems**

After World War II, Japan was preoccupied by the rapid economic growth. This caused severe pollution in the nation. Two case of Minamata disease (methyl mercury poisoning) have created approximately 20000 victims. Itai-itai disease (cadmium poisoning) created 188 officially acknowledged victims. Air pollution caused by Yokkaichi Petrochemical Industrial Complex created approximately 1000 victims. Pollution in big cities got worse due to the industrialization and rapid growth of the car traffic. City of Osaka had 160 days of smog in 1960. Similar problems appeared throughout the nation. In 1960's, major metropolitan areas and industrial cities in Japan were, literally, the "infernos". The number of victims of air pollution were approximately 100000. What was responsible for all these problem ?

First of all it was the companies because the companies expanded their business but cut back the investment to prevent the pollution. Secondly, it was the central and local government. They regulated the pollution measures as long as the measures did not harm the companies' economy. Establishment of Pollution Law delayed. The anti-pollution movements broke out all over Japan. Environmental policies developed two ways in Japan, the reformation of regional policies in local governments and pressure of decision of pollution trials. In 1970, 14 Environmental Law put in effect. In 1974 Compensation Law put in effect. As a result, mentioned above, serious pollution problems had been prevented. However, the remaining have not been solved yet since then .automobile pollution, wastes, asbestos poisoning.

In addition to those, we have consider preservation of landscape ,protection of nature and global environmental issues.

### **2. From “End of Pipe “ to System Innovation (at the time of report)**

### **3. Creating Sustainable Society from where one stands on**

The five Principles satisfies Sustainable Society .(1) Maintaining peace.(2) Conserve and renew the environment and resources. (3) Overcome absolute poverty. (4) Firmly establish international and domestic democracy (5) Achieve basic human right, freedom of thought and expression , coexistence of various culture. We still face many obstacles for establishment of Sustainable Society. However, there are some hopes in the future.

I will introduce some case which create Sustainable Areas on the spot.

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SHUNICHI TERANISHI\*

**THE HISTORY AND ACTIVITIES OF JAPAN ENVIRONMENTAL COUNCIL  
TOWARDS INTERDISCIPLINARY AND INTERNATIONAL  
COOPERATION IN ASIA**

I would like to make a brief introduction of the history and activities of Japan Environmental Council (JEC).

In Japan, as a very unique interdisciplinary academic group, the Environmental Pollution Research Committee was organised by Prof. Shigeto Tsuru who was a famous political economist. The committee has been issued a quarterly journal since July 1971.

The committee members set up the Japan Environmental Council in June 1979 in order to build the wide network for promotion of environmental cooperation and environmental policies in Japan and Asian region. Has about 400 members as of 2006. The members of JEC are academic scholars and scientists in the interdisciplinary fields (e.g. law, economics, sociology, education, engineering, medical science, ecological science, etc), lawyers, environmental experts and journalists, leaders of environmental NGOs & citizen's groups, and graduate school students, etc.

JEC has organized the Asia-Pacific NGO Environmental Conference (APNEC) since the beginning of 1990's; APNEC-1 (December 1991, Bangkok), APNEC-2 (March 1993, Seoul), APNEC-3 (November 1994, Kyoto), APNEC-4 (November 1998, Singapore), APNEC-5 (September 2000, Agra), APNEC-6 (November 2002, Kaoshiung), APNEC-7 (November 2005, Kathmandu). On the base of this APNEC network, JEC has started a interdisciplinary and international project for editing & publishing a series of "The State of the Environment in Asia" according to the Kyoto Declaration of APNEC-3 in November 1994.

Our Challenge in this Century is to make advance of the above-mentioned APNEC network more widely and to build up 'Asian Environmental Cooperation Organization'. We would like to learn many lessons from the history and experiences in European region.

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HIDENOBU JINNAI\*

## URBAN REGENERATION OF TOKYO AS A WATER CITY

Tokyo has been called the 'Water City', similar to Venice, repeatedly throughout its history. In the lowlands where many rivers pour into the bay, a unique urban space has been created where the canals run in a mesh pattern. Its scenic beauty is wonderfully depicted in numerous landscape paintings and old photographs.

With the coming of modernization, however, Tokyo has begun to shift from the 'Water City' to 'Land City'. Railways, streetcars, motorways, and subways have prevailed over the urban structure. After the World War II, the city's alteration for the preparation of the Tokyo Olympic Games of 1964 became a big turning point and the image of the 'Water City Tokyo' was completely lost. Gutters and rivers were filled in, or blocked under the highways. As rivers and oceans became more polluted than ever, the water space became more distanced from the people's daily life.

Yet the movement towards the revival of the 'Water City' has happened sooner than expected. As people's sensibility for the environment has developed again, the land use on riversides comprising of factories and warehouses, and the reclaimed bay area, started to change.

At present, Tokyo's urban development has reached maturity, and the expansion toward the suburbs has saturated, thus causing the return to the city center that has encouraged the construction activities of new big scale high-rise condominiums on the waterfront. The important issue here is how to realize urban spaces for people at the Bay area that was designed to be the industry and distribution center during the modern age of industrialization. It has also been recognized that the surface of the ocean, rivers and canals play an important role to solve the problem of the Heat Island phenomenon.

To revive the water space and to promote its charm does not only enrich civil life, but offers immeasurable possibilities to tourism and cultural policies. I'd like to discuss in my presentation how to depict the future Tokyo as the 'Water City'.

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YOSHIMITSU SHIOZAKI\*

**REPLACEMENT PROJECT OF ELEVATED HIGHWAY AND URBAN  
ENVIRONMENT  
CASE STUDY IN KOREA, USA AND JAPAN**

In this paper I would like to describe the current situation of replacement projects of elevated highway in the urban area in Korea, USA and Japan. Huge elevated highway system, which had been constructed for convenience of road traffic since 1960s, have crossed over the down town areas in Japanese major cities. Those have caused public nuisance in urban area for example air pollution, noise and vibration problem and many other problems. In the last quarter of 20<sup>th</sup> century, the court showed that the highway has been the factor of health damage for many people who has been suffers from public nuisance disease.

In 1995 the Hanshin- Awaji earthquake destroyed the elevated highway along 600m length in Kobe. It killed 16 persons. This showed that elevated highway is very dangerous for the major disaster. So we faced the question whether the elevated highway should be reconstructed or not. Eventually, the local and central government decided quickly to reconstruct them. And actually they were emerging within a year and half.

In Korea the city of Seoul has completed the big project in autumn of 2005, which contains demolition of elevated highway and revitalization of Chongechon River in the downtown area. This elevated highway was constructed during 1970s to cover the pavement over the river, which passed the 120000 traffic a day. However this highway had caused many problems as air pollution and bad smell from base river and also needed big expense for its maintenance. So the mayor decided to demolish this highway and to revitalize the base river to enhance the urban amenity.

Although USA is well known as motorization state and has huge freeway system, today she is a top runner in the field of replacement project of motor way. Portland and Oregon replaced the highway along the river in downtown area and made waterfront park. San Francisco and Oakland demolished the elevated highway after long discussion, which had severe damages by earthquake. Boston has now replaced big highway to under ground and is going to make new park. This highway was located between downtown and waterfront area, which disturbed access from downtown to waterfront. This project is called as "BIG DIG", spent huge money and long time. However the project can be thought to give good amenity to future Boston. Also, Seattle, WA, is now under thinking about replacement of damaged highway by earthquake, which is called as Alaskan Way, located between downtown and waterfront area.

Japan is even now constructing elevated highway in Kyoto city, which is world famous historical city. However today it is discussion theme that the elevated high way over the Nihonbashi bridge, one of the important historical monuments, in the downtown Tokyo. If this project will go on to implementation stage, Japan can turn to way to recover and create urban amenity.

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NAOTO NAKAJIMA \*

**POSSIBILITY FOR REGENERATION OF HISTORIC TOWN THROUGH  
TRADITIONAL FESTIVAL IN JAPAN  
- COMMUNITY, TOWNSCAPE, TOURISM -**

In Japanese local town, traditional festival is at once a fundamental activity for community and a resource for tourism. Especially, festival which has its setting not only in precinct yard or plaza but in whole town expresses culture, history and landscape of town. In this presentation, I will focus on the issue how traditional festival regenerates historic towns mainly thorough the case study of Yatsuo town, Toyama Pref., Japan.

Yatsuo town was constructed on river terrace in the front of the Monmyo Temple in the 17<sup>c</sup>. There are sequence of stone walls and some historic buildings and townscapes. Old town of Yatsuo consists of 10 small historic neighborhoods with populations of from 100 to 400 residents. However old town has been facing on serious declining population.

Two big traditional festivals (Hikiyama float parade festival in May and Owara Kaze-no Bon dance Festival in September) are hold using whole town as their stages. These festivals based on the neighborhood unit are spiritual and practical cornerstones of community. Moreover, these festivals provide a basic style and composition of public spaces and townscapes. Over 20 thousands of tourists from all over the country visit these festivals each year. They are walking around whole town for seeing floats, groups of dancers and players all day long. They experience Yatsuo town itself thorough this particular style of sightseeing.

However, there are many problems about community, townscape and tourism. Depopulation makes it difficult to organize groups of Bon dance based on the neighborhood units. According to the increase of possession of car, townscape has been changed from traditional and individual to modern and deindividual. Tourism cannot contribute actively to local economy because tourists concentrate on the periods of festivals or some facilities.

In the middle of 1990s', a synthesizing approach to solving such problems was started by local commercial people and residents. These going-on efforts achieved some positive results. I will show these efforts for discussions on the possibility for sustainable development of historic town based on the ingenious balance between community, townscape and tourism.

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KAZUKO GOTO\*

**CULTURAL POLICY AND SUSTAINABLE CITIES  
HOW CULTURAL POLICY WORKS FOR SUSTAINABILITY IN JAPAN**

Sustainability and creativity are both important concepts for city development all over the world. However, environmental policy and cultural policy had been developed separately in Japan until the 1980s. After the late 1990s these policies seem to be sharing common interests in cities. In this presentation, I will focus on the issue how they met and how they are sharing common interests now in Japan.

First, I will introduce a short overview about how cultural policy for cultural heritage has developed in Japan and I will show how it connects to the concept of amenity in the cities. Second, I will focus on cultural policy for contemporary arts and will see how it can contribute to the sustainability of cities.

One reason of sharing common interests in environment policy and cultural policy in Japan is that the environmental policy has expanded its interests from pollution of the environment to amenity and at the same time the concept of cultural heritage has also expanded its definition from mere goods to comprehensive space. Moreover, these two policies strongly connect to city revitalization and regeneration now.

However, there are some problems between the two policies. For example, sustainability and city revitalization using cultural heritage have had some conflicts at times. To look at alternatives, I will show that not only the cultural heritage approach, but also combining the contemporary arts in the community with intrinsic values including history, culture and environment is becoming a more important factor for the sustainability and regeneration of cities and regional communities in Japan.

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YAYOI ISONO YOKOYAMA \*

**ECOTOURISM IN JAPAN  
-FROM A LEGAL ASPECT-**

Many efforts for developing eco-tourism have been done over fifteen years in Japan. But even now, Ecotourism is not popular in Japan. I will show the reality of tourism in Japan and discuss on some legislative issues for supporting sustainable tourism in this report.

The central government has been consistently and strongly followed the resort development policies since 1980s. The Resort Law of 1987 played a main role in carrying out these policies offered the preferential tax treatments and granted loans at low interest to local governments when local governments construct the facilities which were included in a general resort development plan by a local authority under the act. The countryside and the seaside changed to summer and winter resorts, golf courses and amusement parks from woods and sands. These developments caused serious disruption of the nature all over Japan.

On the other hand, fifteen million people went abroad in a year for these 10 years. 170 million people had a trip of two days or more in Japan, but 1.92 days tour per person. These facts show that travelers quickly move one place to another place. People did not enjoy a long stay in a resort area. The resort developing policies resulted in failure.

Local people realized that these policies caused unbridled development and opposed these policies for protecting their local environment. One of these movements was ecotourism movement. Iriomote Eco-tourism Association, the first eco-tourism association in Japan, was set up in 1996. Japan Eco-tourism Society was set up in 1998. The government really started eco-tourism policy just before twenty-first century. From the case studies of ecotourism, three points should be indicated as follows.

(1) The local tourist industry, the local government and majority of local people are generally favored mass tourism. Ecotourism needs the cooperation between local people and a local government.

(2) The concentration of eco-tours in an area adversely affect the local environment. Ecotourism policy should be set up in sustainable community policy.

(3) The Resort Law and local development acts adversely affect sustainable tourism. Restoration of local environment by ecotourism needs new legal scheme.

Many by-laws were legislated for prohibiting some kinds of the resort developments and the leisure-time activities such as affect local environment. Some acts as Landscape Law support the eco tourism as well. But the current legal scheme of the tourism has not changed from the resort development scheme. We must abolish it, and new schemes should be developed. Furthermore, various legal means developed, so that local governments, local people and other stakeholder will cooperate in developing sustainable tourism.

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OSAMU ABE\*

## **THE STATUS OF ESD (EDUCATION FOR SUSTAINABLE DEVELOPMENT) IN JAPAN**

“ESD (Education for Sustainable Development)” is newly introduced term in Japan. However, the idea that the education for sustainable society is needed has existed for long, and there have been variety of educational activities that aim to establish sustainable society. The initial proposition for the “Decade of Education for Sustainable Development (DESD)” was made by the Japanese NGO (the Suggestion Forum at the Johannesburg Summit), and the Japanese Government picked up on the idea and proposed it formally at the summit, and it thus came to be included in the summit’s document of execution. The group was established in November 2001 as an organization to exist for a limited period of time up to December 2002. The Suggestion Forum at the Johannesburg Summit set up and ran many workshops related environmental education in Japan and out of Japan for short time. The group carried out its activities with the goal of making a “Decade of Education for Sustainable Development” a reality, disseminating information about this and creating a network of NGOs. These moves spurred the Japanese Government to act and also led to the adoption of DESD in the United Nations General Assembly.

After going through these preparatory stages, the Council for the Promotion of the Decade of Education for Sustainable Development (ESD-J) was founded in June 2003 (96 groups in June 2006) active in a wide variety of fields relating to ESD. The aims of this group are to tie up and support the activities of groups and individuals involved in education relating to various social issues in Japan including environmental issues and health care, the coexistence of different cultures, gender, peace, human rights, development so that it ties up with the significant practical efforts of the UNDESD.

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**ASSESSMENT OF URBAN HERITAGE DEGRADATION AND ADVERSE  
HEALTH EFFECTS RELATED TO ENVIRONMENTAL AIR POLLUTION:  
THE CASE STUDY OF CRACOW (POLAND)**

Modifications of occupational land uses as well as increases of anthropogenic activities in urban areas have considerably altered air quality through the release of numerous toxic pollutants. Poor quality of air have lead to multiple alterations of urban environment and of citizens' health status. Air pollutants, as sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>) and heavy metals cause multiple damages on monuments and buildings and alter seriously urban housing quality and patrimonial resources. Moreover, exposure to most of pollutants was shown to be associated with the occurrence of some respiratory pathologies including cancer and asthma. Such degradations, observed in most large European cities have lead national and international communities to introduce the sustainable development in order to withstand deleterious effects of those pollutants and preserve quality of life. However, making effective such development requires the settlement and the validation of a risk – assessment methodology that can integrate and connect the anthropogenic uses of urban areas and the state of air pollution with the alteration of patrimonial buildings and of human health. One actual and major challenge is how to apprehend complexity of systems and the interaction of multiple parameters at each level of organisation (anthropological or biological, individual or population) and scale (regional or local). We propose that such challenge can be facilitated by the development and the validation of a multidisciplinary and integrative methodology using geographical and epidemiological / biological approaches. We choose to use Geographic Information System (GIS) and remote sensing as relevant tools to establish not only the spatio – temporal dispersion of air pollutants, as it can take into account of climatic, meteorological and topographical parameters with anthropogenic soil occupation and activities but also, to identify the contribution of each source of air pollution and their involvements in routes of exposure. Additionally, because air pollutants act rarely as single but rather more as a complex mixture, we propose to apply GIS in the delimitation of polluted and unpolluted areas taking into consideration several pollutants as well as in the determination of a single or a global degree of exposure. This is a fundamental issue as in final, the overlaying of maps of exposure to one or several pollutants with maps of topographical and/or epidemiological data should allow us to establish spatial links between anthropogenic air pollution and degradation of urban and patrimonial buildings and/or adverse human health effects. We have selected the city of Cracow to perform a multidisciplinary pilot study such as the one described

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above as this Polish city was shown to be affected with time by several phases of SO<sub>2</sub>, NO<sub>2</sub>, particulate matter (PM) and heavy metals emissions from industrial or domestic/household activities (heating) and car traffic. Determination of the spatio-temporal dispersion of those pollutants is currently underway through the GIS – integration of climatic and meteorological data with concentration data of each pollutant during the last five years. Preliminary results indicate that the most polluted zones of Cracow which display concentrations of pollutants that exceed often European air quality norms correspond to the most crowded areas Cracow. The fact that one of the highest polluted areas either in PM<sub>10</sub> and NO<sub>2</sub> or in heavy metals are respectively located close to the historical west side of downtown and close to the surrounding of the city hall of Nova Huta suggest that these pollutants affect differentially and specifically some historical parts of the city including the heritage of industrial “communism period”. In conclusion, validation of such interdisciplinary and integrated risk assessment methodology should fulfil the need to settle down a better European urban management that should maintain the integrity of air quality and preserve urban heritage and human health as well.

ANDRZEJ KADŁUCZKA \*

**IDEA OF SUSTAINABLE DEVELOPMENT AND ISSUES OF  
PRESERVATION OF HISTORIC HERITAGE IN CRACOW AND IN  
FLORENCE**

The long-established cooperation between the Institute for History of Architecture and Preservation of Monuments and the Romualdo del Bianco Foundation as well as the recent, considerable revival of mutual relations between the partner cities of Krakow and Florence have not only allowed for the exchange of scientific experiences in protection of historic heritage but also facilitated the critical assessment of their direction and methods. Moreover, these methods are in many respects the fruit of cooperation and shared ideas.

The Cracow Charter, itself a contemporary interpretation of the Venice Charter, was conceived with the participation of Italian conservators, who were represented - among others - by scholars from the University of Florence. The essence of the Cracovian paper lies in perceiving the protection of historic heritage as the overall aim and in stressing that the achieving of this aim does not have to pose obstacles and barriers to the development of civilization. On the contrary, it might become a fundamental factor in this development.

The contemporary doctrine of conservation is marked by a shift in the approach to a historic monument, which is now understood rather as a subject than as an object of conservation. The very term monument has evolved with time; today it refers not only to an ever-expanding area of protection but also to a multiplication of meanings that are carried by a given monument. Such a philosophy of heritage protection implies a natural consequence - a tendency towards the equilibrium of protection and the needs of development of a historic city.

Can we speak of a 'sustainable development' in the context of a contemporary doctrine of conservation? What is the meaning of this term? Let us briefly leave aside controversial issues regarding the understanding of the term *sustainable development* 1 and its Polish interpretations as *eco-development* (Polish *ekorozwój*) or *durable and balanced development* (Polish *rozwój stały i zrównoważony*) 2. It is worth mentioning that the idea of a development based on the utilization of renewable energy sources is quite close to the concept of the 'revalorization' of architectural heritage which basically means the reinstatement of lost elements of architectural decoration or material relics of architecture.

Renovations, conversions and modernizations that are realized professionally and according to all the rules of conservation, in harmony with all new developments may enrich the heritage and extend its substance. Such an understanding of the process of renewal of urban space and architectural structures is represented in the APPEAR Project (Accessibility Project. Sustainable Preservation and Enhancement of Urban Subsoil Archaeological Remains) that is financed within the 5-th Framework Research Programme EU (DG Research). This project pertains to the complex activities linked to

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conservation, integration, restitution and the using of archaeological relics that still remain underground. They, however, shall be publicly accessible in the future. 3

The national project “Relics of Medieval Architecture in the Centre of Historic Cracow; Scientific Guidelines for Their Incorporation in the Process of Modern Urban Development” (Polish „Relikty architektury średniowiecznej w centrum historycznego Krakowa; naukowo-badawcze przesłanki ich wykorzystania we współczesnym procesie rozwoju miasta”) that is financed by the KBN (Committee for Scientific Research) was based on similar premises.

1 W. Pęski *Zarządzanie zrównoważonym rozwojem miast*, Arkady, Warszawa 1999, p. 17

2 K. Górka “Strategia dla Polski a ochrona środowiska naturalnego”, *Aura* 1995 nr 2

3 „APPEAR Project: public access to archaeological sites in an urban context” *ICOMOS nouvelles/ news*, vol. 14, Nr 1, July 2004, p. 8

4 KBN project nr 0898/T07/2003/25

RICHARD FENOLLO\*, RACHEL GAUTIER\*\*  
**UNION DES TERRES DE RIVIERES EUROPE**

**Introduction**

Interreg III is a Community initiative which aims to stimulate interregional cooperation in the EU. It is financed under the European Regional Development Fund (ERDF/ FEDER).

This phase of the INTERREG initiative is designed to strengthen economic and social cohesion throughout the EU, by fostering the balanced development of the continent through cross-border, trans-national and interregional cooperation. And through part C aims to improve a large-scale information exchange and sharing of experience (networks).

Part funded by the EU Interreg IIIC Programme, Union des Terres de Rivières (U.TdR) is an ambitious networking project of 24 partners across 10 States. The partners, who comprise municipalities, development agencies, universities and non governmental organisations (NGO's) have come together to share experience and knowledge on the impacts of society and land use, on water. Using the EU Water Framework Directive and the Ecosystem Approach as key common points of reference, U.TdR partners seek to develop and implement sustainable environmental and economic measures for the benefit of all EU citizens.

**Two big objectives for this grouping:**

1) "Water is an inalienable common heritage and its use is a primordial human right."

Protection and environmental development, economic, cultural and social of water, of the water-ways and the aquatic surroundings,;

Set in adequacy of the regional development with the management of water, of the rivers and water-ways,

2) "Europe will construct itself for a long time when we, European of basis, will collaborate day after day."

Participation at the citizen construction of Europe in a gait of "bottom-up

**The interreg project presented**

Union des Terres de Rivières, concerning water management and development of the fluvial landscapes, appears in the field of the Water framework Directives emitted by the EU

The interreg project set down, includes 5 components,

- Component 1: administrative management of the network, development of a structured and sustainable network,

The transformation of an network in an European Group of Transnational Cooperation

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\* President of the Union des Terres de Rivières

\*\* Union des Terres de Rivières

- Component 5: communication, how to develop the communication inside and outwards of the network

- Component 2; water: element, source of life,

Resource management in water, treatment of the pollution and depollution, desalinisation, purification,

- Component 3: water: factor of sociocultural and economic development

Protection, development of the fluvial landscapes,

- Component 4: Capitalization of the knowledge and know-how for exchange, transmission and sustainability

With transversal actions of the expert groups

a) To be able to propose a scientific approach to the problematic

b) To define a procedure for a translational cooperation between the local collectives and the expert groups

c) To make evolve the knowledge and the training, to give to the decision makers tools for help to make decision,

That project gives a birth to the European Group of transnational cooperation of **UNION DES TERRES DE RIVIERES** with for aim.

In the framework of citizen construction of Europe and, the Grouping associative has an aim of sustainable development and in particular an environmental protection and economic, cultural development, patrimonial of water, waterways and aquatic midst.

Water, is inalienable common heritage, to which the access as well as the one to the networks of purifications is a primordial human right. To this title, our grouping, considering that such a heritage can be protected for a long time, developed and guaranteed universal in perfect interrelationship between peoples and states, work in order to develop co-operations between the different partners, contributing like this or that to the citizen construction of Europe.

PAOLO DEL BIANCO\*

## HISTORICAL HERITAGE AND CROSS CULTURAL COMMUNICATION

Past and future activities of international exchange promoted by the Romualdo Del Bianco Foundation among its network of experts in 37 centre-Eastern Eurasia Countries are conceived under the main ideals and philosophy that cultural heritage could be a powerful engine for initiating meetings, exchanges, interpersonal knowledge, understanding and friendship. Thus, tourism could be considered as a peace-spreading strategy. Traditional tourism generally is pursued *out of Individual needs*, thus becoming *Selfish Tourism*. Usually tourists do not integrate much with the people of the Country they are visiting. Traditional Tourism, or “fast Tourism” of the second half of the 20th century, risks contributing to the growing increase of individualism, which is often a direct consequence of it. Historical cities, which attract tourism change as much as possible in order to offer the appropriate services necessary for international tourists and only for business reasons. Hasty tourists usually are not interested in befriending the inhabitants of the city they are visiting. Exchanges such as words, looks, etc. occur only for business reasons (buying and selling), thus making integration impossible, like trying to mix oil and water. In addition, cities receiving visitors work in order to offer services to tourists. Thus, they are in their most compelling work phase, which is business oriented and often times only business minded. Actually there is more to it. Due to the spontaneity of such a phenomenon, cities neglect the planning of increasing tourist flows, risking to *suffer* and undergo the bad effects of such uncontrolled richness. On the contrary, planning should be focused on the limits and conditions of a sustainable development because cities are not able to steadily increase their tourist flow without making their citizens suffer. In other words, if sustainable development is not strived for, citizens risk deeming tourists as a negative element for them and their city, rather than as a richness. In pursuing citizens' and visitors' interests as well as those future ones of historical cities, the mission of each urban system must be defined in order to show the limits of possible development. By doing so, cities shall no longer slowly become large Museums for Visitors, cities that cease to exist because they do not belong to their citizens anymore! The paragraph about Management within the document resulting from the international conference held in Krakow on October 26th 2000 (“Krakow 2000”), clearly states that unmanaged tourism means suffering. The Foundation believes that people coming from different countries and cultures meeting together fostering direct socialisation among them and contribute to the development of a “Culture of International Integration”, while at the same time respecting diversities. For this reason, the Foundation believes in a type of organisation which shall ensure gatherings among people and mutual knowledge in order to understand each other's values, thereby exalting the differences as cultural points to be known and understood. It is a type of organisation, which shall ensure concrete meetings to occur among people, a richness that can really contribute in making a better world.

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**TERRITORIAL ANALYSIS METHOD OF SOCIO-ECONOMICS CONFLICTS  
BETWEEN HUMAN DEVELOPMENT AND ENVIRONMENTAL  
CONSERVATION**

The paper focuses on a methodology for analysis of potential territory capacities like local development and conflicts resolution of land natural resources uses. *Ecological economics* and *landscape ecology* are the theoretical origins of this methodology so that it's possible to give a value to both economic aspects and social-environmental aspects. In this case public stakeholder choices will have many actuation opportunities because they will base on the sustainable development concept. Present paper analyses potential conflicts between environmental conservation and human development, and starts from many functions of agricultural sector in the Territory Empolese Val d'Elsa located in Tuscany Region.

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**SUMMER SCHOOLS IN THE VENICE LAGOON:  
A LESSON IN PRESERVATION OF NATURE AND CULTURE.**

No other place in the world provides a better example of the co-existence and conflicts between nature and civilisation. Since the first settlements in the Venice lagoon in the sixth century, man has made all efforts to survive in an environment, which, *a priori*, is not suitable as a human habitat. It is a paradox that in such unfriendly environment the civilisation flourished during centuries, creating enormous wealth, sublime culture and well being of citizens of the Republic of Venice. Today, the lagoon and the city of Venice face an unprecedented challenge of protecting the natural habitat and the cultural heritage against two major threats: the sea and mass tourism. Both are vital to the economy of the City, but must be properly managed to ensure a sustainable future of such a unique socio-ecological system. Fishing, navigation, and beach recreation are important, but the sea invades the City with increasing frequencies while coastal erosion which threatened the very existence of the lagoon, is counteracted by means of massive engineering interventions on the littorals. Tourism is one of the “raison d’être” of the City but 13 000 000 visitors per year create a major threat to the architectural treasures and to environmental quality. Numerous conflicts among various stakeholders and pressure groups result in vigorous disputes and finding optimal solutions presents a major management challenge. Monumental works have been undertaken to attenuate the flooding of the City, but efficiency and possible ecological consequences of these measures are still the object of a lively discussion. Pollutant load from point (industry, island agglomerations) and diffuse (drainage basin, atmosphere) sources are of a major concern for water and sediment quality. Considerable efforts are being made to assess the environmental status of the lagoon and propose adequate management strategies for the lagoon and its watershed. This unique setting provides an excellent opportunity to train students in natural environmental science and introduce them to the complexity and interdisciplinary nature of environmental research and management. In cooperation with the Istituto di Scienze Marine (ISMAR) of the Consiglio Nazionale delle Ricerche (CNR), the Institut F.- A. Forel of the Université de Genève organizes Summers Schools for students of the Master in natural environmental sciences (MESNE). Although the major focus is on environmental assessment of the lagoon, problems related to socio-economical aspects, tourism and protection of cultural heritage are also dealt with in order to underline the interdisciplinary character of environmental issues. The Summer School programme, its didactic goals and methods are continuously reviewed in an attempt to optimise students training by selecting the most relevant aspects from a wealth of important issues. One of the aims of the Summer School is to evoke among students in environmental sciences a deep interest in the protection of this unique site and encourage some of them to undertake research in this area.

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**POLISH LONG-TERM INTERDISCIPLINARY CO-OPERATION OF  
SCIENTISTS, YOUTH AND LOCAL COMMUNITIES FOR THE PROMOTION  
OF ECO-TOURISM AND SUSTAINABLE DEVELOPMENT IN REGIONS OF  
PARTICULAR NATURAL AND CULTURAL VALUES IN POLAND, SPAIN  
AND ITALY**

The AGH - University of Science and Technology in Krakow has a long tradition in integrating scientists, scholars, decision makers and local communities in common action for sustainable development. This includes over 50 years of the tradition of Seminars on Sustainable Use of Natural Resources started in Poland by the rector of the AGH-UST– Prof. Walery Goetel. Our team continue this tradition referring to the sustainable development of national parks (including international parks). The leader of our team initiated (in 1968) Polish and international schools “Man and Environment”. They were held in places of particular natural values, usually in national parks. A particular role in sustainable development belongs to eco-tourism connected with sport activities of academic students, including the members of the International Alpinist Union).

Our team has methodological experience from the series of international and national summer schools referring to alternative forms of tourism and sustainable development in the regions of some Polish national parks. There were also visits to national parks in other countries (Spain, Great Britain, Romania, Italy). The international course of the sustainable development of protected regions in Europe was carried out in the Spanish National Park Coto Doñana.

We also carried out work on the state of environment in historical urban complexes in Poland and Italy (e.g. International Workshops in Florence in the co-operation with the Del Bianco Foundation). Recently we also completed the work within the European project connected with our participation in the project on the modern education of tourists and residents in eco-tourism and the sustainable development of the areas of exceptional natural and cultural values. The model area was the Cinque Terre National Park (Italy). The participants represented 11 countries.

The experience in the implementation of sustainable development in national parks of other countries was used, including work carried out in Poland since 1968. This includes the experience from the mountainous and submountainous national parks like the Tatra N.P., the Pieniny N. P., the Bieszczady N.P, the Babia Góra N.P. and the Ojców National Park, as well as from the Baltic coastal region (e.g. the Wolin N.P. and Słowina N.P.). These parks face high tourist pressure, but at the same time in most cases human influence is necessary to keep their character - prevent meadows from being covered by forests in the process of natural succession. This feature is common with the Cinque Terre National Park, where human activities are necessary to prevent terrace vineyards from being overtaken by forests. A particular subject of the interest of

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the co-operating with us experts from the Department of Photogrammetry and Remote Sensing Informatic (Prof. J. Jachimski, Drs. A. Boroń, B. Hejmanowska, W. Drzewiecki, S. Mikrut) was related to GIS in the context of the needs of the national park, mainly the development of tourism and nature conservation. Remote sensing and photogrammetry techniques can be successfully implemented for the needs of the Park. A map of vegetation/land use was made based on satellite data. This can make a starting point for the monitoring in the aspect of land use changes. Some examples of photogrammetric documentation of historical monuments in the Park were also made, including spherical panoramic images.

The Region of the Park was a model area for the consultation of experts and local decision makers as well as the residents in the cultivation of traditional forms of life, necessary to protect a unique cultural landscape. The activities were directed towards the diminishing of the concentration of tourism at the coastal area by encouraging tourists to visit mountain areas. Complementary experiences of professors, university youth, local stakeholders and managers from different regions in Europe support the idea of networking of experts (e.g. within the Union of Terre des Rivieres) for the promotion of eco-tourism, education and sustainable development.



ADAM BORÓŃ\*, WOJCIECH DRZEWIECKI\*, BEATA HEJMANOWSKA\*,  
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**THE 3D AND 4D INFORMATION FOR THE MOST EFFICIENT  
MANAGEMENT AND APPEALING PROMOTIONAL ACTIVITY IN  
PROTECTED AREAS**

For efficient management in protected areas up-to-date and reliable information is necessary. Most of the management issues are spatial in their nature. Spatial phenomena can be mapped, but conventional mapping techniques are time- and cost-consuming. Remote sensing technology offers an alternative approach to obtain relatively cheap information about large areas. The users can choose appropriate data for their task from the variety of close-range, airborne and satellite images in various spatial, spectral and temporal resolution, supported with information from existing contemporary and historical maps.

The imaging geoinformatics techniques (including remote sensing, photogrammetry, and cartography) not only allow registration of georeferenced position and geometry, but also unveil the details of the surveyed objects. Their powerful capabilities make them the best solution for recording, documentation and presentation of cultural landscape – the topography, natural features as well as important man-made objects, such as architecture, architectural details and even pieces of arts. Moreover, all information gathered can be easily integrated within Geographical Information Systems (GIS in 3D or 4D) and used not only for internal inventory and management tasks, but also for modern and appealing promotional activity.

In the paper we present practical proposals for applications of photogrammetry, remote sensing and GIS in protected areas, based on the experiences gained at the AGH University of Science and Technology Department of Photogrammetry and Remote Sensing Informatics. Examples taken from our works in the Cinque Terre National Park (Italy), Bieszczadzki National Park (Poland) and other protected areas are provided for illustration.

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**PARALLEL SESSION I:  
SOUND TOURISM IN HISTORICAL CITIES AND ECOTOURISM IN  
PROTECTED REGIONS**

MANUELA SILVIA CAMPANINI \*

**QUALIFIED TOURISM. TRANSFORMING THE ICELANDIC EXPERIENCE  
IN A FLEXIBLE APPROACH.**

*Carrying capacity* and *qualified tourism* represent both *passive* and *active* concepts, which *resilient environments* planners have to pay attention at.

Iceland may be conceived as a *model* where to test several kinds of experiences assumed as marketing products. Icelandic natural features and landscapes fit many educational programmes on *health/environment/energy sensitive* topics.

Due to insularity, incoming tourism is in Iceland easily controlled and planned. This makes possible to release specific educational programmes tailored on different cultural model's requirements.

This kind of approach meets several needs. Considering the island's limited *carrying capacity* and *vulnerability* as a *plus*, *qualified tourism* standards will avoid the negative impacts introduced by *mass tourism* and offer high client's *satisfaction* standards.

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**EDUCATION FOR SUSTAINABILITY: TOURISM AND THE  
CONSERVATION OF NATURAL RESOURCES**

It is almost universally accepted that global warming is taking place and that one of the contributory causes of this global warming is air travel. Travel by air has grown dramatically in recent years, particularly for the transport of fresh produce to the affluent western countries. Another significant area of growth however has been the growth in leisure travel, fuelled in part by the rapid growth of the ‘no frills’ air transport industry. In terms of leisure travel however there has also been a growth in long haul travel as people seek to assuage their jaded appetites by experiencing ever more exotic locations. These exotic locations are of course areas of outstanding natural beauty (e.g. the Grand Canyon) or historic significances (e.g. Machu Picchu) – or often both. And a fashion which is prevalent is ecotourism. All of this tourism both contributes to global warming and potentially to the destruction of the environments which make the tourism attractive. As such it might seem that such tourism is undesirable and should be discouraged.

But there is a dichotomy. Tourism is a major industry in the world and many parts of the world rely on tourism as a significant source of income. In many less developed parts of the world this is very significant and the governments and local communities in such areas wish to encourage and develop such tourism. In effect it provides a form of income redistribution from the wealthy west to other parts of the world. So here is the essential dichotomy of tourism – it is at once desirable and undesirable. Thus a compromise is necessary and this paper examines the nature of this compromise. In doing so we argue that there is an important role for education because an educated tourist is a responsible tourist. As a consequence there is a need to provide education for sustainability as part of tourism.

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ZYGMUNT WNUK\*

## TOURISM IN PROTECTED AREAS

Nowadays tourism is an important source of economic income in world economy and it includes an increasing number of people starting distant journeys.

Natural, protected environment, beautiful landscapes and unique cultural values are the basis for long-term development of tourist activity. It should be kept in mind that all forms of environmental protection are “living museums” but only national parks and partially landscape parks are administratively protected.

At the moment tourism is directed to areas where nature is relatively natural and such areas are adapted for tourist activity. It causes the increase of demand for wild animals and plants and souvenirs made of such plants and animals what threatens many species. In many region tourism replaces industry as far as the creation of income is concerned so it is quite probable that it can replace it as far as ecological damage is concerned as well. Such damages are clearly visible everywhere where uncontrolled tourist management that can rather be called tourist business (**income by all means**) is developed. Commercial economy changes into the commodity both the treasures of nature and culture and tourist as well. Its strategy is to persuade persistently the customers desires that are far beyond their real needs and it does not differ in it from other branches of capitalist economic system for which the increase of consumption is the only stimulus for development. The threat of nature always existed but there are periods when this subject becomes “hot”. It usually happens when the system of social values of a given society is shaken or during the acceleration of economic development e.g. in the second half of the thirties, in the seventies and after 1989. The cable railways in the national parks, car roads for Tatra rallies in the middle of the mountains, lake banks and other beautiful places built over and at last but not least confusion around “the colourful dizziness” in Bieszczady are the remnants of such situations. Nowadays the society expects quick economic success and old ideals are changed. Instead of “better and better satisfaction of the economic and spiritual needs of the whole society” the people are obtruded with the ideal of **excessive individual consumption**, the desire to possess things, the race towards private wealth which leads to disregard the natural values of nature, biodiversity, the beauty of landscape and purity of environment. In such times the threat of nature grows and **damage goes unpunished**. Tourism has been considered and praised as an important branch of economy that is why it should be evaluated from the ecological point of view just like any other branch of industry. The experience with industry reveals that without an external obligation it does not apply to the rules of environmental protection. So, reflection and caution outpacing material sphere are necessary. The limits of using nature by tourism must be set and it must not be an individual case in defence of this or the other national park, lake or mountain range but general legal standards must be set and people must generally start respecting

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them. **Tourism** should become **the promotion of nature protection** and should be bound for **the ecologization of tourism product**.

In connection with the above, the ecostrategy of the development of tourism should fulfil the following rules:

1. plan first then give access (global and complex thinking);
2. plan for vast areas ;
3. give access concentrating on the places chosen consciously;
4. spare land, concentrate buildings, gain free space;
5. keep areas that are specially precious and valuable as far as nature is concerned, areas that are not built over and cultivated (protected areas);
6. modernize and use the existing buildings in a better way;
7. limit building construction and set the ultimate abilities of the development of a given area;
8. develop tourism only in places where native people accept tourism and are interested in its development;
9. balance all economic, ecological and social gains and losses;
10. keep and strengthen farms and let them produce highest quality food (food certification);
11. losses are to be covered by those who caused them;
12. favour the development of public transportation;
13. pass round natural obstacles leaving natural forms of earth relief;
14. build architecture in local style and of local building materials;
15. open out selectively to technology, but mainly to clean technologies.

Tourism should be developed, but it should as well be rigorously controlled as far as the protection of environment is concerned, as finally it means the protection of its own future and the interest of tourists. It is obvious that the culture of tourism should be raised by educating its participants and organizers. Tourist base and tourist equipment should be cleverly placed . If mountain gminas say that cable railways or ski lifts are capable of attracting tourists such areas will be equally attractive if they are built outside national parks and wild life reserves.

The former placement policy that amounts to rapacious “vain” capture of the most beautiful and the most precious areas should be abolished and instead the areas with less valuable nature should be included into the tourist areas and they should be improved by clever management.

Spas should not be built in natural “heavens” but “heavenly” gardens should be created there. It should become clear that the access to the most beautiful places is limited and that the attendance in some national parks must be limited as well.

**The strictly protected areas cannot be accessible to everyone.** The problem of tourism bearing some costs of protection and preservation of naturally valuable areas should be considered. The following matters should be taken into account: - new investments in some areas should pay the placement tax if they profit from their placement (e.g. neighbouring national park, wild life reserve, landscape park); - paying

for using the environment even though using means bathing, walking, skiing or beautiful landscapes; - differentiation of taxation and other burdens to relieve some areas and direct migration to different areas. Gminas with national parks, landscape parks and wild life reserves should have priorities in getting grants and loans from NFOŚiGW, WFOŚiGW and other institutions and funds.

It is important to introduce such regulations to the legal systems that would make tourism bear the financial consequences of using natural resources and that would make the owners of tourist objects and organizers of tourism behave in a proecological way. The most important problems to be solved on the border of tourism and nature protection are as follows:

- to relieve some mountain ranges and sea zone from mass tourism that exceed the ecological capacity of these areas, - to relieve national parks of the highest level of traffic such as Pieniński, Ojcowski, Wielkopolski, Tatrzański, Świętokrzyski i Karkonoski; - development of visiting tourism (eco-agrotourism) in the rural areas all over Poland and first of all in landscape parks; - give priority to balanced forms of tourism that will favour biodiversity on preserved areas and outside them; - prepare legal regulations securing protection of nature and biological diversity in tourism; - cooperation of everybody engaged in preparing international regulations joining the interests of tourism and protection of nature. The most important thing is to stop “aggressive attacks” of national parks and the most valuable areas performed for the sake of illusive material benefits and national prestige. Tourism, hiking or even a few hour long walk outside the town are the only possibilities of relations with nature, admiration of landscapes, overlooking life vibrating in every forest, peatbog, marsh, meadow, field, pasture, barren, shapely tree and other natural forms.

We should put all our energy into the preservation of nature in the best possible condition for future generations.

ZBIGNIEW MYCZKOWSKI \*

**SUSTAINABLE DEVELOPMENT AND INTEGRATED PROTECTION OF  
IDENTITY OF LANDSCAPE AS BASE FOR SOUND TOURISM IN  
MONUMENTAL TOWNS**

In Poland, a new social and economic reality has been established, changes in the political system introduced, accompanied by a real yearning and urge for democracy. The latter is often seen as an unlimited freedom of action directed by a rapacious desire for possessions and aspirations to catch up on those lost decades. Those factors constitute a serious threat to both the townscape and countryside and its components: the cultural heritage and natural environment; they also hit the individual, community, and national identity.

Thus, some nationally protected regions in Poland have been selected as a research ground for the considerations as suggested hereinafter; these are regions protected in respect of both the national nature and the national culture particular in scale of villages and specially – of historical monumental towns, for example – the medieval Szydłów and renaissance Zamość (being on World Heritage List of UNESCO from 1992).

The principal thesis included in this contribution lies in proving that landscape is an expression of the identity of place and time whereas the identity of place and the identity of time constitute the keystone of landscape architecture that is the discipline of both the science and art.

A universal conception of identity, regarded as a unique instrument and objective, may be useful to carry out the requirement that is being so vividly "discovered" nowadays, for an integrated protection the final effect of which may be landscape of identity.

At the end some examples of monumental unique towns are included which constitute a matter of aspects and opinions demonstrated in the text. These refer to the state of the "old" and "new" identities of the landscape protected in connection with sound tourism, which appears as one of most important economical and functional factors for real conservation and, as well as, form of using this areas in Poland.

The contribution deals with some last examples of such studies (2004 – 2006) and expert works and with pragmatic and theoretic conclusions for solution in the light of contemporary landscape and spatial management and administration, as, for example, so called cultural parks – the newest form of protection of cultural landscape, which is allowed by Polish law.

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## **APPLICATION OF A DECENTRALISED INFORMATION SYSTEM FOR MANAGING SPECIAL TOURISM AND MANAGEMENT OF A BALANCED DEVELOPMENT OF HISTORICAL CITIES**

One of the important elements, which help cities and regions to develop, especially regarding the historical and economical importance, is tourism. Development of tourism in cities needs a guarantee of suitable infrastructure. In order to accomplish this, often high-cost investment which is difficult to find is necessary, so it would seem important to improve the quality of the tourist's stay in such a way that far-reaching effects are recognised with small investments costs.

The tools, which would help in this respect, are the Internet and computers. The software may provide a support, which allows the tourists to organise their stay in the most attractive way, and a support, which is best, suited to their preferences.

In the scope of this paper, two pilot versions of the systems were realised within the framework of research and didactic activities at the Department of Computer Science AGH, in the Intelligent Information Systems Group (IISG) with contributions of some students of Computer Science.

The first being a system, which can suggest options to the tourist after taking into consideration their preferences and interests, i.e. which places should be seen and in which events they might take part. This would make a tourist's stay as advantageous as possible with regards to personal needs and interests. Such a system may suggest anything from one day to a complete sightseeing itinerary of the tourist's whole stay. Such kinds of systems may be accessible through the Internet, on stationary computers as well as on mobile devices. Also a GPS may be integrated into the tourist stay planning system, obtaining a system that can suggest the optimal routes and manner of getting around the region, either physically or from a financial point of view.

The second system supports the planning of movement in any given region, giving advice on the means of transport a tourist should use and where to change. The municipal public transport (MPK), railway network (PKP), the regional bus transport system and taxis are all taken into consideration. In the case of these systems it is also possible to mention the methods of using them: through the Internet, accessing on the stationary computers or having applications installed on mobile devices.

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PIOTR BÓRAWSKI\*

## ECO-TOURISM DEVELOPMENT IN POLAND

Eco-tourism is a form of sustainable tourism. This kind of tourism is particularly important for its high environmental and natural values. Moreover, eco-tourism is environmentally friendly and it contributes to natural environmental protection. Eco-tourism is connected with rural tourism, sightseeing, and both rural and environmental preservation (Zibeniene, 2000)<sup>1</sup>. Eco-tourists are environmentally conscious about the consequences of natural exploitation and damage and they are concerned about its well being (Zaręba, 2000)<sup>2</sup>. They want to experience the beauty of the environment, protect it, to know more about the country, its natural features and ecological food. Eco-tourists are interested in history and visiting archaeological and historical sites and generally enjoy spending their nights under a farmhouse roof. According to the American Eco-tourism Society, eco-tourism is a conscious journey to natural places, which helps to protect the natural environment and support farmers' incomes. Eco-tourism is an activity, which helps farmers to increase their income in accordance with the natural environment. This activity helps to generate income from renting rooms on a farm, employing a free labor force and it also enables farmers to meet and talk with people from cities (Jaźwińska, 2000)<sup>3</sup>. On the other hand, eco-tourism has many advantages for tourists as well. It is a way to spend free time, which is relatively cheap in comparison to traditional tourism. A farm holiday can be adjusted to meet tourists' needs and it also improves their knowledge of traditional customs. The development of eco-tourism depends on the good behavior of farmers. Their ecological consciousness has widened and they are more polite and better-behaved. They generally invite tourists to play an active role in the farm work, animal feeding, fishing, hunting, picking blackberries, playing sports and so on. The aim of this paper is to present selected aspects of eco-tourism farm development in Poland. A group of 100 farms belonging to the European Center for Ecological Agriculture and Tourism in Poland (ECEAT-Poland) is featured. The basic data included: farm area, main tourism attraction, number of rooms and the prices of bed and breakfast, dinner and supper. The group was divided into six regions, according to ECEAT-Poland division: Pomerania, Mazury, Wielkopolska, Mazowia, The Sudety Mountains and the Carpathian Mountains. Moreover, it was possible to measure the impact of farm's area, numbers of rooms and places on prices in surveyed farms. The collected material shows that most of farmers prepare food for their tourists mainly from their own farms. They also help in organizing countryside walks and teach tourists how to bake bread and to do other manual tasks. Eco-tourism in Poland is presented by using Ministry of Agriculture and Rural development data.

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<sup>1</sup> Zibeniene G., 2000. Ekoturystyka na terenach chronionych Litwy (w:) Problemy rozwoju turystyki wiejskiej na Wileńszczyźnie, Warszawa-Biała Waka, s. 9-15

<sup>2</sup> Zaręba D., 2000. Ekoturystyka. PWN, Warszawa, s.183

<sup>3</sup> Jaźwińska A., 2000. Perspektywy rozwoju agroturystyki w dolinie Bugu. (w:) Problemy rozwoju turystyki wiejskiej na Wileńszczyźnie, Warszawa-Biała Waka, s. 183-193.

JACEK CZUBIŃSKI\*

## **TRADITION OF SUSTAINABLE DEVELOPMENT IN HISTORICAL KAMIENIEC PODOLSKI AS A POTENTIAL FACTOR OF TOURISM**

Kamieniec Podolski until the end of 18<sup>th</sup> century played a role of one of the most important political, military, economical, cultural and social centres as well in Poland as in Europe. Nowadays Kamieniec is an architecturally and culturally devastated provincial town, a local centre in historic Podolia Region in Republic of Ukraine. Its great history is witnessed only by material relicts of past glory strongly tied up with still existing in common memory immaterial intellectual layers and with almost untouchably preserved natural landscape. These three elements of the town identification: nature, culture and immaterial factors say about site exceptionality and its meaning for European culture.

It could be said that Kamieniec Podolski was an excellent example of a town, which developed in a sustainable way during its great history. This thesis is connected with relation between natural and cultural landscape as well as with different issues of its social and political life. The location of the town on the top of a meander hill of Smotrycz river used optimally its natural topography for defence purposes. Historic structure of three basic nations living harmoniously in the town: Ukrainians, Poles and Armenians with their own political, economical, religious and cultural autonomy, also secured sustainable development of the town. Simultaneously existence of social and cultural polycentrism and syncretism caused, apart from development of identity every mentioned nations, some, unique in European scale, new phenomenon.

In spite of radical destruction of Kamieniec Podolski's cultural layers, with the existence of almost untouched values of natural landscape, the town and its region has nowadays an extraordinary tourist potential. Its activation should be based, apart of nature and multiculturalism, on underlining immaterial and meaning historic factors. Reintegration of these elements, based on an idea of sustainable development, could bring back to Kamieniec Podolski its lost European meaning.

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ALEKSANDRA MACHNIK\*

## **ECOTOURISM IN PROTECTED AREAS – CHANCES AND THREATS**

Nowadays, even protected areas are menaced by our developing civilization. As a very valuable, well known and considered as very attractive, they attract many tourists, which means they are exposed to very strong tourist penetration. This situation causes many dangers, especially for rare and endangered species or natural landscapes. On the other hand good environmental education is a very important factor in nature protection and sustainable region development. People, who want to see and understand nature, probably would not destroy it in the future. Not only tourists but also a local community should be well oriented in its own region, especially in neighborhood - particularly in situation when this neighborhood is protected or very valuable. That coerces a compromise between protection and education.

Ecotourism is one of possible ways to show protected areas with not harming them. Unfortunately, very often not well prepared, made by hazard, in not proper places causes more threats than traditional tourism. Definition says that it is not tourism for everybody. It contains several really important factors and in fact it is not so easy to create. Moreover tourists and local communities attitude to nature and natural tourist attractions is still not very satisfied. So sometimes they are simply not correctly prepared to take part in this kind of tourism. It is necessary to improve this field, without which neither nature protection nor ecotourism could be done efficiently.

In paper will be discussed some problems connected with ecotourism in Polish protected areas on West Poland landscape park case and with conflicts between tourists, local communities and protected areas management. The research has been held in Chair of Human Ecology, Faculty of Tourism and Recreation, AWF Poznań.

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## WHERE IS ECOTOURISM HEADING FOR IN POLAND?

Contemporary tourist trends and their evident turn to natural environment let us be optimistic on one hand, and anxious on the other.

Tourism has been one of the biggest threats for natural environment for many years. Its new forms were causing new problems but were also challenging for the people who dealt with the destructive influence of tourism on natural environment. The idea of ecotourism has brought hope for the change of a “selfish” image of tourism.

The strategy of making a tourist map of Poland foresees that the progress of qualified and specialist forms of tourism are going to be inevitable for Polish tourist product being competitive on European and world market. The protected areas, where the main assignment is to find compromise between cases that concern tourism and protection of nature, play important part. The old model of protecting nature, based on system of bans, is now replaced with education in natural surroundings. Proper making use of the surroundings, that guarantees ecological balance, gives also the opportunity of close relation with nature, better knowledge, and ecological conscience. The nature-friendly tourism is connected with preservation of the biggest possible bio-diversity –beside the condition of environment it is one of the most important values. Co-operation with local societies is very significant as well; neglect in this field leads frequently to serious conflicts and unwillingness to create protected areas, while ecotourism can become one of the ways of earning money, influencing at the same time active protection of nature.

The theoretical tasks connected with progress of ecotourism have been described for years, but they are not always realised in practice. The first and main problem in Poland is the definition of ecotourism. It leads to misunderstanding of this idea and that’s why we can find the offers, which are called environment-friendly, but they aren’t. This problem concerns not only Poland but also other countries. Another thing is how to prepare areas for ecotourism and how to adapt their virtues. What is specific is the fact that the attention to promoting rare and endangered species is paid, while the knowledge and eco-conscience of the society is poor. Because of the fact that environment-friendly tourism is often realized through qualified and specialist forms, the lack of detailed descriptions of routes for horse-riding, cycling, canoeing or even trekking, is especially alarming. Usually people who work on it do not co-operate with scientists. This situation quite often leads to degradation of surroundings, reduction of bio-diversity, decrease of natural values and finally less interest. Training of the staff prepared to create and deal with ecotourism is another big problem.

Thanks to new trends in tourism, we hope to influence it, so that it will not be harmful for the environment. However, we have to be aware of the responsibility that people who deal with ecotourism have. If not, ecotourism can soon become one of the most serious threats for environment.

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## CRACOW AS A BALNEOTHERAPEUTIC CENTRE

Cracow, as a cultural and scientific centre of Cracow Metropolitan Area, has a chance to be a Balneotherapeutic Centre. Cracow is situated in a region, which has numerous kinds of balneological natural resources. These resources have been used in therapeutic and preventive treatment for ages. It has a special meaning nowadays, when improvement of environmental condition has not a reflection in improvement of physical condition of society. This state has connection with fast rate of development and increase of civilizing hazards. In such situation therapeutic treatment in health resorts is of considerable importance within the system of health protection as it combines the function of prophylaxis, treatment and rehabilitation.

Cracow, as a place of development of the Balneotherapeutic Centre in connection with spatial forming of Cracow Metropolitan Area, can be created as an important centre of sustainable tourism development in Europe. Significant element of sustainable tourism is complex usage and protection of environmental resources in connection with keeping a life comfort of local society at increase its economical benefits.

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## DEVELOPMENT OF ECOTOURISM IN THE BESKID SĄDECKI MTS.<sup>1</sup>

The Beskid Sądecki Mts. are a part of the Outer Carpathians and include two mountain ranges: the Jaworzyna and the Radziejowa. The ranges are dissected by picturesque valleys, providing a landscape of exceptional beauty. The landscape and the wealth of nature (both animated and unanimated) resulted in the creation of the Poprad River Landscape Park in 1987. Currently, under law protection are: 13 nature reserves (mostly forests with one historical and landscape site), 85 monuments of animated nature and unanimated nature with botanical values, and 25 unanimated nature monuments which represent an immense geodiversity of the Beskid Sądecki Mts. Exceptional nature valour combined with the landscape and the climatic conditions resulted in the arrival of tourists into the region dated back as early as to the 16th century. The discovery of mineral waters enabled the development of health resorts in Krynica, Szczawnica, Piwniczna, Muszyna and Żegiestów, which gave rise to the intensive health and medical tourism – an example of proper utilization of natural resources. Low but picturesque mountains became the paradise for hikers and skiers. Recently, the agritourism has become popular in the local villages and farmsteads.

The mass arrival of tourists causes environmental hazard - mostly the excessive traffic and pollution of streams and rivers due to inadequate water supply and sewage drain systems as well as by improper waste management and disposal. Farther development of tourism in the region requires joint efforts of local administration, communities and investors, which would be ready to implement the new solutions provided by the sustainable tourism in order to protect the nature wealth of the Beskid Sądecki Mts. One of the tourism forms, which may become the quality product of the region, is the ecotourism – the combination of health, leisure and specialized tourism forms, e.g. geotourism.

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<sup>1</sup> The research was supported by the AGH grant DS. No. 11.11.140.159

**PARALLEL SESSION II**  
**THE MONITORING AND PROTECTION OF HUMAN ENVIRONMENT**

FÁTIMA DAVID, RUTE ABREU\*

**THE ACCOUNTABILITY EFFECT OF FORESTS FIRES**

The multiple consequences of forest fires in sustainable development and environmental responsibility are well known, in a country like Portugal where Tourism is one of the principal economic activities. The aim of this research is to study the forests protection and its social, economic and environmental effects in Tourism. Consequently, the research analyse the accountability effect of forest fires in Portugal. Therefore, the results suggest a need of the trilogy prevention-detection-surveillance in the forest protection and in the environment preservation, with view to the maintenance of the biodiversity in a role of the Government and the Citizens.

**Keywords:** Tourism, Forests Fires, Sustainable Development, Social Responsibility

JOANNA TARGOŃSKA \*\*, EWA PANEK\*\*\*

**SPATIAL DISTRIBUTION OF HEAVY METAL (Cd, Cr, Cu, Ni, Pb, Zn)  
CONCENTRATION IN ROADSIDE PLANTS BETWEEN KRAKÓW AND  
ZAKOPANE**

The aim of the paper was to determine influence of area configuration on heavy metal concentration in two plant species: moss *Pleurozium schreberi* and Dandelion *Taraxacum officinale* along road Nr7 and 47 between Kraków and Zakopane. The samples of *Pleurozium schreberi* and leaves of *Taraxacum officinale* were collected in the following distances from the road: 5, 10, 50 and 100 m in the flat area as well as the descending and ascending slopes. *Pleurozium schreberi* accumulated higher amounts of all heavy metals: Cd 3,3 times, Cr 5,5 times, Cu 1,7 times, Ni 7,7 times, Pb 7,2 times, Zn 2,7 times higher than those in *Taraxacum officinale*, in the distance of 5 m from the road. Metal concentrations descended according to the increased distances from the road. Area configuration influences heavy metal concentration in the plants. The highest concentration at the distance 100 meters from the road were stated on the descending slopes: 2,9 µg Cd/g; 8,4 µg Cr/g; 9,1µg Cu/g; 5,4 µg Ni/g; 26 µg Pb/g; 86,2 µg Zn/g in *Pleurozium schreberi* and 0,8 µg Cd/g; 3,2 µg Cr/g; 11,1µg Cu/g; 6,1 µg Ni/g; 3,1 µg Pb/g; 74,3 µg Zn/g in *Taraxacum officinale*, respectively.

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## **OPTICAL AND OLFACTORY SENSORS AS TOOLS TO SUPPORT SUSTAINABLE DEVELOPMENT**

Advanced manufacturing procedures and progress in electronics have made sensor components, computers and telecommunication devices more affordable. Analytical procedures, such as spectrometry, as well as new chemometric sensors, like electronic noses, previously confined to laboratory use, are now available for field application. Remote sensing and online monitoring in liquids (water) and gases (air) might develop from a scientific procedure to common parameters, like temperature and pressure in the weather forecast.

Sustainable development might benefit in various manners from this improvements in sensor technology. Not only improved environmental monitoring, but also cleaner and more efficient production plants, specially in the bioenergy- and biorefinery sector, may be assisted by innovative sensor technology. Development and fabrication of sensor applications not necessarily requires large and expensive infrastructure. Sensor application development can be performed in rural areas or historic cities, providing additional, clean and future-oriented economic options in these areas. Due to decreased costs of sensor components it's economic, not to develop all sensor equipment into full featured and calibrated devices, but also to use 'dumb' detectors to improve spatial and temporal examination of an environment or plant by only detecting alterations from a defined state, mimicking biological sensor-concepts.

Practical examples of such sensors application will be provided for various applications. Results to detect various contaminants in wastewater by analysing the headspace with an electronic nose will be discussed. Spectroscopic fingerprinting of rapeseed oil is presented as a method to establish an affordable quality control in crops for production of regenerative energy. An application of a MOX-type gas sensor will be introduced, allowing to use air-quality as additional parameter, describing the environmental status of a region or a city, e.g. to use air-quality for marketing purposes or online-quality control in tourism. Further applications and options as well as limitations of the sensors and concept will be discussed.

### **Keywords:**

sensor, spectroscopy, electronic nose, gas-sensors, economy, quality control

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ANTONINA CEBULSKA-WASILEWSKA \*

## GENE MUTATION ASSAY IN *TRADESCANTIA* STAMEN HAIR AS A BIOINDICATOR OF AMBIENT AIR QUALITY IN URBAN AREAS

Some substances from complex polluted mixtures like air, water or soil are potentially dangerous to the whole environment and to human health in particular. In order to define a major contamination, its genotoxic effectiveness and to realize devastating or genetic and carcinogenic hazards, studies are necessary which yield new information on destructive and harmful outcomes of pollutants. So, it is important that the limited resources available are focused on first discerning hazards. To achieve this, integration of data from a variety of sources is necessary to result in definition of the most likely centers of devastating or carcinogenic hazards. It is also important searching for experimental genotoxicity data of chemicals and for correlations between accurate measures of exposures with the evidence of induced damage in exposed environment, living organisms and human health system. Bio-monitoring techniques associated with simple methods like plant systems are an essential component of a cost-effective attempt to improve the situation. The technique using the stamen-hair system in *Tradescantia* (Trad-SH) is one of the most radiosensitive plant known. The extremely high and similar to human cells radiosensitivity of its hybrid clones is followed by very high sensitivity to chemicals as well. This facts make the Trad-SH assay particularly suitable for the environmental studies and for the detection of hazardous action of pollutants. This paper shows results of applications of the Trad-SH bio-indicator for the monitoring of the ambient air pollutants in two urban areas, two historical and industrialized during the former period cities; Krakow and Plock. The detection of biological effects of radiation from the Chernobyl fallout is also shown for comparison. Correlation of biological effects with some chemical and physical measures of pollutants is exposed. Good correlation is shown between results obtained from *in vitro* studies of various chemicals effectiveness in the induction of gene mutations in Trad-SH assay and cytogenetic damage (CA, SCE) induced in human lymphocytes after the same genotoxic agent action. Results of monitoring studies that have shown a significant influence of the PAHs (polycyclic aromatic hydrocarbons) present in ambient air of historical cities on decrease of the efficiency in DNA damage repair processes in human lymphocytes are revealed. Presented results confirm, although, human monitoring of exposure to genotoxic agents is a well-established discipline, and newer approaches are continually arising, though, responses from plant bioindicators are often measured as economically and ethically acceptable and very effective. In a broad sense, since humans are ultimately a part of the ecosystem, we may conclude that ecosystem health encompasses human health. A preventative measure that detects the environmental hazards that infringe on human health should be established on a global scale.

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**ASSESSING THE WINTER TIME AIR POLLUTION IN THE KRAKOW AREA  
IN RELATION WITH POSSIBLE INFLUENCES ON HUMAN HEALTH AND  
CULTURAL MONUMENTS**

The emissions to the air in Poland are still substantial, resulting in direct and indirect threat to human health and the environment, including cultural monuments. Sulphur dioxide and particulate matter (PM) emissions place Poland among the biggest European polluters. During last fifteen years Poland has been done much toward its sustainable development. These include basic restructuring and modernization of industry, the implementation of abatement technologies, introduction of a broad energy-saving programme as well as alteration of the composition of energy supplies by reducing coal consumption. The SO<sub>2</sub> and PM emissions to the air are directly connected with the composition of energy supplies. During the last twenty years coal consumption in Poland was reduced by 18% from approximately 80% in 1984 to approximately 62% in 2004. Simultaneously, the adoption of environmental legislation transposing EU directives, in particular relating to air quality has been realized. All these measures led to the decrease of atmospheric emissions and to the significant improvement in the air quality. However, in some locations in Poland, including urban areas, air quality problems still persist, specially in winter time.

Krakow located in the Southern part of the country with a population of 738,000 ranks fourth in the total number of Polish cities. This old capital of Poland is also a treasury of inestimable monuments and objects of Polish history and culture. In order to assess the air pollution situation the pioneer monitoring project MONAT-84, led by Warsaw University of Technology, was carried out in February 1984. The National Network of Basic Stations was created in 1992. Tightening of air quality standards has led to increasing attention to assessment of air quality management in voivodeships, hence Regional Networks of automatic stations has been created during 2000-2004 for 11 (from 16) voivodeships in Poland, including Malopolskie voivodeship. The air pollution in Krakow is mainly due to local sources: the space heating in winter time, the transport and various industrial activities. In addition there is the secondary component, originating both from other national and trans-boundary sources that emit the pollutants.

This paper discusses the winter time air pollution in Krakow, starting from 1984 up to 2006. Analyses of available monitoring and modelling data are presented. Special attention is put to the winter air pollution in 2006 when the strong episodes of black smoke occurred due to severe winter. The air pollution levels in Krakow are compared with levels in other big cities in the country, with levels in other historical capitals of Europe as well as with EU Air Quality Standards. The assessment of possible influences of winter time air pollution on human health and cultural monuments is also presented.

**Keywords:** Air Quality Monitoring and Modelling; Urban Air Pollution; Health and cultural monuments effects; Sulphur dioxide; Particulate matter; Poland; Krakow, European cities.

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SYLWESTER SMOROŃ, ANTONI KUŹNIAR\*

## THE SEASONAL CHANGES OF A SURFACE WATER QUALITY IN THE TOURIST AREAS OF THE PODHALE (THE WESTERN CARPATHIANS)

The content of the chemical substances of biogenic character, in the waters of Bialy and Czarny Dunajec rivers, were shown for the period of 2001-2003. At 2 month intervals, the content of N-NH<sub>4</sub>, N-NO<sub>3</sub>, PO<sub>4</sub>, in waters originated from the two sampling points: the Bialy Dunajec, a typical basin with high tourist influx, (nr 1 – Suche and no 2 - Szaflary), and at Ludźmierz on the Czarny Dunajec (basin of agricultural character) was analysed. During the investigation period, an average concentration of N-NH<sub>4</sub> in the Bialy Dunajec waters at the point no 1 amounted 0.40 mg·dm<sup>-3</sup>, and in the point no 2 - 0.21 mg·dm<sup>-3</sup>. The lowest concentration was in the Czarny Dunajec – 0.08 mg·dm<sup>-3</sup>. A similar pattern has been maintained in all sampling points in the case of PO<sub>4</sub>, which developed concentrations 0.35; 0.29 and 0.04 mg·dm<sup>-3</sup> respectively. With regard to N-NO<sub>3</sub>, the differences were much lower (1.38; 1.36 and 1.09 mg·dm<sup>-3</sup>). The significant differences were registered in the summer and winter periods, particularly during tourist seasons. Such considerable difference in concentrations, between the rivers under study, particularly of N-NH<sub>4</sub> and PO<sub>4</sub>, is probably caused by intensive anthropopressure, which is an outcome of tourist and holidaymaker's affluence as well as the higher density population in the Bialy Dunajec basin. It concerns particularly the periods with a mass influx of tourist, winter (Jan and Feb) and summer (July), in which the concentrations of the substances in the surface waters were considerably higher. In May and from September till October, hence in the period of negligible tourist movement, the concentrations were at low level. In the context of water resources protection, such considerable seasonal increases of chemical component concentrations in the tourist regions of the Podhale, indicate on the necessity of adopting the infrastructure, which protects the environment, for the needs resulting from an influx of persons arriving for holiday purposes.

*Key words: Nitrate, Amonium nitrate, Phosphates, surface waters, and quality classes*

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MAREK KOPACZ\*, STANISLAW TWARDY\*\*

**SPATIAL AND STRUCTURAL TRANSFORMATIONS IN THE CARPATHIAN  
PROTECTED AREAS, AGAINST A BACKGROUND OF QUALITATIVE  
CHANGES OF THE WATER ENVIRONMENT**

The objective of this work is an evaluation of the environmental impacts of structural transformations in land use, including the tourist activities, which have taken place in selected basins of the Upper Vistula river (the Gorny Dunajec and Poprad) during the last 25 years, in the context of changes of water cleanliness. They were analysed in basin and administrative layout, utilising a data from the Main Statistical Office of Poland and the Regional Inspectorate of the Environment Protection in Nowy Sacz as well own field research results. The basins under considerations are characterized by a unique nature, landscape and cultural values, whereas large forest cover areas in the land use pattern of the Vistula basin classifies this region in the rank of the highest afforested area in the Polish Carpathians. This is favourable in view of water management and the environment protection. The detailed analysis showed the significant changes in land use pattern: decrease of arable land in favour of extensive meadows also there was an improvement in land use structure based on permanent grass-forest cover. It was found that the environmental conditions in the analysed basins would determine their multifunctional development mainly in the low-input and organic farming, as well tourism. Against a background of those transformations, particularly in the aspect of dynamic tourist development, changes of water cleanliness, first of all, the biogenic substances were evaluated. The concentrations of N- NH<sub>4</sub>, N- NO<sub>3</sub>, PO<sub>4</sub>, Cl, Na, SO<sub>4</sub> and K. components were analysed. As results it was found that pollutions of agricultural character had been decreased, whereas there was an increase of biogenic constituents of a municipal origin. The presented studies respond to a social demand in the area of sustainable and multi-functional development of mountain regions.

Key words: land use, structural transformations, the Carpathians, protected areas, water cleanliness

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## **RISK FACTORS IN URBAN ENVIRONMENT AND POSSIBLE MECHANISM OF ACTION OF ELECTROMAGNETIC FIELDS**

Electromagnetic fields are present in the natural environment and in all atoms constituting the matter. Each atom or particle in movement originates a magnetic field. Magnetic fields are present in both, in lifeless nature as external magnetic fields and in the living matter as internal magnetic fields. The interrelationships between the external and internal fields, the first ones everywhere more abundant, could induce interferences, as it is the normal case between different devices of the information and communication technologies. The chronic interferences of the external magnetic fields to the internal ones, could conduce to the inhibition of the electron flux or the activation of enzymatic activities of the complex I and III, in the electron transport chain, in the nervous and muscular systems and in the brain. By the same way, pathological effects can be induced influencing the chemical reactions in the electron transport chain after the chronic interference from the higher external to the lower internal magnetic fields. This effect could signify an electromagnetic sensitivity in humans. The medically unexplained symptoms depend on probable but unknown different risk factors, which can be internal and external. Internal risk factors have to do with the electrochemical proprieties of the tissues like conductivity and permittivity, both depending on the physiological and biochemical status of the human body.

Chemical compounds status in the tissues and organs are depending on such physical proprieties: a). metal overload (haemochromatosis: Fe; Wilson disease: Cu; Zn and others). In our experience, the overload of 9 mineral elements injected to rats, the toxic ones Cd, Hg and Pb were the heavy metals which induced a higher permittivity and lower conductivity in the rat tissues. The induction of allergic diseases by mineral elements is well known. b). organic compounds, used as pesticides in agriculture (insecticides, herbicides and fungicides), everyday more abundant as contaminants in food, food chain and food poisoning: more of them are accumulated into the organism; they could have influence on hypersensitivity and synergism to the effects of EMFs. These factors can intervene with others in the biophysical properties of the human tissues inducing synergism in the effects and hypersensitivity to EMFs. c). biochemical characteristics of the tissues, like enzymatic activities induction, inhibition or pathology, principally in the electron transport chain complexes I to V and other cytochromes in the biochemical status of the human body, in the brain, nervous and muscular system. Between NADH and O<sub>2</sub> (molecular oxygen) there is an electrochemical or redox potential difference of 1.1 volts. The chemical reactions have potential differences inferior to 0.1 volts.

External risk factors interfere with the internal electricity. Physical laws tell us: without electricity there are no chemical reactions ruling out with electron exchange. Not published data in our laboratory suggest that EMFs at a frequency of 50 Hz, and an

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intensity of 27.5 Gauss (2.75 mT) induced a decrease of the permeability of the blood brain barrier in mice. People living in an urban environment at different workplaces are exposed to complex mixtures of EMFs. For health risk assessment it is necessary to know the strength of the field, the distance from the source, duration of exposure, stage of pregnancy, age and molecular pathology of the subject.

JACEK WALCZEWSKI \*

## **ESTIMATION OF THE INPUT OF THE DISTANT EMISSION SOURCES TO THE AIR QUALITY IN CITIES**

Accordingly to the opinion of many Authors, especially those investigating the air quality in Cracow, the inflow of air pollution from outside of the city area has big contribution in the destruction of the urban air quality. The similar statesments may be found in analyses, concerning other cities, too. The investigations concerning the mechanism of inflow of pollutions from distant sources to a given area made possible to describe this mechanism, especially in relation to high emitters. The important role is played here by following factors: the stability of the lower atmosphere and the directions and speeds of winds at the level of plume. The long-range transport of emission substance has place most frequently in night conditions, when the highly stable stability of the atmosphere is demonstrated by the low (most frequently about 200m high) inversion which is cutting-off the plume from the ground level and allows the plume to travel on long distances. This process may be observed, too, on the satellite images, on which the smoke plumes are visible.

In the morning, when the convection is developing, the high-reaching mixing processes are taking down the components of plume. The effect may be observed at the ground level as the sudden, frequently very big, growth of the pollution concentrations („the morning maxima of pollution”), reaching frequently 2-3 times higher values than previous concentration level. The frequency of appearing of this mechanism depends on the frequency of upper winds (at the height level 100-300 m) at the direction: emitter-receptor.

For monitoring of these processes in continuous way it is necessary to apply the remote-sensing methods: vertical sounding Sodar (monitoring of the ground-layer stability), Doppler Sodar (monitoring of the directions and velocities of the winds, up to 300-400 m height), and satellite images (direction and length of plumes). These problems were studied by the Division for Remote Sensing of the Institute for Meteorology and Water Management in Cracow.

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## SUSTAINABLE ENERGY SYSTEMS

Sustainable development (SD) is a multifarious approach focusing on the specific feedback and balance between social, economic and environmental aspects of a given problem. With regard to the energy systems it means an energy source and type of production that is natural and fits into the environmental potential in a given region. Sustainable energy contains three main elements: is environmentally friendly, more efficient from the economic point of view and produced with consideration of the social aspect (on the basis and with help of local community). It makes energy supply and use cleaner, more productive and more secure without compromising the social, economic and environmental needs of future generations<sup>2</sup>.

Development of appropriate energy policy is a long-term challenge. It requires determination of the decision-makers and changes in legislation, technology (innovations in production patterns) but first of all – implementation of new solutions. Choice of sustainable energy systems as future variable is conditioned e.g. by environmental protection. This necessity is supported by Kyoto Protocol aiming at reducing greenhouse gas emissions. Also the conventional energy sources are not anymore advantageous from the economic point of view – prices of oil are increasing (within last 2 years twice more). Sustainable energy systems - including renewables – contribute to better energy security and independency from traditional suppliers. Additionally they are based on the resources specific for given region.

This paper will try to present strengths and opportunities of sustainable energy systems and their utilization.

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<sup>2</sup> Sustainable development has been defined in many ways. This term is vague and the precise description mainly depends on the user. In 1987, the World Commission on Environment and Development, which had been set up in 1983, published a report entitled "Our common future". The document is known as the "Brundtland Report". It developed guiding principles for sustainable development as it is generally understood. "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." [Development and International economic co-operation: environment, Report of the World Commission on Environment and Development: Our Common Future, United Nations, General Assembly, 42. session, 4 August 1987.]



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E. MIZGAŁA <sup>\*\*\*</sup>

**ETIOLOGY OF CANCER IN EPIDEMIOLOGIC STUDIES CONCERNING:  
NUTRITION, DISTURBANCES OF IMMUNOLOGIC SYSTEM, DEFICIT OF  
MICROELEMENTS AND SOME OTHER PHENOMENA SUCH AS VIRAL  
INFECTIONS.**

Environmental cancerogenesis problems, in a recently published world bibliography by Prof. S.Wiąckowski <sup>#</sup> have been analysed (in press). These problems have been observed [1] by me and my team for more than 20 yrs. The correlation between the severity of cases of breast carcinoma, some environmental parameters and percentage of deaths in the first 5 years after mastectomy were observed. Epidemiological procedures. Epidemiological studies in very polluted towns of Upper Silesia region - Piekary Śląskie, Zabrze, Poland - are continued. We gathered the dates concerning the therapeutic effects of selenite sodium on the percentage of recovered women, suffered from breast cancer (B.Lipiński<sup>##</sup>). The other part of our epidemiological studies in parts of town, Piekary Śląskie concerning the type of architecture' influence was interesting. Genetic disturbances we have indicated in UE group study (Fels L.M. and co-workers) [2].

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**THE LONG TIME PROGNOSIS FOR PSYCHO-INTELLECTUAL  
DEVELOPMENT OF CHILDREN LIVING IN DIFFERENT PARTS OF THE  
VERY POLLUTED TOWN PIEKARY ŚLĄSKIE, UPPER SILESIA DISTRICT  
OF POLAND**

The disturbed psycho-intellectual development of children living in Piekary Śląskie was underlined in the publication of Szymik E., Norska-Borówka I. [1]. In the objective statistical analysis we observed the group of 183 children. The examinations of 1000 children in the Environmental Health Out-Patient Department of Piekary Śląskie in months April-May and September-October in each year from 2005 to 2006 were made. These studies in whole town were initiated: 1) in part - where the architecture of family houses is a typical example of Upper Silesian social buildings for coalminers from 19th century, 2) in other parts of town - made in new style architecture of - "post-war Polish style". The experimental study consist of following parameters: environmental and paediatric interview, physical examination and blood lead level evaluation by spectrophotometry. Results confirmed our former findings including to the statistical analysis - some parameters, as family live conditions, place of living in different parts of the environmental polluted town Piekary Śląskie. The special problem in children living in the very polluted towns of Katowice District is the exposition to environmental lead with various consequent clinical symptoms of intoxication [2].

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MARIA MARKIEWICZ\*

**THE CONTRIBUTION TO THE METHODOLOGY OF THE EVALUATION OF HAZARDS TO HUMAN HEALTH AND THE ENVIRONMENT RELATED TO THE HEAVY GAS RELEASES TO THE ATMOSPHERE.**

Heavy gases or dense gases are those substances, which released to the atmosphere have a density greater than that of the air. Here belong the gases, which either have a molecular weight greater than that of the air or the gases, which only behave like the gases with a great molecular weight due to the storage or release conditions having a molecular weight smaller or comparable to that of the air. Among heavy gases are chlorine, cold methane, ammonia with the admixed ammonia droplets and some others. In the modern industry the use of heavy gases is growing. This can be seen as a problem because these substances may be hazardous and toxic to human health and the environment. In addition some of installations using heavy gases are located in the vicinity of residential areas in cities.

Special legislation acts are initiated in order to prevent accidents and limit their consequences for man and the environment. These acts are prepared on the international, European and national levels. In Poland the main legislation act is the Environment Protection law. According to this act special documents such as safety reports and inner and outer evacuation plans have to be prepared in the industrial plants in which the hazardous and toxic substances are produced, stored or transported in the amounts above the specific thresholds. In these documents the evaluation of the hazards to human health and the environment related to the uncontrolled heavy gas releases to the atmosphere have to be analysed. It would be useful to have in Poland the methodology describing the procedure of this evaluation. Such methodologies have been developed in US and in some European Union countries.

In this article the contribution to the methodology is presented. Some cases of industrial plants localised in the vicinity of residential areas are given.

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**PARALLEL SESSION III**  
**PERSPECTIVES OF SUSTAINABLE DEVELOPMENT**

ISABEL GALLEGO\*, LUIS RODRIGUEZ DOMINGUEZ

**ENVIRONMENTAL INFORMATION AND SUSTAINABLE DEVELOPMENT:  
AN ANALYSIS OF SPANISH FIRMS FROM DIFFERENT SECTORS**

In 1987, the World Commission on Environment of the United Nations Organization defined sustainable development as development that could satisfy current needs without endangering the capability of future generations to attend to their own needs. In light of this, it is our view that social and environmental aspects must be taken into account in order to achieve sustainable development.

Focusing on environmental aspects, this paper has a two-fold objective: on the one hand, to verify empirically how some Spanish firms that trade on the Ibex-35 present their environmental information with regard to materials, energy, water, biodiversity, emissions, effluents and waste, suppliers, products and services, compliance, transport and overall, considering that environmental aspects are indispensable factors for attaining sustainable development, and on the other hand, to see whether some of the firm in the Spanish tourism sector (not traded on the Ibex-35) present this type of information or not. Subsequent to this we shall discuss the results obtained.

To perform the empirical study we considered the influence in Spain of the Green Paper issued by the Commission of the European Communities in July 2001, the GRI framework, the Sixth Environment Action Programme of the European Community 'Environment 2010: Our future, Our choice' issued in 2001, and the White Paper for the Reform of Accounting in Spain, compiled by the Spanish Accounting Standard Setting Board (ICAC) in 2002. The study of the environmental information reflected in the sustainability report was carried out by the content analysis method.

It is important to point out that the indicators relating to biodiversity are reported on to a greater extent by firms belonging to the energy and water, transport and communications and construction sectors. The indicators relating to emissions, effluents and waste are more reported by the firms belonging to the energy and water and industries of transformation, construction and basic metals sectors. As regards the tourism sector, we have verified that to date not many firms present information on environmental aspects, but focus more on other aspects such as social and economic ones.

**KEY WORDS:** Environmental Information, Sustainability Report, Sustainable Development, Sectors of Activity, Spain.

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ISABEL M. GARCÍA-SÁNCHEZ\*, JOSÉ M. PRADO-LORENZO\*

## **ENVIRONMENTAL MANAGEMENT SYSTEMS IN EUROPEAN MUNICIPALITIES**

The aim of the paper is identify the factors which determine whether municipalities develop or not a strategy for the implementation of an Environmental Management System.

A verification of a sample of municipalities in the European Union has evidenced that organisational structure and the pressure exerted by some stakeholders impact the development of certain strategies for the implementation.. Although, to a lesser extent, the pressure exerted by interest groups and geographical location also come into play, factors such as the ideology of the municipal government or services being the predominant activity in the municipality bear no relevance.

**Key words:** Environmental Management Systems (EMS), Sustainability Development, Public Sector, Municipalities, Determinant factors.

KAZIMIERZ GÓRKA\*\*

## **THE EARMARKED FUNDS AS A BASIC ECONOMIC INSTRUMENT OF ENVIRONMENTAL POLICY IN POLAND**

Earmarked funds – collecting environmental fees and penalties – have played important and specific role in the financing of investment for environmental protection in Poland and in other Central and East European countries. Not so long ago they covered up to 40-50% of all investments in this field, at present this index in Poland is 24-25%. The Polish system of environmental funds is complicated and divided onto four levels (and four other kinds) as well as other weaknesses. But these funds have a lot of strengths owing to which they can play an essential part in the financing of some environmental programmes, especially connected with foreign assistance etc. In the article there are discussed some necessary improvements in the present system and possibilities of important changes in the future: environmental fees and funds should be replaced by taxes.

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**LISBON STRATEGY AND SUSTAINABLE DEVELOPMENT  
MYTHS AND FACTS.**

The Lisbon Strategy shows one general objective ( creation “ the most competitive and dynamic knowledge – based economy in the world ...” ) and three main dimensions<sup>3</sup> :

- economic ,
- social ,
- environmental .

In my opinion realization of two of them will be very debatable , but attempts which at the same time member countries may realize all three targets shows that authors of Lisbon strategy rather counted on a miracle Shortly speaking the economic gap ( and etc.) between UE and USA increased during last five years as a result of several reasons , but one general fact ( in my opinion ) is the most important : its impossible to widen and deepen integration of several national economies at the same time on the different levels of economic and integration stages

The Lisbon Strategy was completed by an environmental dimension to ensure the equilibrium between economic growth and ecological considerations. . To be efficient, for example,, macroeconomic policy needs structural reforms , structural reforms need mechanisms of social protection and both policies needs sustainable development. Sustainable development is much more than a purely environmental concept, because development trends are the consequence of past choices in production , technology, patterns of land use and infrastructure investments.

The Lisbon Strategy is typical example of political declaration. It is not economic long – term program, because the authors tried to mind too much dimensions .Concluding, this document can set several economic , social and environmental objectives without précising one main and it is basic reason of failure. The Commission pledges in the Report to meet the challenges of rising oil and gas prices and of cutting pollution. However , both the social dimension and the environmental component still play a secondary role in the Lisbon Strategy , which rather focuses on the “ growth and jobs” rationale .

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<sup>3</sup> - paragraph 5 of the Council Conclusions, environmental dimension add during the Gothenburg European Council in June 2001 .

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## **IDEA OF GREEN LUNGS OF POLAND IN CONTEXT OF SUSTAINABLE DEVELOPMENT**

The idea of Green Lungs of Poland (ZPP) has been created in the beginning of 1980s. It was an alternative for previous economic plans for large regions and from its the early beginning corresponded with built at this time period scenarios of eco-development.

In the paper the NE part of Poland has been characterized, as region covered by the ZPP idea, with special attention to resources, both natural and manmade. The main goals of the ZPP Programme has been analysed. Among the identified goals, connected with the rules of sustainable development, characterized are the most important, as:

1. inventory of all natural resources of the region;
2. natural resources protection by creation of the network of protected areas, mainly national parks;
3. preparation of the spatial plans for regional development;
4. increase of quality standards of the environment, focus on: surface waters, atmospheric air and soil protection, by investments and administrative-organizational actions;
5. funds rising for ZPP Programme, both from domestic and foreign sources;
6. promotion of the ZPP idea in Poland and internationally.

In the paper the development of the ZPP idea has been shown by presenting new partners joining this agreement, as: previous Ministry of the Environmental Protection, Natural Resources and Forestry, National Fund of the Environmental Protection and Water Management, Eco-Fund Foundation, and other ministries, agencies, and governmental institutions. In the best time period consists of 30 involved parties. The Programme received great support with the most spectacular recommendation given by the Parliamentary Committee for Environmental Protection, Natural Resources and Forestry. In the final part of this article authors presented scenarios of the development of the ZPP Programme and possibilities of its enlargement into an idea of Green Lungs of Europe.

In synthetic way have been presented effects of the research done by the research team of scientists working at the Department of Economics and Natural Resources Management, Faculty of Management, AGH University of Science and Technology, particularly with two leaders: Professor Anna Jankowska-Kłapkowska and Professor Rafał Pajda. Additionally has been shown the input and involvement of the Environmental Association of Environmental and Resource Economists – Polish Division in the development of the concept of ZPP as well as process of implementation rules of sustainable development at the regional and local level.

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JUSTYNA KOBYLARCZYK\*

## **SIGNIFICANCE OF CENTRAL ZONE FOR SUSTAINABLE DEVELOPMENT OF A HISTORICAL CITY, ON AN EXAMPLE OF JAROSŁAW**

The central area of the town of Jarosław can be recognised as a subject of action to promote permanent development. The distinctive character of its zone implies a number of problems of urban sustainable planning. First of all, the central zone as a representative area with its medieval market square in the historical centre requires certain protection activities. These activities not only promote individual values of the place, but also, looking ahead, support the development of tourism, which is important for the general development of Jarosław. The European Committee particularly focuses on the quality of central zones as zones properly functioning in the model sustainable cities. To implement this idea it is essential to investigate some problems. These include: the range of multiple functions together with integration of particular functions, the degree of correctness of vehicle traffic organisation, including adequate restrictions, possibility of adapting development to the local needs of the present – day function of the market square (in Jarosław there is an additional possibility of using multi – storey cellars), which function is, among other things, to redevelop human contacts and promote tourism.

In order to determine the contribution of the central zone of Jarosław in tourism development the author did a survey in cooperation with and approval of the city authorities, who took a lively interest in the project. The results were no doubt. The old town - its aesthetic looks, architectural values and history can obviously be attractive to tourists. What is important for Jarosław is not only being included in the group I of “the list of architectural monuments”, but also making available the old, buried in the olden days, cellars. The underground passages not only testify to the city’s identity; they also give it a unique character, since they cannot be found on such a scale in any other city. The history of the multi – storey underground is very rich and dates back as far as the 17<sup>th</sup> century.

Owing to the Company for Mining Works in Bytom and researchers from the University of Mining in Cracow with Prof. Feliks Zalewski as leader, who carried out the rescue operation of the underground after it had collapsed the recovered cellars were made into a tourist route. In conclusion, it seems that the historical town of Jarosław, with adequate promotion campaign, can count on development of tourism. The town also appears to meet the requirements of sustainable development by applying (to a considerable degree) the guidelines for permanent development provided by the European Committee. Unfortunately, the central zone has certain deficiencies in this area. These concern, among other things, conservation of historical monuments, including the unique houses with umbrella roofs. Such problems, however, are typical of most Polish towns and cities, regardless of their location and size. To improve the situation the good will and operation efficiency of town authorities together with different municipal departments are necessary, but also changes in legal regulations. This is what makes the problem common.

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## **EXTENT OF UNION FUNDS GAIN BY FIRMS OF HOTEL AND CATERING LINE IN WARMIA AND MAZURY VOIVODESHIP**

Extent of absorption and utilization of European Union funds will be a factor supporting bringing into line the level of Polish regions development and level of UE countries regions.

The aim of the work was to analyze the extent of union funds utilization, to assess the beneficent knowledge of the financial support sources and to indicate potential barriers accompanying micro- and small firms of hotel and catering line in subsidy gaining. The aim has been realized by determination of the main knowledge sources about UE subsidies, definition of factors making union funds difficult to be gained by beneficent, assessment of area of firm activity mostly supported by union funds and determination the influence of gained funds on improvement of the firm competitiveness.

The method of firm opinion exploration by poll sent by mail was applied. The results were analyzed using Statistica 7.0 software.

It has been showed that knowledge of union subsidies came mostly from television and newspapers. In the group of firms under the study about 22% utilized union funds in the past. Among the firms that used UE financial support the most important barriers in applying for funds were law and financial matters. The firms not applying for financial support stressed also that lack of idea how to use the money was a barrier in their activity.

Most frequently funds obtained from European Union funds were utilized in turn to: broaden firm product or service offer, firm foundation, next – creation of new working places. No firm stated that received subsidy did not improved its competitiveness on the market.

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**NEW CHANCES OF ECOTOURISM AND EDUCATIONAL TOURISM IN  
NEIGHBOURING MOUNTAIN REGIONS OF POLAND, GERMANY, CZECH  
REPUBLIC AND SLOVAKIA**

The political, economical and ecological changes which started in Central Europe in 1989, as well as changes of service markets and the globalisation challenges unforced radical change of the traditional model of tourism as being formed here from the end of 19th century and next, under the new conditions, after the 1945. Towards the state care of environment and tourist industry became being very limited, the competition and ecological needs as well as safety restrictions being stronger, there is no more much place for the traditional mountain mass tourism being organized, as a rule, on the non-profit basis, and rather unspecialized. The traditional tourism as well as the old economy in mountain regions (mining, metal industry, fabric industry, robbery exploitation of the wood etc.) ignored ecology and, in many cases, health and education needs of different social groups; there was also little of holistic thinking about the tourism, ecology, economy and the social system. There was also much pressure for making generally accessible almost all interesting spots (caves, mountain lakes, nature reservations etc.), causing much environmental damages by little of real advantages for the mass tourists .

In the new political and economical reality the tourism must be: 1/ not more based on mass tourist enterprises like the of Lenin's name (more then 10.000 people at one spot), 2/ decentralized and applying various projects oriented on history, literature, architecture, religions, ethnography, technology (historical mines, factories etc), biosphere, ecology, health care and many others, 3/ conducting the complex regional and multiregional education of the youth jointly with the international integration and growth of understanding of European identity of the local population and of the guests, 4/ enabling guests to enjoy many sports and sound entertainments (countryside skiing , climbing, mountain biking, canoeing, thermal baths etc.) as well as familiarity with regional folk culture events (e.g. folk music concerts, beginnings of shepherd seasons), 5/ mainly commercially based and creating as many jobs as possible, also by developing the production of regional and ecological foods, agrotourist farms etc. 6/ changing the natural, macro-economical and social structure of post-industrial regions with lots of unemployment (stone-coal and brown-coal belts in border triangle Poland-Germany-Czech Rep.), by giving a contribution to the ecological and historical reconstruction of the whole border mountain area.

From 1989 a big progress was already made in area of envelopment of heavy industry damaging the environment, especially in Sudetians, privatization of areas and buildings (e.g. the historical castles starting to be used commercially), development of international cooperation in framework of the UE; also the small businesses in tourism

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and health care (e.g. by using the former uranium mine near Kowary in Sudetians) was remarkably developed. Unfortunately, much must be still done in area of legislation and administration significantly influencing the environmentalist and tourist activity, e.g. decision making of local authorities concerning the National Parks (e.g. the rope rail at Kasprowy Wierch). Also the common investments e.g. Poland and Slovakia in area of transport under the Tatra mountains, Poland and Czech Rep. in area of infrastructure around the “rocky towns” etc. should be based on more complex international projects, e.g. the Euroregions. Some particular examples, the positive as well as negative ones, and some particular proposals based on the authors’ practical experience will be given in the presentation.

## SUSTAINABLE DEVELOPMENT OF URBAN DRAINAGE SYSTEMS

Conventional practice for stormwater management, concentrating runoff and carrying it off a site as quickly as possible through storm sewers, causes various environmental problems, including erosion and downstream flooding, pollution loading of surface waters, and reduced groundwater recharge. Rising frequency of the flood, causing serious damage to property, required the immediate improving of the channels, their renovation or replacement.

Sustainable development of stormwater management involves a combination of strategies to reduce the amount of runoff generated and to reduce the amount of pollutants that contains the runoffs. Generally, the most important management strategy for stormwater is to: a) provide for infiltration into the ground as close as possible to where the precipitation falls b) control the flow rate through the sewer network. The example of the sustainable approach to development of urban stormwater systems is the concept of Water Sensitive Urban Drainage (WSUD) that grew out of a recognition of the linkages in the water cycle between urban development, stormwater systems and the quality of downstream ecosystems. The application of WSUD planning and management principles involves incorporating water resource issues early in the land use planning process. It addresses water resource management at the catchments, suburban, precinct, cluster and allotment scale. WSUD makes the entire stormwater treatment network part of the urban fabric via multiple use corridors and best management practice (BMP) treatment trains. Vegetated swales, filter strips, extended detention basins and constructed wetlands are all part of fully functioning stormwater treatment systems. It maximises infiltration and on-site storage, treatment and reuse and utilises natural runoff channels where appropriate. The paper presents an overview of the successful implementation of the sustainable drainage system in the Augustusborg (in Malmoe). The primary purpose of the stormwater system in Augustusborg is to detain and reduce the peak flows of the stormwater runoff from the area. Choosing an open system in which the water is visible has also added a positive aesthetic and ecological contribution to the community. The goal is for 70% of all rainwater in Augustusborg to be directed away or detained in the new storm water system. Water from roofs and other impervious surfaces is collected in gutters and channelled on through canals, ditches, ponds and wetlands before finally draining into a traditional stormwater system. The other way, often underestimated, to reduce amount of runoff is rainwater harvesting and reuse by households, public utilities and by enterprises - this practice can save up to 50% of average daily tap water consumption. The paper presents potential benefits of rainwater harvesting in Poland.

The flow through the underground part of the drainage systems can be also effectively monitored and controlled. Due to problems with precise determining the probability and intensity of critical storm, some part of the sewage systems has a significant reserve in hydraulic capacity while the other parts becomes surcharged. Control flow through the rational throttling of the channels with spare capacity often

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allows to avoid expensive modernization of the surcharged channels. If the source control and channel storage are not enough to prevent floods, the detention structures are necessary to be built at one or several points of the sewer system. There is a lot of technical solutions that allows to construct the detention facilities for different preconditions but the on-line detention tanks, constructed in series with the sewer network, are particularly useful on dense urbanized areas. Some constructions of an on-line detention tanks, makes possible to reduce the required storage capacity – to even 60% - in comparison with traditional constructions. The most advanced part of the sustainable drainage system for urban areas, to fully achieve benefits of stormwater management, the crucial thing is to put into practice the real time control (RTC) systems. The real-time integration of each of the elements (sewer network, wastewater treatment plant and receiving water) coupled with their deterministic models makes possible to optimize the use of capital and maintenance expenditures as well as minimizing the impact of sewage and drainage systems on the environment.

WŁODZIMIERZ WÓJCIK\*

### **SELECTED INDICATORS OF SUSTAINABILITY**

One of the main problems in decision-making process is quantification of sustainability. For example comparison of the optional solution requires some tools for evaluation which project or product is more sustainable. The paper will discuss several indicators used in evaluation of sustainability. Particular focus will be on energy analysis theory based on so-called energy memory. The foundation of the concepts, advantages and disadvantages as well as an example of application will be discussed.

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**REFERENCE CONDITIONS ACCORDING TO WATER FRAMEWORK  
DIRECTIVE 2000/60/WE THE BASE FOR ECOLOGICAL VALUATION OF  
RIVER VALLEYS FOR THE MANAGEMENT OF TOURIST POLICY**

The Framework Water Directive [FWD, 2000] makes the framework for the EU activities in terms of water policy, and it introduces in the member states the duty to plan and control water management within river basins. The main purpose of FWD is to achieve (by 2015) a good ecological state in all the defined water categories (rivers, lakes, transition water, coastal water and underground water). In the following years a good state of waters should be achieved in the areas where present natural, technical and economic conditions make it impossible to achieve in the first stage.

The basic problem that is to be solved in river valleys of great natural values is a sustainable balance between different functions the area is to fulfil, both on national, regional and local point of view. In case of particular natural values landscape-planners and decision makers usually face a dilemma: „**to protect or to make available ??**” and if to protect – then **how and to which extent**.

Natural resources of river values and river catchments – a high level of biodiversity, unique landscape values, abiotic resources, cultural values and clean water demand full or partial protection and they can be used in a sustainable way. On the other hand one should remember on the preferences of local communities. Jobs, economical efficiency of farms and small business, proper working conditions, sufficient network of roads and communication network, flood protection and providing sufficient amount of water for drinking and household – these objectives are often hard to comply with the protection of national and regional natural values.

One of the promoted and worldwide implemented ways of the sustainable development of river valleys is tourism and recreation. Attractive situation and proper natural and landscape conditions often make a concrete base for the development of these areas. For local communities, widely understood tourism and recreation make a dynamic and profitable area of services that not only gives job on its own, but also is a stimulator for the development of agriculture, small industry and work-craft, trade, building industry, transport, etc.

It should however be emphasised that an uncontrolled and exclusively commercial development of tourism can be dangerous for natural values of river valleys and water ecosystems. Thus the assessment of the possibilities of the development of tourism in the areas of river catchments should assume sustainable development.

In a planistic work over a sustainable development of river valleys and catchments one of the biggest tasks is **ecological valuation** of such difficult to quantify values as biodiversity, natural and cultural landscape and cleanness and aesthetic values of natural environment. In solving this task a very efficient and practical tool includes

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**REFERENCE CONDITIONS** made according to Framework Water Directive (in terms of quality).

Reference conditions make a reference point, according to which „*the health*” of an ecosystem of a given type of waters is assessed. The main purpose to determine reference conditions is to define a pattern of a very good ecologic state for different types of surface waters.

At the same time FWD obliges to monitor biological, hydromorphological and physico-chemical elements of the quality of all the categories of surface waters.

The determined reference conditions and current assessment of ecological state will help in ecological valuation and consequently in choosing a strategy (within SWOT analysis) of the sustainable development of river values. Simultaneously the quantification of natural- and landscape values of rivers and the assessment of the occurring pressures and threats will allow shaping a proper tourist and recreation policy.

ALEKSANDRA WAGNER\*

**THE ROLE OF WATER RESERVOIRS IN HISTORICAL CITIES – THE  
POSSIBILITIES OF ECO-TOURISM – CASE STUDY IN THE CRACOW  
REGION**

The paper presents the role of water reservoirs in historical cities such as Cracow and the neighbouring area - the town of Niepołomice and the villages of Staniątki and Dobczyce. All these localities are interesting because of historical monuments. The best known is Cracow city, however there are also cultural monuments in Niepołomice (the Royal Castle), Staniątki (the Benedictine Convent) and Dobczyce (the ruins of a castle). In all these places there are water bodies, which increase the attractiveness of the area by improving the landscape and increasing the biodiversity of the area, which can make these places interesting for ecotourists. Especially interesting from environmental point of view are different bird species. The need for the protection of birds was expressed in the programme Nature 2000 as well in the European Bird Directive.

The water bodies include the Vistula River situated below the Wawel Hill with the Royal Castle and Cathedral. The River makes the area attractive for waterfowl, especially in winter. There are also other water bodies situated near the city centre, among which the most important are the pond in Dąbie made after the exploitation of clay (the only in Cracow site of the yellow water lily (*Nuphar luteum*) and the ponds in Płaszów (Staw Płaszowski and Bagry) made after the exploitation of gravel.

The pond in Niepołomice is situated near the Royal Castle. It used to be an anti-fire water reservoir, but nowadays it has mainly decorative character. A few years ago the banks of the pond were fortified with wicker. The pond in the neighbouring Staniątki village used to be a fish pond and nowadays it is rather decorative. The pond has been diminished over the last 10 years. Due to the dense vegetation of reed mace it is a nesting place for moorhen (*Galinula chloropus*).

The Dobczyce castle is situated over the Raba River and in that place the dam was built making the water reservoir for Cracow. The reservoir is also a foraging place for many bird species.

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## PLENARY SESSION (CLOSING)

K. OCHNIK \*, A. STASCH \*\*\*

### APPLICATION OF RESONANT ABSORPTION OF RADIATION ENERGY TO THE PROTECTION OF ENVIRONMENT

The presented project should advance the understanding of the processes of resonant interaction of any kind of radiation and biologic systems. The general model of the resonant absorption of energy will be constructed by systematically exploring the region with following radiation sources: electromagnetic (from lowest "power-line" frequency over: waves absorbed in NMR, EPR, laser, free electron lasers (FEL), to  $\gamma$  and X rays), acoustic (from infra up to hyperultrasound), corpuscular radiation (e.g. electron or neutron beams etc.). Most of the waves mentioned above are recently produced with power and tunability capabilities not previously available. The project follows a streamline of increasing complexity from bio-molecules over cells (e.g. membranes, chromosomal and DNA integrity) to human species. It is shown that present, rapidly increasing number of applications necessitate preventive as well as reactive research to assess risk of potential damage of ecosystem (including biological activity, both functional and morphological). The developing and promotion of following, environmentally friendly, technologies has been discussed in some details:

1. resonant absorption based technologies like Sterile Insect Technique (SIT). The SIT helped to farm the most fertile parts of Africa by eliminating the tsetse fly causing the sleeping sickness disease. The economic effects of SIT are estimated by FAO at US\$ 10 billion per year.
2. "insect killing sound weapons" - **a new hope also in the fight against the anopheles mosquito.** Anopheles mosquito, the deadliest creature on earth is SIT resistant, responsible for more than 300 million cases of malaria and causes three million deaths each year. **It should be noted that** resonant frequency depends on the individual parameters of the biologic system (or subsystem) and can be used to selective killing one **concrete insect type, only**. Our calculations shown that the resonant frequencies, which can destroy (rupture) internal organs of mosquitoes are lying between 2000Hz and 8,000Hz. i.e. in the range of human auditory. These surprising results explain why tests on devices, using ultrasound frequency show that they don't kill or repel mosquitoes. For more precise calculating of deadly resonant frequencies are necessary the measurements of the dynamical (elastic), electric and magnetic parameters of each body parts of insect (head, thorax, and abdomen). It should be noted that in the case of mosquitoes the estimated frequencies of same thousand Hz correspond just to resonant frequencies of infrasounds destroying the internal organs of human body: (0.5 – 4Hz), (4Hz – 7Hz), (7Hz – 12Hz), and (13Hz – 30Hz). A worldwide application of resonant absorption of radiation in the fight against insects can considerably reduce the environmental costs of pesticides estimated at US \$120 billion per year.

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3. the preparation of resonant absorption based cancer treatment like photodynamic therapy (PDT). PDT is a double resonant, two-step procedure that is done on an outpatient basis. After an injection **with a resonant absorption of light-activated drug**, which targets cancerous cells, a laser light is directed onto tumor cells.
4. the phenomena in the existing gap of knowledge regarding the effects of Terahertz (THz) radiation on biological systems, which covers the frequency range between 100 GHz and 20 THz (i.e. a wavelength between 3 mm and 15  $\mu\text{m}$ . THZ biological applications should be based on the specific spectroscopic fingerprints of biological matter in the far infrared (FIR) and THz spectral regions, due to the high density of electronic, vibrational and rotational states. However, very little is known of the effects of THz radiation in biological systems.

W. BOCHYŃSKI\* , A. STASCH\*\*

### MANAGEMENT OF RESEARCH AND DEVELOPMENT OF RENEWABLE SOLAR ENERGY TECHNOLOGIES

The Kyoto Agreement saw the international community of states, including the European Union, undertake to reduce greenhouse gas emissions by 8 per cent by 2008-2012 compared with 1990 levels, and in part with 1995 levels. With a reduction objective of 21%, Germany has taken responsibility for the largest proportion of the EU obligation to reduce levels of environmental pollution.

But “It is impossible to solve a problem with the same methods that caused this problem” (Albert Einstein). It was the reason, why the Parliament of FRG support the research, development and applications of the new technologies connected with the generating of electricity from:

- photovoltaic systems
- wind power
- hydroenergy
- biomass between
- geothermal power

For the same reason the German Act on Granting Priority to Renewable Energy Sources (Renewable Energy Sources Act - EEG) provides early-stage funding and enterprise development activities to entrepreneurs, helping build successful businesses that supply renewable solar energy technologies and services. The support includes securing investment financing, training and hands-on business development assistance. Generally the EEG Act deals with the purchase of, and the compensation to be paid for, electricity generated exclusively from hydrodynamic power, wind energy, solar radiation energy, geothermal energy, gas from sanitary landfills, sewage treatment plants, mines, or biomass. According to the Act, Compensation Rates to be Paid for Electricity Generated from

- photovoltaic systems with min. 48,1 Eurocent/kWh

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- Wind power between 6,19 Eurocent and 9,10 Eurocent/kWh
- Hydroelectricity min. 7,76 Eurocent/kWh
- Electricity from biomass between 8,70 Eurocent and 10,23 Eurocent/kWh
- Geothermal power between 7,16 Eurocent und 8,95 Eurocent/kWh

(Another very promising applications of solar energy are : thermal utilisation of sunlight and solar thermal cooling, whereby the heat generated by solar collectors is used to power absorption or adsorption cooling machines. In its “White Paper on Renewable Energy” of 1997, the European Union envisaged a total installed area of 100 km<sup>2</sup> in Europe by the year 2010. German companies are working hard to provide attractive and innovative products and to ensure that this target will be met.

In 2004, the European Commission initiated also the Green Building Programme (GBP). This programme aims at improving the energy efficiency and expanding the integration of renewable energies in non-residential buildings on a voluntary basis. The programme addresses owners of non-residential buildings to realise cost-effective measures, which enhance the energy efficiency of their buildings in one or more technical disciplines. The German government supports all activities connected with the expansion of solar thermal energy use with 5 billion € early with various promotion programmes. Investors receive grants and low-interest loans for small systems, while the installation of large solar thermal systems for local heat supply is supported by a pilot and demonstration programme.

ELMAR A. STUHLER\*

## TEACHING AND LEARNING ABOUT SUSTAINABLE LIFE THROUGH CASE RESEARCH

We focus on the development of Sustainable Life at local and regional levels. Dealing with environmental and other problems related to the survival of our planet needs rather preventive than reactive strategies. How can we enhance our ability to solve environmental and socio-economic problems through teaching and learning at all levels, which address specific regional and local conditions? How can we attain our goal without public financial and administrative support?

Johann Heinrich von Thünen (born 1783) was a thinker of the Classical School. In thinking about the future development of cities and protected areas an approach similar to that of Thünen could be adopted with focus on improving the conditions for regional and local Sustainable Life. Drawing upon his model of “Der isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie” (The isolated state in relation to agriculture and economy) I choose the city of Augsburg and its surroundings as the base of further consideration.

Augsburg is a city with about 260 000 inhabitants. Greater Augsburg has some 500 000 inhabitants. The hinterland is still mainly used for agriculture and forestry. A relatively large nature reserve, “Naturpark Augsburg - Westliche Wälder” of nearly 117,500 hectares, including many villages and some towns is situated west of the city. One of the most attractive resorts of recreation is the Abbey of Oberschönenfeld, with its 100 hectares of land (50 ha are under bio-farming). It is situated 20 km west of Augsburg.

One of the important questions related to this background is how people think, plan, decide and act towards sustainable life and how teaching and learning should be geared to the new and evolving needs of managing a city and its adjacent areas with agricultural, recreational and other cultural functions. How can we enhance the human capacity to handle the problems involved, which result from tensions and diverse environmental and economic compulsions and policy making at various levels? Case based teaching and learning linked to the concept of the “Dutch Natuurschool” (Nature School), which can be operated without any government subsidies, could be an approach worth testing in the scenario of Augsburg and its surroundings as well as other locations.

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## POSTERS

NEDAL ALBEJ\*

### **MONITORING OF POLLUTION IN THE ATMOSPHERE BY MOTOR VEHICLE EXHAUST IN TERRITORIES WITH OBJECTS OF HISTORICAL VALUE**

In relation to long term interdisciplinary studies initiated by Prof. J. W. Dobrowolski on the influence of traffic output on the World Culture Heritage in Krakow I carried out comparative investigation in relation to exposure of selected old buildings in Krakow (Poland) and Damascus (Syria), using Japanese-Polish Amaya-Krochmal samplers.

The problem is devoted to the perfection of the monitoring of pollution of the atmosphere by harmful gases in areas with historical monuments and actions on their protection against influence of environmental contaminations. Processes of destruction of monuments the under influence of sulfur dioxides and nitrogen contained in the atmosphere are analyzed. The control of their contents near monuments by the modified technique, which is based on sampling of harmful gases from the atmosphere by the absorbing sampler, is proved. The essential divergence of the contents of sulfur dioxide and nitrogen in the atmosphere near monuments in working days and the days-off established at rates of growth, which is correlated with annual rates of growth of the number of vehicles. Regarding ecological trouble, it is designed measure criterion for the early notification in both size, and relative frequency of excess harmful gas concentration above the level of average (or maximum) concentration limit. Actions for the reduction of harmful emissions of motor vehicles, improvement of the ecological situation of cities, and the restoration of the surface of historical monuments are systematized. Round-the-clock, two-level monitoring of gaseous conditions of the atmosphere is recommended on the basis of the offered technique and criteria.

Key words: pollution of an atmosphere, motor transport emissions, control of the contents of sulfur dioxides and nitrogen, destruction of monuments materials.

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**BENECON PROJECT FOR THE TERRITORY OF CILENTO (ITALY) AS  
MODEL FOR SUSTAINABLE DEVELOPMENT AND SYNTHESIS AMONG  
CULTURAL HERITAGE AND NATURAL PECULIARITIES**

The context of our research is in the topics of Benecon, a Centre of Competence dealing with the sustainable development (also through sustainable tourism) of Cilento, an inner area of Campania (Italy) as protected area in which we have the main priority of protection not only of natural biodiversity but also of cultural biodiversity that is the heritage of local historical centres, handcraft, folklore, gastronomy and historical traditions. In the field of the general debate about the limits of the development, the awareness that the tourist development is not unlimited is more and more disseminated.

First of all, this is because the policies individuating the tourism as a strategy for the development help interventions offering economic immediate advantages, and often represent a quantitative promotion and not a global and long term emphasis of the territory, and also represent a wild exploitation of environmental resources and not their safety and protection. On the long term, the consequences of these choices are more and more dangerous and sometimes tragic also from an economic point of view: it's well recognized that environmental assets, either natural than cultural are not reproducible resources, destined to finish if consumed and excessively exploited. On the other hand, tourism is a social phenomena in a continue evolution: the needs and the hopes of the tourists, the quality of the supply, the relationship with a more wide economic and cultural context change. Considering all this we present integrated strategies for the territory of Cilento to become it unique and different from other areas of the Campania. In this way the tourism as a social and economic field makes a system, with environment, exalting the territory as an economic value, but also considering the sustainable development, supporting above all the quality of life, and assumes a main role for the rural societies as the Cilento societies in which there are country sides with a low density of populations and with a strong rural tradition and vocation. Tourism, in this innovative concept of environmental protection, could generate possibility of employment for young people, keep in seat the residents, either in the areas with consolidated tourist vocation than in the inner marginal areas, where new possibilities of employment are possible. Furthermore, the consolidation of a real tourist development, could bring the seasonal flow of population at the margins of southern regions, representing an opportunity of economic global development for the whole Southern Italy.

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Always more and more today, in function of the sustainable development of a region, we speak of a development through territorial systems. By this term we indicate a new modality of territory management by a system approach that is an integrated approach that finds in the naturalistic and cultural landscape peculiarities the key of development of territory, in function of the environmental compatibility. This is the main goal for Cilento: the increase of strategies to boost the value of hinterland areas to stop the uncontrolled development to favourite competitiveness, an integrated and systemic valorisation of tourist supply and a marketing point of view linked to quality of tourist services and satisfaction of tourists to joint satisfaction of conservation and valorisation of natural and cultural heritage purposes and social – economical development also trough the experience of Benecon.

EUGENIA ALOJ, NINO GUARINO, MARIAGRAZIA DE CASTRO,  
ANNA ZOLLO

### **THE PHENOMENON OF *TRANSUMANZA*<sup>4</sup>: FROM A HISTORICAL PHENOMENON TO OPPORTUNITY FOR NEW TOURISM.**

*Transumanza* is the periodic transferring of flock from a point to an other of territory, in wide areas of Italian Apennines. Since prehistoric time to recent years it has been an important role in regional economy in terms of revenue and employment. The transferring of flocks, in fact, has been required also transferring of employers, business along well defined routes defined *tratturi*. Along these routes, different villages have been developed and the tracks of routes and villages are well visible in many parts of territory as signs on the landscape.

The phenomenon is full of either material than immaterial components as we can speak about *tratturi network*.

The historical and cultural heritage linked to this phenomenon has to be known and re – evaluated for promotion of territory from the point of view of sustainability and for fruition by eco – tourists . The knowledge of the *transumanza* means knowledge of all territorial elements: nature, culture, typical food to think of, in a proposal way of territory, to a quality agriculture and to new tools of eco tourism such as *horse – tourism*.

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<sup>4</sup> Periodic transferring of flock from a point to an other of territory.

EUGENIA ALOJ, NINO GUARINO, MARIAGRAZIA DE CASTRO,  
ANNA ZOLLO

**CAUDINA VALLEY (ITALY) A MODEL OF *CITIES NETWORK* BETWEEN  
HISTORICAL HERITAGE AND POSSIBLE OPPORTUNITY OF  
SUSTAINABLE TOURISM**

Caudina Valley is in Campania region a barycentre point among the areas of the towns of Benevento, Avellino and Caserta. Since ancient time it has been a lake basin filled by the rains from Partenio, Taburno mountains. Nowadays some municipalities of valley are protected in regional parks and the area is plain, fertile and rich.

In fact all area is full of historical visible prints as witness of different and ancient cultures and full of historical and archaeological rich traces such as the ancient Sannio cities as *Saticula* (the modern *Sant'Agata de' Goti*) and *Caudium* (the modern *Montesarchio*), the archaeological traces of Roman *Cocceio villa*, medieval urban systems with castles, churches, convents, palaces and so on.

If history confirms the identity of Caudina Valley, the network of its identities produces the necessary local knowledge. The systemic transmission of the value in all genetic heritage of *Caudina Valley* allows the growth of dynamics that represent the exact knowledge of the same identity.

The historical root could represent the capacity to link past with present by exalting the below *cities of network* and considering it not only as cultural heritage but also as tool for competitiveness of territory.

Strategies of bottom up development requires a recovery of historical heritage for all the interested local municipalities as system of cities to become competitive the same territory managed in an integrated territorial marketing point of view.

In this point of view of high innovation, historical heritage and knowledge economy find in sustainable tourism an opportunity:

To protect cultural heritage  
To link the different municipalities in a cities network  
To find new business opportunities



## **THE INITIATIVE CARRIED OUT FOR THE PURPOSE OF SAVING THE CULTURAL HERITAGE OF CARPATHIAN FOOTHILLS AROUND BRZESK**

The Polish Carpathian Mts. feature great variations in the land use being closely linked with the land relief diversification and the history of settlement. Centuries of harmonious existence of villages and towns in the diverse Carpathian geographical regions contrast harshly with the adverse landscape transformation the area experienced during the last fifty years, as a result of rapid settlement expansion. During the last fifty years, landscape suffered adverse changes as a result of chaotic settlement processes. Towns were developed rapidly, many surrounding villages were turned into suburbs. There also took place processes of rural infrastructure thickening, emerging of numerous hamlets, creating tourist settlements like service, technical, traffic facilities etc., as well as detached summer cottages. What should be done to protect the Carpathian landscape? The essence of lasting natural a cultural heritage depends on three factors: our knowledge, skills and attitude. Therefore, there is a need for more promotion of the knowledge on settlement adjustment to environment.

The article presents the experience, the course and the effects of the initiative carried out for the purpose of saving the environment and the cultural heritage of Carpathian Foothills around Brzesk. The undertaking was organised by the Jagiellonian University, the Kraków School of Technology, and the Centre of Agricultural Advising in Małopolska and it was of cognitive nature as far as regional and ecological education is concerned. The whole course comprised of: 1. Exhibition under the title 'Polish Landscape in the Drawings of the Students of Architecture Department of Kraków School of Technology'; 2. The contest 'House Surrounded by Garden' addressed to the inhabitants of Brzesk area who find it precious and essential that the house's surroundings recall tradition; 3. Conference putting forward a set of interesting solutions as far as architecture and organisation of the space around the house are concerned; it also presents environmental and cultural qualities of the Carpathian landscape together with both causes and effects of adverse landscape transformations. The article presents how to activate co-inhabitants around common undertakings for the purpose of transferring cultural heritage. The article mentions how to revive tradition and the roots, that is, how to recall characteristic elements of the area (materials and plants which had created former houses and their surroundings) by means of building new houses and establishing gardens around them.

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**GESTA ENVIRONMENTAL MANAGEMENT GROUP INTER-DEPARTMENT  
CENTRE FOR THE ENVIRONMENTAL RESEARCH - UNIVERSITY OF  
BOLOGNA**

The group works in the framework of an interdisciplinary department and in cooperation with Laboratorio AISA on a wide spectrum of concepts, applications, tools in order to achieve a better environmental performance and an environmental sound communication.

Concepts – Applications – Tools

**EMS – Environmental Management Systems.** The **concepts** have been investigated and developed distilling experience from public authorities EMS applications and working on the concept of the environmental significance. The concepts have been **applied** in order to support EMAS-II<sup>5</sup> implementation in the Municipality of Faenza, of the rural town councils of Brisighella, Casola Valsenio, Riolo Terme (Ravenna province) and in the marine protected area (MAP) of Tor Paterno (Rome province) – Italy. The **tools**: EMAS procedures and EMS rules, esp. environmental aspects significance identification and ranking rules.

**ERA - environmental reporting and analysis.** **Concepts** cover indicators theory and systems, reporting projects, applying also the GRI (green reporting initiative) and European recommendations. The **applications** have been addressed to the mentioned public authorities (Faenza, Brisighella, Casola Valsenio, Riolo Terme Tor Paterno) and to the basin of river Lamone in the framework of the project Espace rivière Europe – ERE (INTERREG IIIC programme). Products are environmental analysis and reports.

**EC – environmental communication.** Agenda 21, environmental communication and participation, right of access to environmental information<sup>6</sup> are the **concepts** and the frameworks called in cause. The main **application** in this field is the environmental education project of the “dashboard of the sustainability” funded by the Regione Emilia Romagna. The project will allow the Faenza population to be aware of the environmental conditions and to interact in the environmental management. The **tool** is a specific software.

**EIS - environmental information systems** have been coupled with EMS and ERA.

Data base management system (DBMS) has been **applied** to the Municipalities of Faenza, Brisighella, Casola Valsenio, Riolo Terme (Ravenna province). Products and tools are:

DBMS - EMAS documents

DBMS – EMAS legal compliance

DBMS – environmental aspects

DBMS applied for the regional environmental project “Dashboard of the sustainability”

DBMS – GRI

DB of the data of the Lamone river basin, project– ERE (INTERREG IIIC programme).

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<sup>5</sup> Regulation (EC) No 761/2001 of the European parliament and of the council of 19 March 2001.

<sup>6</sup> Directive 2003/4/EC

GRZEGORZ DĄBROWSKI\*, PATRYCJA OGRODNIK\*\*  
MARIA ZIELIŃSKA\*\*\*

**ACTIVITIES OF THE GRAMINEX COMPANY – RESEARCH DEVELOPING  
STUDIES ON THE LASER STIMULATION OF RAPE (*BRASSICA NAPUS*)  
AND FLAX (*LINUM USITATISSIMUM*) SEEDS**

The company Graminex - Nasiona has been co-operating with the Faculty of Mining Surveying and Environmental Engineering, Chair of Environmental Biotechnology and Ecology, AGH-UST in Krakow for 3 years.

The Graminex is a producer of the blends of seeds of grasses for lawns and different blends of grasses and pod-plants (*Leguminosae*) for meadows and grasslands. We are proud of the introduction into market new varieties of grasses from our own cultures. The company also deals with seeds of crops sold on national and international scale. A particular role is played by rape seeds (*Brassica napus*)

Winter rape (*Brassica napus*) is a plant of cabbage family (*Brassicaceae*), which take the first place in Poland in terms of the surface of oil crops plantations. Winter rape is used in the production of plant oils (for consumption and technical purposes), protein-containing animal feed and biofuel. In the production of winter rape a seed time is important, because it influences the growth and proper shape of plants and consequently their survival during winter. Sowing between 15<sup>th</sup> and 25<sup>th</sup> August give the best results and later sowing result in the harvest reduction and freezing in the plantation.

Together with the Chair of Environmental Biotechnology and Ecology, AGH-UST in Krakow we carried out the study of the influence of laser biostimulation on the energy and power of the germination of winter rape seeds (*Brassica napus*). The task, carried out by Professor Jan W. Dobrowolski and his team together with the representatives of Graminex, was to investigate to which degree laser biostimulation would improve the power and energy of the winter rape seeds and, consequently increase the resistance of seedlings to drought.

Following initiated by Prof. Dobrowolski application of laser photostimulation of plants for better adaptation of irradiated material to suboptimal conditions of the environment, we applied red and green light emitted laser diodes for irradiation of seeds of rape. Irradiation with green light improve growth rate and amount of chlorophyll in young plants cultivated in soil contaminated with cadmium versus control plants under laboratory conditions. The purpose of the experiment was to check if the biostimulation would increase the growth of plants in case of significant delay in seed time, which would increase the chances for winter.

In the carried out field experiments the seed material of winter rape was irradiated with laser for biostimulation (LB) three times for a second and the control, not biostimulated sample. Both sets were sown on 10<sup>th</sup> September 2005 into dry sandy soil of the bonitation class V during unfavourable atmospheric condition – prolonged drought .

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The observations show that:

1. The seeds irradiated with LB laser 3x1 are characterised with higher germination energy compared to the control sample. On the 11<sup>th</sup> day of the experiment the number of plants grown from the irradiated sample was by 344% higher than in the control.
2. The stimulation of the seeds of winter rape with LB laser 3x1 makes the seeds germinate even in unfavourable conditions. The biostimulation process caused that germination power (60 day of experiment) was 121% greater than the control.

The amount of cadmium decreased in result of short irradiation. Among control and experimental plants cultivated in uncontaminated soil no differences have been found. This stimulation increased also resistance of young plants to applied fungicide. Comparative study about the influence of laser irradiation of flax (*Linum usitatissimum*) seeds on resistance of young plants to cadmium in soil are carried out at Plant Physiology Laboratory of University of Agriculture in Fitotron in Krakow in scientific cooperation with prof.F.Gambus and J.Wieczorek. The most effective was stimulation of flax seeds also with laser diode emitting green light. Irradiated plants were much more resistant to side effects of fungicide than control one.

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TADEUSZ TUMIDAJSKI<sup>\*\*\*</sup>

## **APPLICATIONS OF DUST AND GAS AIR POLLUTANTS SPREADING STOCHASTIC MODELS**

The gas and dust air pollutants are serious problem of industrial and highly urbanized regions. Their big concentrations influence both the inhabitants health and buildings conditions (including monuments). Apart from continuous reduction of pollution emission, by application of modern production technologies and reduction of traffic in selected areas, also the correct pollution monitoring is very important, which allows predicting certain type pollution concentration in selected day.

The pollutants concentrations are representative for certain area, not for measuring point. Although they are changeable in time, they are being analysed usually in 24h scale and they should be interpreted in this way. Many factors influence directly on pollution level. These are, i.e. meteorological conditions (wind velocity and direction, temperature, humidity), landscape, mixing layers, alluviation direction from neighbour areas etc. All of these factors may be included by application of so-called stochastic (statistical) modelling. Authors showed several ways of modelling based on phenomenological description of phenomena (statistical data), supported also by heuristic elements in model form selection. The following model types should be listed:

- regressive models;
- adaptive models;
- non-linear modelling (including neural networks).

Correct concentration prediction allows both the warning system of over-subscribed pollution standards in certain area start-up, as well the prevention, concerned, for example, investment location – e.g. construction of industrial plant in certain area. However, to obtain the satisfying results, it is necessary to locate monitoring stations in correct spots, which can supply reliable data of individual sorts of pollutants concentrations.

Key words: air pollution, concentrations, stochastic modelling, monitoring

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## **CADMIUM AND LEAD CONCENTRATIONS IN VARIOUS BODY PARTS OF WILD ANIMALS IN THE MALOPOLSKA REGION**

Due to geological and anthropological conditions, the Malopolskie and Śląskie provinces belong among the most heavy metal polluted regions in Poland. About 7.2% of soils in Malopolska has been classified as apparently polluted with cadmium and 4% as polluted with lead. Elevated content of these metals has been registered in the 38 and 47% of arable lands in the Malopolska region.

The present work had two objectives: 1) an attempt at determining cadmium and lead accumulation in different body parts of deer, hares and foxes killed in the Malopolskie Province area and 2) an assessment of spatial distribution of the studied metals in kidneys of hares in Malopolska, depending on the level of soil heavy metal contamination.

The first objective was realized on the basis of analysis of various organs and tissues from 11 deer, 27 hares and 17 foxes, whereas kidneys from 208 hares killed in different places of Malopolska provided the research material for the second objective. The analysed materials were mineralised in the mixture of concentrated nitric and perchloric acids and cadmium and lead content were assessed by atomic absorption spectrophotometer.

Definitely the largest amounts of cadmium accumulated in the kidneys and then in livers of the analysed animals, which was most evident in deer and hares. The other organs and tissues contained many times lower amounts of this metal. Distribution of lead in different parts of the animal bodies assessed in the investigations was more unified. Apparently greater accumulation of this metal was found only in bones and, unlike cadmium, foxes accumulated bigger quantities of lead than deer or hares.

Cadmium concentration in hare kidneys is a good indicator of the environmental pollution and this metal mobility in the food chain. The highest amounts of cadmium were assessed in animals living in the areas where soils contained its elevated concentrations (the north-western part of the province) and south of Krakow, where acid soils prevail, which enhances cadmium solubility and its entering food chain. Lead accumulation in hare kidneys to a much lesser degree depended on this metal content in the animal habitat.

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## ASSESSING LEVEL OF THE AIR POLLUTION BY SULFUR DIOXIDE IN POLISH NATIONAL PARKS

The total sulfur content was measured in the thalli of *Hypogymnia physodes* collected at points in all National Parks in Poland. The concentration of sulfur in plant material was collected in two periods: during the year 1998 and 2003, and then values obtained of both years was compared. For each of National Parks was calculated the Index of Sulfating (GIS), in the following way: the average concentration of sulfur for Park to the lowest content of total sulfur of all Parks was compared.

Comparing the average values concentration of sulfur obtained in lichens in the years 1998 and 2003, the increase of air pollution by sulfur dioxide in almost all National Parks in Poland was found. It seems that environmental risks particular by sulfur dioxide in Parks had increased.

The statistical significant increase concerns seven north Parks in our country, one Park in the central part of Poland and three parks located in the south Poland in mountain ranges.

Because in the last years in our country occurred decrease of quantities of emission pollutants from the main, large sources connection with production decline, it seems that the real hazards are local low emission and long-distance transport of air pollution.

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AGNIESZKA GRUSZECKA \*

**ENVIRONMENTAL IMPACT ASSESSMENT OF THE SELECTED HEAVY METALS IN THE VICINITY OF THE INDUSTRIAL WASTE SITES AT THE EXAMPLE OF BUKOWNO (POLAND) AND MANSFELD (GERMANY)**

Environmental Impact Assessment became lately very serious problem due to the fact that disposal of the industrial wastes still is the most common method of the waste treatment. Inseparable component of industrial wastes are heavy metals. The volume of the wastes on such sites is so large, that the trace amounts of heavy metals, becomes the efficient concentration. With the dangerous features of this substances the question appears: is there a impact of spreading from waste site heavy metals to the vicinity of such disposal sites and what risk can it cause for the neighbouring environment and for living organisms? Till now such waste sites are not included in the process of assessing the risk assessment and the author would like to answer the question, if such impact exists and if so, how hazard can it be?

The area of researches were two waste sites in Bukowno region in Poland and in Mansfeld region in Germany, in which vicinity it was taken water samples from surface streams, bottom sediment samples from above mentioned surface streams, soil samples taken in transects W-E, SW-NE, NW-SE to the distance of about 900 meters from sites. The heavy metal concentrations were determined with the ICP-MS, ICP-AES, XRF, IC methods. The physical and chemical parameters were measured as well (pH, Eh, conductivity, dissolved oxygen, temperature). In selected soil samples the mobility of heavy metals was determined through the three-step sequential extraction procedure (BCR-scheme). Laboratory procedures and determining the concentration of heavy metals were made from March till November 2005 in the UFZ Centre for Environmental Research Leipzig-Halle, Germany. The results show that the heavy metals concentrations in Mansfeld region are higher than in the Bukowno region. The concentrations most of investigated heavy metals do not exceed permissible limits for the industrial areas in the Bukowno region (according to Polish law). In the Mansfeld region most of heavy metals exceed the permissible limits of the concentration for the industrial areas (according to German law). In water, bottom sediments and soils the concentration of Pb, Zn, As, Tl is high hard upon waste sites and decreases with the distance from disposal sites. The results show also, that the heavy metal migration is caused by the blowing winds. Horizontal and vertical analysis of the distribution of the heavy metals in environmental samples let see, that waste sites cause the efficient impact for the areas at which there are located. The next step of the investigations is quantitative assessing the ecological impact of selected heavy metals coming from above mentioned industrial waste sites for the environment and living organisms using models used in EIA procedures.

Key words: heavy metals, environmental impact, industrial wastes sites

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BEATA GRYGIERZEC<sup>\*</sup>, KATARZYNA GOWIN<sup>\*\*</sup>,

**THE INFLUENCE OF MINERAL FERTILIZATION ON FLUORESCENCE OF CHLOROPHYLL IN LEAVES OF SOME CULTIVARS *POA PRATENSIS***

Investigations were conducted at the Plant Breeding Station at Skrzyszowice near Krakow (220 m a.s.l) on degraded chernozem formed from loess. The field experiment, set up by randomized block method in four replications. The research aimed at assessing the influence of different levels of mineral NPK and micronutrients fertilization on chlorophyll fluorescence in leaves of some cultivars of smooth-stalked meadow-grass (*Poa pratensis*), like Eska 46, Duna, Skiz, Balin.

Chlorophyll fluorescence is a form of loss of energy in photosynthesis and has been often used to analysis photosynthetic performance of plants. The measurements of chlorophyll fluorescence by PAM 2000 Fluorometer were conducted in autumn 2005 in the first year of utilization. The applied techniques seem to be useful in estimation of vitality of same cultivars of smooth-stalked meadow-grass (*Poa pratensis*).

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BEATA GRYGIERZEC<sup>\*</sup>, KATARZYNA GOWIN<sup>\*\*</sup>, MARCIN MATYSEK<sup>\*\*\*</sup>

## FLORAL BIODIVERSITY IN THE BESKID ŚREDNI MTS. AFTER THREE AND TEN YEARS FROM DISCONTINUATION OF USE

Economic situation in Poland caused that most agricultural areas are not utilized any more and currently observed processes of plant communities synatropization reflect the degree of ecosystems degradation caused by abandoning formerly used methods of utilization.

Therefore the aim of the work was to present floristic changes occurring under the influence of ongoing succession but also the economic value of plant communities after their utilization was discontinued 3 and 10 years ago.

The research comprised six fields of which four were located at 450 and two at 600 m asl in the Koskowa Góra range and in the Babica range in the Beskid Średni Mts. The use of investigated fields was discontinued three and ten years ago. Six fields were localized on acid brown soil developed from the Magura sandstone with medium silty loam texture.

Red clover was the last crop cultivated on fields no. 1 and 2 situated at 450 m asl but cultivation on field no. 1 was abandoned three years ago, while on field 2 ten years ago. Fields No. 3 and 4 were localised at 450 m a.s.l. The field No. 3 was last sown with wheat three years ago, whereas field No. 4 was also sown with wheat but ten years ago. On the other hand, red clover was the last crop cultivated three years ago on fields No. 5 and 6 located at 600 m asl, whereas field No. 4 was last sown with wheat 10 years ago.

Discontinuation of use for three years caused formation of plant communities with dominant grass fraction. On the other hand discontinuation of use for 10 years favored formation of plant communities with prevailing herbs and weeds. Economic value of all plant communities expressed in Lwu was low and ranged between Lwu = 2.8 (field No. 6 and 10 years after discontinuation of use) and Lwu = 5.5 (fields No. 1 and 3 and 3 years after discontinuation of use). Apophytes and then spontaneophytes prevailed in the analyzed plant communities, while archophytes occurred as single species.

On the basis of investigations conducted it was found that utilization guarantees maintaining high economic value of plant communities, which are elements of Polish rural cultural heritage.

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MATEUSZ JAKUBIAK\*

**THE APPLICATION OF LASER BIOSTIMULATION TO INCREASE THE TOLERANCE ON SALINITY AND RECLAMATION EFFICIENCY OF WILLOWS (*SALIX SP.*)**

When observing degradation of environment it becomes obvious that soil salinity appears to be more and more frequent pollution. There are many sources of salinification but the most common are salty mining water pumping out from mines, salt-mining and processing and using of salt and brine for street cleaning during winter time. Salty lands usually are not suitable for agricultural use because high concentration of salt causes crop decline, worse plant growth or even wilt and death of plants.

There is a need for reclamation and bringing into cultivation lands with increased concentration of salt. One of the ways to solve this problem could be cultivation of plants which seedlings or seeds that were stimulated by coherent light before planting. The laser stimulation of plants material effects in an increase of plant's resistance on salt and other unfavorable environmental conditions, bigger growth of biomass, an increase of trace elements concentration in plant's tissues as well as an increase of phytoremediation abilities.

The aim of the experiment was an attempt to increase the tolerance on salinity and reclamation efficiency of various species of energetic willow by properly chosen parameters of laser biostimulation. The study included popular genotype of *Salix viminalis* 1154 and *Salix amygdalina* as well as Polish strains of *Salix viminalis* created at The Chair of Plant Breeding and Seed Production of The University of Warmia and Mazury, Olsztyn: Turbo, Start, Sprint.

The willow cuttings were divided into groups of equal quantities and then exposed to variable parameters of laser stimulation: the type of diode, time and power of radiation. The control groups of unirradiated seedlings were also prepared. All groups were planted on the soil with raised salt contamination at the area of a closed part of The Salt Mine "Wieliczka".

Observations allowed concluding that properly selected parameters of stimulation with coherent light may effect in double biomass growth, larger leaves surface. The plants in the exposure group also appeared to be more tolerant to salinity – did not wither or show yellowing – when compared to the control group.

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**HIGHLY SENSITIVE ASSAY OF METALLOTHIONEIN IN HUMAN  
PLASMA  
BY HPLC-NAM FLUOROMETRY**

**Introduction**

MT is induced very sensitively by the changes of the environments, therefore it may be useful for a biological markers to estimate the environments. We have been studying a quantitative assay of Metallothionein (MT) on the bases of a detection of SH, and published an assay of a commercial MT from horse kidney and rabbit liver by HPLC-NAM fluorometry. MT has two types of SH, one is free SH (disulfide) and other is masked SH with metals. In order to detect SH, the former must be reduced chemically and the latter must be free from metals by HCl acidification. We studied a sensitive assay of MT in human plasma by HPLC-NAM fluorometry.

**Assay of Disulfide of MT in plasma**

A 0.05ml (plasma:0.2 $\mu$ l) of diluted plasma was reduced by 0.02ml of 300mg sodium borohydride/ml of 2mM NaOH at 50 $\square$  for 30minutes under N<sub>2</sub> atmosphere. Then the excess amount of reducing agent was decomposed by 0.09ml of 2N meta phosphoric acid in the presence of 0.01ml of 10% n-octanol/methanol as a deforming agent. A 0.19ml of pH 6.5 50mM sodium phosphate buffer and 0.02ml of 1.0 $\mu$ mol NAM/ml acetone were added successively. After standing for 15min at room temp, 0.02ml of the reaction mixture (plasma:0.01 $\mu$ l) was induced into HPLC.

**Results**

Plasma contained 45% of the low molecular SH compound such as GSH and 55% of four MT components by reduction-HPLC-NAM fluorometry. Total amount of SH of MT in plasma was determined by acidification-HPLC-NAM fluorometry. We could assay MT in human plasma sensitively and accurately by the methods. And we could calculated the metals binding with MT from the tetrahedron structure of metals and MT. In order to apply the data to biomarker of the environment, we should study the relationship between composition of MT and poisoning.

**Acknowledgment**

This research was associated with an ISTC project in Russia. We appreciate that Kansei Fukushi Research Center of Tohoku Fukushi University supported and contributed to this study.

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R. KAWECKI\*, A.STASCH\*\*

## MANAGEMENT OF RESEARCH AND DEVELOPMENT OF RENEWABLE SOLAR ENERGY TECHNOLOGIES

The sun is a gigantic power plant. The continents of this planet are supplied over 219,000 thousand billion kWh of energy, year after year, which is 2,500 times the energy used by the entire world population. Therefore, in its "White Paper on Renewable Energy" of 1997, the European Union envisaged a total installed area of 100 km<sup>2</sup> in Europe by the year 2010. For Germany it means hard work to provide attractive and innovative products and to ensure that this target will be met. Since 1998, around €15 billion has been invested in the R&D in the field and construction of solar factories and solar power plants in Germany alone. Although Germany is hardly an ideal solar energy country due to its geographic position and its mediocre sunlight, the largest market for solar energy in Europe has developed in here. Recently Germany takes second place after Japan in the world when it comes to photovoltaic power generation. At the end of 2005, German roofs boasted just under 6.7 million m<sup>2</sup> of collector surface with a heat output of 4,700 megawatts. At present 4 % of German homes use environmentally friendly, sustainable solar thermal energy. This saves 270 million litres of heating oil every year. It should be noted that in Germany, a surface area of 12,200 km<sup>2</sup> is available for the installation of solar collectors.. It is estimated that, in the long term, solar energy could cover 80 times today's energy requirements in Germany. According to rather conservative forecasts by the European Commission and the Federal German Government, European Community and Germany will need in the area of solar technologies, between 2007 and 2017, 2 millions and 1 million specialists and executive employees respectively. The most actively involved with solar technology R&D in Europe are regions of civilisation of Lake Constance (Bodensee-zivilisation). For the regions of Bodensee-zivilisation: Baden-Württemberg , Bavaria , Hesse , North Rhine-Westphalia, Switzerland , Piedmont and Lombardy, the development and application of the solar technologies are very important parts of technological-cultural phenomenon.

The following facts explain the dynamism presented by the regions of civilisation of Lake Constance:

- development of high tech technologies in the greatest R&D houses in the Europe: Shell Solar GmbH München, Martin Bucher Projektentwicklungen, Stuttgart, Swiss UNAXIS S.A. globally leading company in the area of thin-film and vacuum technology), Siemens, IBM-Europe, Bosch, Hewlett Packard Europe, Daimler Chrysler, ALCATEL-SEL, BASF, Bayer AG, Novartis, AUDI, Porsche, BMW, , Boehringer AG, DEC, SAP,
- highest number of patent solutions in the world (1000 per 1 million inhabitants);
- highest levels of future investment in the R&D sector in the world at 4% of GDP;

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- more than 3 million SMEs (small and medium-sized enterprises) developing, implementing and applying technologies of the 21<sup>st</sup> century.

In the period up to 2008, alone the Swiss UNAXIS S.A. is planning production capacities of 40 MWp term annual capacity target of UNAXIS is 1000 MWp. To this end, more than 80 million euros will be invested in the thin-film module production plan to be erected in Thuringia and about 3000 new permanent jobs will be created.

**SPA – A SYMBOL OF LUXURY OR A CHANCE  
FOR HEALTH RESORTS OF THE BESKID SADECKI MTS.? <sup>1</sup>**

The tourism market is an extremely dynamic branch of recent global economy. Development of new, quality products aims to meet the changing demands of still growing number of tourists. As revealed by the WTO report, the number of tourists will increase by 5-6% per year, which will result in 800 millions of travels per year. For both the health and the medical tourism the most important is the „Age 45-65” group, which recently includes the largest number of tourists and which will grow in the future due to increasing lifetime of societies.

The Polish health resorts are in deep crisis after cessation of state funding of sanatorium treatments by the National Health Fund. The expected changes in legislation may provide a chance for the resorts.

In the Beskid Sądecki Mts. the 5 statutory health resorts exist: Krynica, Muszyna, Żegiestów, Szczawnica oraz Piwniczna. All of them have a centuries-long tradition of hydrotherapy due to rich mineral water resources, which, together with scenic landscape and specific microclimate provide exceptional opportunities for health restoration, recovery of physical strength, convalescence of disabled, etc.

Since 1998 a gradual decrease in number of domestic tourists has been observed in the health resorts together with slowly increasing number of foreign visitors. Recently, only 2% of foreign tourists visiting Poland declare the health treatment as a purpose of arrival. In 2005 these tourists spent only about 211 USD per capita for health services. This group is dominated by Germans and citizens of other EU countries. The largest increase (15-30%) was observed in the number of tourists from Canada, Australia, Great Britain, Japan and Greece.

The SPA - a revitalizing, refreshing and invigorating therapy, popular especially in the Southern Europe is a chance for the Polish health resorts. The upgrade of former state-owned sanatoriums into high-standard SPA centers, acceptable for the new group of visitors requires significant investments including the strategic investors and the bank credits as well as the new legislation. All these changes may bring the economic and social success and prosperity to the region of long therapeutic traditions. The crucial factor is the implementation of sustainable development principles accepted by the local communities and the resulting, proper utilization of natural resources.

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<sup>1</sup> The research was supported by the AGH grant DS. No. 11.11.140.159

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## **STUDIES ON LASER BIOSTIMULATION OF WILLOW CUTTINGS TO IMPROVE THEIR PHYTOREMEDIATION PROPERTIES**

Studies conducted at Warmia and Mazury University in Olsztyn were based on a three factorial pot experiment performed in cold greenhouse with willow. The studies were aimed to investigate the variability of biomass yield and content of macro- and micronutrients in above-ground organs of willow of two best Swedish willow energy cultivars (Sven and Torhild – first experimental factor) when to growing media composts were added (second experimental factor). There were two composts tested in the trial – produced from municipal solid wastes in Suwałki and the second produced from sewage sludge in Czarnków. The third experimental factor was biostimulation with blue laser or with diode. It was found that used growing media did not caused any variability in plant height but compost addition stimulated growth of diameter of the stem. Willow cuttings treated by laser radiation when grown on media with composts showed higher above-ground biomass production than control plants without stimulation. Photostimulation of willow cuttings with blue laser and diode resulted in increase of some nutrients (nitrogen, potassium and magnesium) uptake in above-ground organs and in some increase of phosphorus in leaves when plants grown on media with compost. Treatment of willow with laser on Suwałki treatment caused increase of concentration of potassium and magnesium in leaves of two studied cultivars and potassium and phosphorus in their stems. Under effects of and laser and diode treatments studied willow genotypes showed higher uptake of trace elements (excluding nickel) in their above-ground organs especially seen for lead and copper, comparing to control plants (without stimulation).

Key words: laser biostimulation; willow; municipal solid waste compost, sewage sludge compost; plant chemical composition

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## HEAVY METALS IN THE WATER-SOIL SYSTEM AT THE INDUSTRIAL LANDFILLS SURROUNDING OF THE NITRIC PLANT IN TARNÓW

Industrial waste disposals the “Za Rzeką Białą” exist from 1955 and the “Czajki I i II” from 1967, and are located in old gravel open pit at the distance of 0,4 km from the north eastern site of the Nitric Plant and close to the sewage treatment plant of the city Tarnów. Both landfills are situated in the vicinity of the Dunajec River and the Biała Tarnowska River, and two other small rivers: the Klikowski Stream and the Chyszowski Drainage Ditch. On the disposals are deposited the following types of wastes: power plant fly ash and slag, slug and other wastes from sewage treatment plant, asbestos and inorganic wastes. The industrial waste disposals of the Nitric Plant, because of lack of mineral and/or synthetic barriers have a direct contact with underground waters. Before the last stage of waste disposal exploitation their bottom was covered by a layer of fly ashes.

The evaluation of the river system and soils contamination with trace metals in the surrounding of the waste disposals from the Nitric Plant in Tarnów and assessment of the possible human impact of the disposals in the closest neighborhood were investigated.

To estimate the contamination with trace metals (Pb, Zn, Cd, Cu, Cr, Ni, Fe, Mn) of the surface water – soil systems at the area close to the industrial waste disposals, 17 samples of water, suspended matter and bottom sediments were taken from the above mentioned four rivers and 35 soil samples from the area of about 15 km<sup>2</sup>. The suspended matter, sediments and soil samples were digested in the microwave oven, using conc. nitric acid and the concentration of trace metals in the all samples were determined by AAS and ICPMS methods.

The obtained results showed that the concentration of studied trace metals in the water samples was very low, reaching the 1<sup>st</sup> class of river water quality. The suspended matter and bottom sediment samples showed metals concentration higher than their geochemical background values. The obtained results showed that sediment samples of the Dunajec River and the Biała Tarnowska River are less polluted and contain the metals as follows: 73-140 mg/kg Zn, 19-40 mg/kg Pb, 460-790 mg/kg Mn, 16-26 mg/kg Ni, 1,4-2,7 mg/kg Cr, 1,44-3,60 mg/kg Cd and 19-33 mg/kg Cu. In the suspended matter of these rivers, higher concentration than in the bottom sediment samples of Zn (128-788 mg/kg), Pb (86-711 mg/kg), Ni (72-302 mg/kg), Cr (115-258 mg/kg), Cu (51-105 mg/kg) and lower of Cd (0,79-0,93 mg/kg) were found.

The sediments of the Klikowski Stream and the Chyszowski Drainage Ditch were slightly enriched with Cu (46-123 mg/kg), Pb (72-170 mg/kg) and Zn (27-1156 mg/kg),

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whereas significantly enriched with Cd (4,3-22,9 mg/kg). Concentration of Ni and Cr remained low, 23-36 mg/kg and 1-22 mg/kg respectively. The suspended matter samples if compared with sediments showed higher amounts of Cr (102-611 mg/kg), Ni (33-720 mg/kg), Cu (54-317 mg/kg) and Zn (540-830 mg/kg) but high content of Zn was stated only in a few samples.

From all studied components contamination of ground waters and soils are the most important for possible risk assessment. Analysis of ground water show slightly elevated concentration of Cd, Pb, Hg, Cr (IV) and SO<sub>4</sub> ions (unpublished data). In the vicinity of the discussed landfills contamination with Cd seems to be most important. Its high amount in both, the bottom sediments and ground waters may suggest that landfills are the main source of cadmium on the discussed area. Cadmium as very mobile metal and easy leached out from the wastes can migrate to the river system and to the soils as bioavailable metal.

TOMASZ LAMORSKI\*

**PUBLIC PARTICIPATION IN PREPARATION OF THE PROJECT  
CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY THROUGH  
SOUND TOURISM DEVELOPMENT IN BIOSPHERE RESERVES IN CENTRAL  
AND EASTERN EUROPE  
CASE OF THE BABIA GÓRA BIOSPHERE RESERVE**

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This definition contains within two key concepts: the concept of “needs” and the idea of limitation. Understanding biosphere reserves as testing sites, recommendations of the Seville Strategy were used for involving widely public participation in the design of this project, especially to reach following goals such as: utilizing biosphere reserves as a model of land management and of approaches to sustainable development, and using biosphere reserves for research, monitoring, education and training. Objectives that are recommended at the individual reserve level were applied.

The Babia Góra Biosphere Reserve has comprised the national park (which creates the core area and the buffer zone) and also its protective zone (which creates the transition area). The aims of biosphere reserves can be achieved only by negotiation and co-operation between the national park administration and the local authorities based on shared objectives and jointed actions of stakeholders because of complicated aspect of the land ownership and numerous bodies managing natural resources.

Stakeholders were invited to joint meetings on sustainable tourism development in the region. Those meetings were focused on consultation with key partners to identify the most critical issues relevant to connections between nature protection and utilization of the area by tourism. Firstly, threads for improving the links between tourism and conservation were named. Secondly, the ways of resolving of conflicts or minimizing negative impact of tourism development on biodiversity were defined. Than, participants proposed taking certain actions that provide mutual benefit for tourism and conservation as well as the local population. Finally, obtained results were evaluated by external experts and used for the elaboration of the project proposal. After the preparation faze, the most involved stakeholders confirmed the participation, the support, and contribution to the project for the timeframe 2005-2008. Their financial support of this project applies to activities that are compatible with their institutional or organizational plans and work.

The effort during the preparation faze and the stakeholders’ willingness for the common implementation of activities strongly show their commitment to the objectives of the project such as:

- support to the development and implementation of tourism management plans in relation to biodiversity objectives,
- create and strengthen an enabling environment for combining sustainable tourism development and biodiversity conservation,

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\* Babia Góra National Park

- support international cooperation among the participating countries, especially with regard to trans-boundary cooperation, to enhance knowledge on tourism and biodiversity
- facilitate a consultative process with key stakeholders (in the public and private sectors) to ensure their active participation and influence in the development of public policies for sustainable tourism development and management in vulnerable mountain and forest areas.

PIOTR LEWICKI\*

**THE APPLICATION OF THE METHODS OF THE COMPUTER IMAGE  
ANALYSIS IN THE BIOTEST BASED ON COMMON DUCKWEED  
*LEMNA MINOR***

Common Duckweed - *Lemna minor* is a small water perennial plant of flat, leather-like thalli (looking like small leaves, in fact originating from stems). Each thallus has one root. It usually reproduces vegetatively – sometimes completely covers the ponds where it was introduced. It grows in stagnant waters or waters with slow flow, prefers high concentration of biogenic elements such as N and P.

It is often used in hydrobotanic wastewater treatment plants, because of the increased degree of the adsorption of mineral compounds (containing N and P). Small size, easiness of cultivation in laboratory, short reproduction time (after about 1 – 4 days the biomass doubles) decided on the application of this species in biotests. The biotest using *Lemna minor* is a widely applied test detecting toxic substances in water. In Poland the biotest of duckweed was formally confirmed and recommended by the Enactment of the Minister of Environment of 13th May 2004.

Companies and institutes dealing with biomonitoring often introduce the modification of tests on *Lemna minor*. In classic biotests the biomass growth is measured by the comparison of the dry mass of the control and experimental samples of duckweed. This method does not allow the continuation of the experiment. Another method is manual counting the thalli, regardless their size. More accurate method is the determination of the biomass growth by the measurement of the surface of thalli in experimental and control samples. This is a non-invasive method allowing the continuation of the experiment. To achieve this goal the attempt to build a measurement tool based on the methods of the computer image analysis was made. The tool using the techniques of the computer image analysis meets all the expectation for the biotest. It gives the repeatable result, measurement error does not exceed 4.4% of the measured value (interpretation in the categories of relative error), which makes this tool useful in a non-invasive measurement of the biomass growth in the biotest based on *Lemna minor*. At the same time a full image documentation of the carried out experiment is made.

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JAN MACUDA, LUDWIK ZAWISZA\*, STANISŁAW NAGY

## **APPLICABILITY OF BIOTECHNOLOGY FOR REMEDIATION OF GROUNDS CONTAMINATED WITH HYDROCARBONS FROM CITY AREAS**

In the first half of the 20th century, coalbed gas was used for lighting streets and squares as well as for heating housing and production objects. In the course of its production the ground-water environment was considerably contaminated, mainly with mono- and polycyclic aromatics and mineral oils. Even after so long, these areas still create a serious hazard for human health and groundwater, which has to be treated.

At present these areas can be found between the city objects with numerous underground technical and communal utilities. This considerably hinders the selection of efficient treatment methods used nowadays.

A unique, patented method of cleaning ground environment was presented in the paper. It lies in introducing autochthonous bacteria in the form of an aerosol in the aeration zone. This method is applicable in all geological-technical conditions and enables cleaning ground environment from hydrocarbon contaminations. The efficiency of this method can be significantly increased by modelling the remediation process, selection of optimal site, number of wells, and amount of bacterial aerosol injected to the ground.

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## DAMAGE OF STONE IN SOME MONUMENTS IN CRACOW<sup>1</sup>

The mechanism of the deterioration of stones depends both on external factors (natural – climatic, biogenic, and anthropogenic – air pollution) and internal (natural - mineralogical, structural and textural). Due to historical and architectural values Cracow has been enclosed on the UNESCO List of World's Cultural Heritage. Unfortunately, air pollution and unfavourable climatic and topographic factors accelerate the rate of weathering of stone monuments in the town. Cracow air is polluted mainly by industry, power stations, boiler houses, and road traffic. Combined long- and short-distance emissions result in high concentrations of air pollutants in its atmosphere.

Among the natural stones used in historic buildings of Cracow, the most popular are:

- limestones:

- from Pińczów (Tertiary),
- from Cracow-Czestochowa upland (Jurassic)
- from Dębnik (Devonian)

- sandstones:

- from the Carpathian Mountains particularly the Istebna sandstones (Lower Cretaceous to Middle Tertiary).

Their mineralogies, structures and textures control, as major factors, the rates of decay. Changes of mineral composition of stone samples were investigated by qualitative and quantitative methods, including optical microscopy, scanning electron microscopy coupled with microprobe analysis (SEM-EDS), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), atomic absorption spectroscopy (AAS) and liquid ion chromatography (LIC). The qualitative composition of the crust, in every type of the stones analysed, is similar. Only quantitative differences are observed. The components of the crusts are coal and coke particles, iron oxides, glass spherules and gypsum crystals. Solid particles concentrates on the surface of the stone. Gypsum concentrates in subsurface layers of the stones but was detected also inside the stone in pores and cracks. Chemical analyses have revealed higher than natural surface concentrations of Zn, Pb, Cd, Fe, Mn, Cu, Ni of the rock, and the presence of aliphatic and aromatic hydrocarbons. The dust-enriched layers not only stain the outer surfaces of building stones. The observed organic substances, iron oxides, glass particles, and the presence of some metals (Fe, Mn) favour the crystallization of other anthropogenic substances, mainly gypsum. Acid rains penetrate into the stone structure and leave behind not only hydrated sulphates, but also nitrates and chlorides in the surface layers and pores of the building stones. The outward migration of such soluble salts is hindered by surface crusts, so the salts crystallize inside the stone, expand it and eventually loosen rock grains. The crusts also form a substratum on which microorganisms can thrive.

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<sup>1</sup> This study was supported by the AGH – University of Science and Technology project No. 11.11.140.158.

ROBERT MAZUR\*

## EMBRYO-TESTS

Regulations referring to the protection of environment in Poland imply the need for the improvement and popularisation of the methods of on-line monitoring of water quality for the proper water management and the protection of fresh water ecosystems. The monitoring of inland waters quality is, however, still based mainly on the control of physico-chemical and microbiological parameters. This is not sufficient in the determination of the influence of pollution on water organisms. Full monitoring of water resources is carried out when, apart from the mentioned above parameters – bioindication methods and biotests are applied. They allow the impact of stressogenic factors on water organisms. Intensive development of research in environmental biotechnology and related disciplines (chemistry, biology, computer science and others) provided scientific premises for the improvement of the control methods referring to the quality of different components of environment, including water. Methods of environmental biomonitoring have been developed because of their scientific and practical values. In designing new biotests the increase of the sensitivity of methods and securing their repetitiveness is important. Less expensive and less complicated methods are preferred. The development of the studies on bioindication methods based on the embryonic development of fresh water organisms gives good prospects for very sensitive and cheap biotests. Developing embryos are more sensitive to pollution compared to adults of the same species. Thus making biotests based on juvenile forms of indicator organisms would significantly increase the sensitivity of biotests. The application of such biotests can contribute to securing environmental conditions for proper reproduction and consequently the protection of biodiversity. The main material for the experimental studies were the embryos of invertebrates *Lymnea stagnalis* and *Tubifex tubifex*. Biotests were used to assess the influence of different concentrations of surfactants of the Brij series, commonly occurring in the pollutants of rivers, e.g.: H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub>, HCl, NH<sub>3</sub>aqua, NaCl, KCl. The values of the concentration of the pollutants causing LD50% were selected. The results indicate big differentiation of the sensitivity of various developmental stages confirming the usefulness of embryologic criteria in the biological monitoring of waters.

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SABINA MICHALSKA \*

## **MEASUREMENTS OF GREEN HOUSE GASES CONCENTRATION IN THE URBAN AREA IN KRAKOW**

The Earth's atmosphere is composed primarily of the gases  $N_2$ ,  $O_2$  and other gases, whose abundance are controlled over geologic time scales by biosphere and a gaseous exchange between air – land and air - water. These trace gases comprise less than 1% of atmosphere and are influential to keep Earth's balance and the chemical properties of the atmosphere.

The carbon cycle is central to the Earth system, being inextricably coupled with climate, the water cycle and production of biomass by photosynthesis on the lands and in the oceans. Observations have shown that the composition of the atmosphere is changing on the global scale – to follow increase the concentration of such gases as  $CO_2$ ,  $CH_4$ ,  $N_2O$  and others. These greenhouse gases act as atmospheric thermal insulators.

The measurements of greenhouse gases are conducted in the laboratory, placed at building of Department of Physics and Applied Computer Science, AGH - University of Science and Technology in Krakow. The analysis of air sample is made with the use of HP gas chromatograph equipped with electron capture detector and flame ionic detector.

A few years of conducted observations allow to state that these measured concentration of greenhouse gases are characteristic for the urban area this part of Europe. Influence of meteorological conditions in Krakow and local emission also insist on these measurements. In order to compare the concentrations  $CO_2$ ,  $CH_4$ ,  $N_2O$  are performed the monitoring also at Kasprowy Wierch station – it is a place which is situated far from the urban areas.

The aim of work has been shown results measurement since 2005 as a part long term measurements of the concentration greenhouse gases in Krakow. It is hoped that comparison of monitored changes in the concentration of gaseous constituents in atmosphere will help in estimation local emission.

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TOMASZ MIKLASZEWSKI

**THE ROLE OF THE EXPO WORLD EXHIBITION IN PROMOTING  
HISTORICAL CITIES AND SOUND TOURISM**

At the beginning the EXPO World Exhibition was treated as manifest of technical civilization development but currently in tend to shift to forum of searching of solution for civilization and nature coexistence problems.

Moreover the EXPO World Exhibition should be considered as concentrated in time marketing campaign, which is simultaneously an element of long term strategy of promoting country abroad.

The goal of this strategy is to strengthen the position of country in international relations in all aspects: political, economic, cultural, academic and social. Promoting of historical cities like Krakow at the EXPO World Exhibition AICHI Japan may be a sound example of above mentioned strategy.

AGNIESZKA NAWIRSKA\*, JOANNA WIĘCŁAW\*\*

## **AGROTOURISM IN THE MUNICIPALITY OF CHOJNÓW LIMITATIONS AND OPPORTUNITIES OF DEVELOPMENT**

Countryside tourism has been known in Poland since 19<sup>th</sup> century. At present it took the form of a so-called “vacation under a pear-tree” „*wczasy pod gruszą*”. A dynamic development of life, arisal of big city agglomerations and environmental pollution caused changes in lifestyle and also made the desire to escape from urban atmosphere. One of the forms of countryside tourism is agrotourism, i.e. staying in a farm in the area which is touristically attractive. To much extent agrotourism is nowadays a social phenomenon, treated as an element of economic policy in rural areas, as a determinant of their development. After the transformation of Polish economy it became a chance to improve the situation of farmers in many villages and a chance for a diverse development of rural areas.

The growing significance of countyside tourism can be illustrated by the fact, that in Waetern Europe it covers 10 % demand in the leisure sector, and on average 3÷5 % farms provide such services. The growth of employment in tourism in rural areas of EU is bigger than in urban areas and mainly refers to jest recreational services. In Poland the knowledge of the opportunities to create jobs based on the use of the values of national parks, landscape parks and agrotourism is still insufficient, local communities have started noticing the benefits out of such activities.

The purpose of the work is to define the possibilities of the development of agrotourism in the municipality of Chojnów. In the paper there was the attempt to show the essence of the development of agrotourism and factors determining and limiting such development.

The municipality of Chojnów is situated within the Śląsko-Łużycka Lowland in the Valley of Czarna Woda, the Legnicka Valley and the Chojnowska Pleteau. The municipality of Chojnów is one of the largest in the Legnica voivodeship.

One of the main landscape values are local, usually small hills in a generally flat landscape. In such areas some localities are situated (including: Stary Łom, Okmiany, Biskupin, Jerzmanowice), which contributes to a picturesque scenery.

The municipality of Chojnów has many interesting tourist attractions. There are 46 cultural monuments including 30 architectural monuments and 16 historical parks in the area. There are also many objects that are not listed, but due to high cultural values they should be protected.

The basic source of income is farming and agriculture, based on individual farms and companies working on the grounds bought from the State Agency of Agricultural Property. Thus potential opportunities for the development of agrotourism in this area are large.

At present there is a tourist infrastructure in the northern part of the municipality in the area of the protected landscape. There is a holiday resort centre in Rokitki, directly neighbouring with forests, based on post-exploitation water ponds. Rokitki are

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visited by the residents of Chojnów, Chocianów, Legnica, Lubin and Złotoryja. An important recreational centre is also in the village of Jaroszkówka, with a very strong potential related to infrastructure and landscape, unfortunately not fully used. The main strength of this potential is horse farm, which could be a place for qualified tourism (learning of horse-riding, hippotherapy). There are also commercial places of angling in Goliszów and Dzwonów. Chojnów could develop in the direction of qualified tourism giving an interesting offer for a weekend and vacation tourism on the scale of the voivodeship and the whole country.

The main purpose of the studies was to learn about agrotourism in the municipality and to analyse the conditions of this form of tourism. Particular studies were referring to:

- the state of agrotourist households, the number and quality of services,
- the motivation for agrotourist activities and expectations,
- the attitude of local authorities and residents to the development of agrotourism in their localities,
- expectations of tourists connected with their time spent in the countryside.

The results show that agrotourism in the Chojnów area is still too little spread form of tourism, and its development is far less advanced than the development in the typically tourist areas such as lakes or mountains. Nowadays there are four agrotourist households in Chojnów. The results show modest and rather one-sided recreational offer – skromną i raczej jednostronną offer such as barbecue, horse-riding (in households with horses), playgrounds for children, excursions. One household offers guided trips on horseback. Unfortunately, the offered agrotourist product does not include such specific forms as guided tours, folk festivals, meeting folk artists, common painting etc.

Additionally, there is the lack of promotion in the municipality. Only 29% interviewed residents know that there are any agrotourist households in the area.

The following conclusions can be drawn:

- the development of agrotourism in the municipality of Chojnów depends on professional promotion and advertisement,
- warunkiem pozyskania klientów jest wysoka jakość services, w tym również services rekreacyjnych,
- recreational offer should regard the specifics of the village, traditions, local customs and be adjusted to the expectations of the guests,
- potential customers should be sought in big cities.

TOMASZ NOWAKOWSKI\*, PIOTR ZANIEWSKI\*\*

**BIODIVERSITY OF LICHENS IN THE WEST PART OF THE PILICKA FOREST. PROJECT OF THE PROTECTION OF RARE AND ENDANGERED LICHEN SPECIES IN REGION**

Determination of the occurrence of the different species of lichens was the purpose of our research in the western part of the Pilicka Forest. Our research was placed between the town of Piotrków Trybunalski, Sulejowskie Lake, Moszczenica village and Koło village as well as the region of Kludzice village.

The effect of our work was drawing of the map of contamination of the air by sulphur dioxide. Using our map as a base, we found almost unpolluted areas with the variety of endangered and rare lichen species. Thus, we have come into effect in stock-taking. We have found many rare lichens from families of *Caliciaceae* and *Usneaceae*.

This places are very important for the region as the only stayed remains of the old lichen populations after the period of heavy sulphur dioxide pollution. This contamination had been caused by the Bełchatów power-station before the anti-sulphur installation was installed.

Now, there are many more habitats for rare lichen species again, as the level of air contamination has dropped. We should protect the essential native genetic pool of lichens. The information about this places was delivered to the owner of the land, which is The State Forests National Forest Holding (Poland). It will be used in the future to protect the endangered species.

We have drawn our map using our modification of Hawksworth's and Rose's lichens scale. We are using the epilithic lichens as well (Nowakowski and Zaniewski 2002). Considerable part of researched area is characterized by good air conditions. The level of air pollution by the sulphur dioxide has decreased since 2001.

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M. PIETRZAK\*

## LANDSCAPE CHANGES AND PROTECTION OF POLISH CARPATHIAN MTS. WITH THE USAGE OF HISTORICAL GIS

In the Polish Carpathians in the early 20<sup>th</sup> century, environmental protection schemes were undertaken as a consequence of increasing negative impact of deforestation, unfavourable changes of hydrologic conditions caused by engineering works, decrease in population of some species of flora and fauna. The factors destroying cultural heritage include inappropriately located, chaotic and ethnographically unmatching housing, unplanned development of communication tracks as well as improper land-use management. Spiritual cultural heritage has been endangered by the lack of continuity in cultural tradition, even the knowledge of it, and inappropriate approach to the environment in both cognitive and ethical sense. The above mentioned examples show that the studies on landscape change and landscape protection require incorporating a geographic perspective and relating any observed phenomena to the natural environment. However, applying only a material approach to the studied phenomena prevents acquiring the awareness of cultural landscape in its broad sense. Thus, to fully understand the relationship between man and nature, the spiritual aspect of man's activities needs to be recognized. The paper presents the results of a survey school and university students and non-school adults, intended to gain insight in the perception of the Polish Carpathian landscape and the values worth protecting from destruction and transformation. Due to tourist activity the Carpathian landscape is normally projected as high mountains thus leading to associations with the Tatra Mts., the town of Zakopane, mountain peaks, slopes, woods and glades. More than 90 per cent of the surveyed would protect wildlife, rare vegetation, streams, lakes, peaks and glades. It is worrying that most of the respondents omitted from the Carpathian landscape human settlement harmoniously blended with the environment. As a result there were no requests for the preservation of traditional villages, historic patterns of small towns or remains of ancient towns.

The second part of paper presents the advantage of using DEM to the visualisation of historical maps in ArcScene. ArcScene lets users visualise their data in three-dimensional animations. Author pointed out importance when it comes to educational purposes and learning the cultural heritage of one's own region and, at the same time, when it comes to spatial planning and landscape shaping. Creation of compatible historical maps and DEM for a rural area completes and introduces new ideas into the methodology of architectural designs. Arc Scene can facilitate fast draping of the same DEM surface. Re-creating the animation of a flight over the village enables the present state to be compared with past one and designed schemes what allows the village inhabitants to choose a suitable project. The advantages of project visualisation as a 3D model include the possibility of its assessment from various observer points, simple and fast preparation of alternative proposal. The advantage of ArcScene is the possibility to export animations as a stand-alone AVI files, which can then be shown to people who do not have access to GIS software.

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## EFFECT OF ENVIRONMENTAL POLLUTION ON ENZYMES ACTIVITIES IN FISH

Cadmium is one of the most harmful heavy metals to animals and has a particularly long biological half-life. Since cadmium and other divalent metal cations are often found together in the environment, it is important to determine whether their toxicity in combination can be assessed by the summation of individual effects. Malic enzyme (ME) catalyzes the oxidative decarboxylation of malate in the presence of coenzyme and requires some divalent cations to express activity. Herring spermatozoa exhibit a high activity of malic enzyme (Gronczewska et al., 2003). NAD(P)-ME was purified from herring spermatozoa by chromatography on DEAE-Sephacel and Red-agarose. The effect of concentration of some divalent cations such as  $Mn^{2+}$ ,  $Mg^{2+}$  and  $Cd^{2+}$  on the kinetics of the reaction catalyzed by NAD(P)-ME from herring spermatozoa has been examined. The  $Cd^{2+}$  ion shows strong inhibition of the NAD(P)-ME activity *in vitro*. When added alone at a concentration of 0.1 mM, it activates the ME of about 5% of that caused by  $Mn^{2+}$  and when added both ( $Mn^{2+} + Cd^{2+}$ ), it only activates the ME to the value of about 43%.

Tributyltin (TBT) is the most common organotin derivative used in antifouling paints for water pipes and vessels. Despite the prohibition of its use it is still used in many industrial processes. TBT has been found to be toxic to carp and catfish spermatozoa. Sperm cells rapidly react on toxicants in the aquatic ecosystems. Cytotoxic effect of toxicants is usually assessed by release of lactate dehydrogenase (LDH) from the cells into surrounding medium. LDH activity in herring spermatozoa is very low and is somehow inhibited by TBT, but the mechanism of this inhibition is still unclear (Rurangwa et al., 2002). On the other hand, it was shown earlier that TBT accelerates the precipitation process of trout hemoglobin IV (Santroni et al., 1997).

We have noticed that creatine kinase (ATP creatine phosphotransferase, EC 2.7.3.2) from herring spermatozoa has high activity (about 452  $\mu$ mol/min per g of fresh milt) and different electrophoretic mobility from isoenzymes present in skeletal muscle (Grzyb et al., 2003). Treatment of herring spermatozoa with TBT caused a time-dependent decrease of viability: 35% nonviable cells with 5  $\mu$ M TBT and more than 90% nonviable cells with 10  $\mu$ M TBT after 6 hours exposure. Creatine kinase release from damaged spermatozoa into the surrounding medium was positively correlated with TBT concentration. We suggest that creatine kinase could be a good biomarker of sperm cell membrane degradation in the case when release of LDH from permeabilized cells is not possible for rapid determination of the effect of TBT.

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MAGDALENA SITKO\*, BEATA GRYGIERZEC\*\*, KATARZYNA GOWIN\*,

### **INFLUENCE OF THE DIODE LASER LIGHT ON THE GERMINATION ABILITY OF SOME CULTIVARS OF THE *POA PRATENSIS* SEEDS**

The aim of the experiments conducted was the estimation of the influence of the diode laser light (red and green) on the germination ability of some cultivars of smooth-stalked meadow-grass (*Poa pratensis*).

The seeds before sowing were irradiated by red and green diode laser. A control variant (without radiation) was used and a few different radiation doses: single exposures were interrupted  $t = 3 \times 3$  s and  $t = 3 \times 30$  s. of each variant. Experiments on germination have been done on Petri glasses with the containing 100 seeds in four repetitions. The seeds have been kept in total darkness and in the temperature of under 20°C. In 20<sup>th</sup> day, 25<sup>th</sup> day and 30<sup>th</sup> of the experiment number of germs was observed.

As a result of conducted experiment, different reaction of tested cultivars of smooth-stalked meadow-grass (*Poa pratensis*) on pre-sowing laser biostimulation was observed. To sum up, the used laser irradiation may be a factor to increase the sowing value and to hurry up early development phases.

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MAŁGORZATA ŚLIWKA\*

## **THE APPLICATION OF LASER BIOSTIMULATION FOR MORE EFFICIENT SEWAGE TREATMENT PROCESS AND PHYTOREMEDIATION**

The aim of experiment was an attempt to increase the efficiency of the Lemna Biological Method of sewage treatment by the photostimulation of duckweed (*Lemna minor*) with a laser diode and argon laser.

Application of the laser photostimulation in environmental biotechnology has been introduced by Dobrowolski in 1975. Effects of fotostimulation by coherent light on plants biomass increase the base of the activation of biological mechanisms (activation of enzymes of mitochondrial fraction).

The experimental groups of equal quantities were exposed to variable parameters of laser stimulation: the type of diod, lenght of wave, time and power of radiation. Initially, all plants in each group were in similar condition. In every experiment the control group of unirradiated seedlings was also prepared.

The results of experiments it showed that photostimulation by monochromatic, coherent light significantly speeds up cell divisions and causes a significant growth of biomass driving to quicker and more efficient uptake of biogenic elements contained in sewage making eutrophication process slower. A factor that limited hydrobotanical sewage treatment process in temperate climate is a short vegetation season of plants and their sensitivity to hypothermia. The laser biostimulation of plants increase their ecological valence in unfavorable environmental factors.

Laser biotechnology is also promising for more efficient bioremediation of trace elements (Ni, Zn, Cd) from sewage. The beneficial influence of photostimulation was extension of the vegetation season of plants.

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## **EXEMPLARY PRACTICES IN SMALL ECOTOURISM BUSINESSES**

Ecotourism is a tool, which ensures ecological, environmental, economical and Cultural friendly tourism. It activities controlled by local community of any respective area where tourism activities are being generated. A major focus of ecotourism involves community empowerment through the formation of partnerships; local businesses, municipalities and culture must be included in all aspects of development and operation of any true ecotourism venture

This research provide a valuable information that can serve for generating Ideas and adapting sustainable ecotourism practices to the specific local Conditions elsewhere. Facts and figures are gathered from the field, the people who have developed these initiatives and who are daily in charge of these business ventures. it reflecting the complexity of small businesses, the great challenges and Opportunities faced, and the endless creativity that this business allows for. The greatest challenge for all of us involved in this tourism segment is learning to trust, and to foster trust in others

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### **APPLICATION OF HPLC- *N*-(9-ACRIDINYL) MALEIMIDE (NAM) FLUOROMETRY OF SULFITE TO MARINE SEDIMENT**

The form of sulfite ( $\text{SO}_3^{2-}$ ) is unstable in the nature. Because sulfite is a reducing agent, it is oxidized into sulfate by dissolved oxygen or natural various oxidants in aerobic state. On the other hand, sulfite is made and kept in anaerobic state by anaerobic microorganisms, sulfate-reducing bacteria in sediment. The sediment is often formed in the creek where excessive organic drain such as domestic wasted water flow in. In such the eutrophied environment, the dissolved oxygen is consumed by a rapid increase of aerobic microorganism. It is well-known that sulfite and hydrogen sulfide threaten health of the human and a lot of the living being. Therefore, this is an important problem on the environmental ecology and the public health.

Recently, we have reported an extremely sensitive assay of sulfite by *N*-(9-acridinyl)maleimide(NAM) fluorometry using High Performance Liquid Chromatography(HPLC). The reaction of sulfite with NAM was successfully applied to determine sulfite in wine and in serum at pico mol level (1983-2002). It should be noted that there are two difficulties to determine sulfite in environment sample, 1) extremely low concentration, 2) instability by dissolved oxygen. Coworker Akasaka succeeded in the development of the determination of sulfite in acid rain using HPLC-NAM fluorometry (1986). We have reported on the application of a highly sensitive assay of sulfite in snow as a representative of aerobic state (2005).

We used the marine sediment in Matsushima bay of an environmental sample as a representative of anaerobic state. Matsushima bay is Japanese most beautiful rias coast (sawtooth coastline), national park, which is adjacent to Sendai City in the north of Japan. Our university is located in Sendai City. The industry of the Matsushima town is a fishery and a sightseeing industry mainly. There are 260 big and small islands and a lot of deep creeks in the bay. The circulation efficiency of fresh seawater is very low. Oyster cultivation industry using the complicated geographical features is active for a long time. Therefore, the environmental condition of the bay has deteriorated because of excessive organic drain from oyster processing factory. The sediment is widely accumulated in the bay. The foul smell and the sulfur smell volatilizes from sediment strengthen in the coastal area in summer.

In this study, we tried to apply the method to determine sulfite to marine sediment in Matsushima bay using highly sensitive HPLC-NAM fluorometry. Marine sediment was collected at beach near fishing port in Matsushima bay. The results are shown as follows. A highly sensitive and simple fluorometric determination of sulfites in marine sediment was developed. The sulfite in marine sediment was clearly detected at pico mol level by setting pH10 of the extraction buffer containing EDTA as a

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masking reagent to dissolved metal ions. Additionally, the HPLC analysis condition, and the preservation condition of natural marine sediment were examined in detail.

#### Acknowledgement

This work was carried out in the Kansei Fukushi Research Center of Tohoku Fukushi University, Sendai Japan, supported by “Academic Frontiers” Project for Private Universities: matching fund subsidy from the Ministry of Education, Culture, Sports, Science and Technology (2004-2008).

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## **PROTECTION OF URBANIZED MINING AREAS IN THE MINE'S CLOSING PROCESSES**

Closing of hard coal mines, especially stopping the process of mine's water pumping, results in a reconstruction of the Carboniferous water-bearing horizon, leading to the intensification of gas flux to the near-surface zone („piston effect”). Stopping the fans considerably enhances the movement of mine's gases towards the surface in closed mines. Stopping the fans results in accumulation of gases in workings and old workings.

The state of methane and toxic gases hazard as well as qualitative and quantitative changes in the area of closed hard coal mine „Niwka-Modrzejów” are evaluated in the paper on the basis of modelling and simulations. Modellings were based on the results of geochemical and hydrogeological analyses. This type of simulations and modellings are applicable for mines to be closed in the future.

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AGNIESZKA ZIELIŃSKA-LOEK\*

**THE PERSPECTIVES OF APPLICATION OF LASER STIMULATION OF  
PLANTS FOR MINIMALIZATION OF NEGATIVE EFFECTS OF  
MOTORIZED TOURISM IN HISTORICAL CITIES**

In my doctoral thesis has been positively proved the concept of Prof. Dobrowolski of introduction of innovative irradiation of some plants (mainly willows cuttings) with coherent light for stimulation growth rate of roots and sprouts under suboptimal conditions. Unirradiated willows cuttings and experimental plants were cultivated alongside main roads in Krakow. Increasing concentration of the traffic output is associated with increasing number of motorized tourists in historical cities. Therefore the result of experiemntal studies may be useful in similar circumstances in different countries. In results of adequate laser photostimulation the resistance to the traffic output has been improved (the period of vegetaation was longer) and the leaves surface increased up to three times. This method may be applied for acceleration formation of protective green areas alongside main streets and parking places in historical cities.

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URSZULA ŻUREK-PYSZ\*

## **BEAUTY MUST BE PROTECTED- ENVIRONMENT AND NATURE OF MIDDLE POMERANIA, NORTHERN POLAND**

Wide sandy beaches of the Baltic sea, dunes covered by resinous forests , a varied postglacial landscape - it is the Middle Pomerania, Northern Poland. The characteristic elements shaped by the last landscape glaciation are: a coastal zone, forests, meadows, moors and a rich network of rivers and lakes.

The basic domains of economy in the Middle Pomerania Region are:

- agriculture and agricultural-consumable industry,
- wooden industry,
- tourism and healing therapeutics, sea economy.

Nevertheless the future of the voivodeship depends mostly on the development of agriculture and various forms of tourism.

Middle Pomerania is a one of the most attractive tourist regions of the country. In the maritime zone alone, there are placed several leisure spots.

The unique values of the post-glacial landscape and valuable natural resources helped determine the decision to protecting the areas, where nature is being preserved its natural character or has only to a slight extent been affected by human activity.

In the Middle Pomerania we use different forms of this protection. The most often are: nature reserves, monuments of nature, landscape park and protected landscape zones.

Our region belongs to these ones that are rich with surface waters – they contain almost 4% of its total surface. Additionally we are situated near the Baltic Sea.

The natural resources of region these are first of all raw materials which are mainly used in building materials industry and road building.

Rich layers of therapeutic mud and healing waters are situated in vicinity of Kołobrzeg and Połczyn Zdrój. The healing peat that is exploited is a very good balneologic raw material used in Kołobrzeg Health Resort.

The very considerable curiosity of this health resort is a small brine spring on the Solna Island.

In order to act efficaciously towards the environment protection, it is indispensable to investigate the state of this environment and changes that occur in it. The regional monitoring gives basis for investigation executed by province Environment Protection Inspection Office. These works are performed with considerable financial support of County's Fund for Environmental Protection.

Our province, with regard to nature and landscape, belongs to the most valuable and attractive regions in Poland. This is the reason to be happy and proud of, but moreover, maybe the first of all, it is our duty to preserve and reconstruct the Region natural environment.

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URSZULA ŻUREK-PYSZ\*

## **PROTECTION OF THE BALTIC SEA IN WEST POMERANIA, NORTHERN POLAND**

The Baltic Sea is one of the youngest seas that occur on the Earth. It is a typical inland sea with area of 415,000 square kilometres. Within the Baltic catchments area live

80 000 000 people in 9 countries. Protection of the Baltic Sea must not be considered in isolation from the remaining part of the country and other coastal countries operations.

The whole history of the Baltic Sea is associated with the last glaciations.

Narrow Danish straits make an obstacle for the Baltic and North Sea connection. The time required for total water replacement in our sea varies from 25 to 40 years.

Life in the Baltic Sea is not rich. The number of plants and animals that live there is much smaller than that in the North Sea. Both freshwater and seawater organisms live in the Baltic Sea. They are much smaller in size and process of their dwarfing is still going on. This is caused by low salinity of water as this prevents living and reproduction of many sea species.

The complex Baltic Sea ecosystem is associated, on one hand, with huge pollution coming from all the surrounding countries, with their industrial and agricultural production and with delivery of a number of pollutants that affect directly the ecosystem and, on the other hand, affect directly the bottom sediment as well as interaction between the sediments.

Protection of the Baltic Sea, is first and foremost, protection and prevention of pollution of waters that flow into it, i.e. the coastal zone rivers. Efforts of local communities and environmental protection services taken up, for example, under the international operation "Cleaning up the World" seem to be invaluable. Each year, in September, volunteers remove from rivers and beaches everything that belongs to the waste dump.

Widely comprehended protective activities of the Baltic Sea area comprise also projects that are associated with production of energy from renewable sources. Solar energy can be used in many ways. Photocell panels can be installed on top of any buildings as well as in buoys and lighthouses to generate electricity from solar energy.

In recent years, visible improvement in the sea purity occurred thanks to substantial reduction of pollutant loads. Therefore, many flora and fauna species can be restored in the Baltic Sea.

The future of the Baltic Sea depends on our behaviour. We must get used to a change in our habits, lifestyle and consumption. These problems were presented in the film "Hots - protection of the Baltic sea in West Pomerania". The main principle of this film concerns geo-ecological education in Poland and abroad. The film is going to be presented during the Poster Session at the Euro-Eco 2006.

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## **BACKGROUND MATERIALS**

DERYA ALTUNBAS\*

### **COOPERATION FOR CONSERVATION OF BIGALI VILLAGE IN TURKEY**

In general perspective, this village stays on the north west part of Turkey that is in the Canakkale province municipal border. It is old village and history of it depends to 1400. At the register in 1475, there was two parts of Bigalı village bigger and small ones. At 2000 Census of population 133 men and 155 women in total 288 people. Today, population of village 250 people. As it seen, population is decreased in time. At the same time, in 1997 population was 338 in the village. Since 1982, Bigalı village has decision of the coservation and second degree site of conservation-preservation areas that extension in Historical National Park. Until 1990 there wasn't technical infrastructure in the village as water line, waste water system. Village Sevices Directorship provided these facilities to village at 1990.

Houses are very old in villge and there aren't any knowledge about dates of construction. Village has a school that the entrance of village that date of it is 1982. On main street there is a 2 flats house and in 1990 it was constucted another 2 flats house in 1994 only a house constructed and at 2000, a house more was constructed. These aren't suitable historical texture of the village. There is a Mosque in Bigalı Village that belongs to 1643, restorated 1960. Old school date is 1890. Cooperation between military and non governmental organizations and university also. 1,724,903 YTL spending for the restoration of the village. Firstly working in the village began with the second commander of army corps to village in 2006 April 19. Evaluation of the idea process until 2006 April 25 developed the projects for Bigalı Village. Proposals of the paper are; the village has importance for sustainability of historical settlements therefore it must supported economical and social and tourism perspectives. Eco- Tourism can be apply or bed and breakfast facilities can be supply also with international partners. Workshops organizations that related with historcal environment and rural economies can be developed in this Village.

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DERYA ALTUNBAS\*  
ELIF KARAKURT TOSUN\*\*

## SUSTAINABLE DEVELOPMENT OF IZNIK IN THE HISTORICAL CITY PROTECTION ASPECT

Iznik city stays at the north- east of 86 kilometres near Bursa. It is important places that is historical and tourism that at Marmara Region. There are a lot of work of art comes from history in the texture of historical settlement belong Rome, Byzantine Empire and Early Ottoman period. It is surrounded by historical city walls. It is famous with tile (ceramics) in the century of XIV. , XV. and XVI. Iznik was a center of art. Famous at scale of world also. Plan of Iznik has grid iron that comes from the period of Rome, Byzantine and Ottoman. It has monumental structures also.

316 B.C. city name was Antigoneia. Iznik city was belong to Bithynia Kingdom at 293 B.C. Along this time, Nikaia (Iznik) was capital city of Bithynia Kingdom. At this time citizen meets with Christian. At palace of Senato 1. Council was done in 325 B.C. , also 7. Council meeting at 787 B.C. was done in Iznik Church of Ayasofya. After Bithynia Kingdom, it was capital city of Byzantine Emprhire, Selcuk and Ottoman Empire.

Today, economics depends on agriculture and fisheries in Iznik. There is also industrial activites. Tourism activities are very low. Income from the historical tourism must be supported by funds to Iznik. Population of Iznik was 41.942 in 1990, in 2000 it was 68.902. There is migration to Iznik very speedy, increase in population rate is 20.4%. Iznik city area has 753 square kilometres. Density of population is 56 at Iznik.

At study, first of all in the historical context it will be defined actual vision to historical structure in Iznik. It will be analyzed preservation and conservation activities and registration of the monuments at Council of Regional Conservation in Bursa that is Iznik belongs to the conservation region of Bursa. In this organization working possibilities, spending money needs of municipality of Iznik will be explained. As known, application of restoration or renowations need to a lot of money. Therefore, municipality budget is not enough for these actions. It must need supported by international funds and partnership actions. This settlement has great importance of the world within the perspective of Christian.

On the other hand, there is a deep deterioration on the historical texture because of unconsciousness of the citizens at Iznik. For this reason consciousness and awareness must been created among the citizens. Education of different age groups have to be given about conservation of historical environment in Iznik.

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MATTHIAS BEYER<sup>\*</sup>  
**INTERNAL MARKETING -A KEY FACTOR FOR A SUCCESSFUL  
DEVELOPMENT OF SUSTAINABLE TOURISM IN PROTECTED AREAS**

Hypothesis of the presentation:

Internal Marketing can help to establish an important framework of legitimacy for protected areas and sustainable tourism development.

Short description of the content:

Protected areas offer all over the world a very wide range of possibilities for recreation and tourism because they are themselves so varied in character, habitats and landscape. Therefore many countries, regions and communities started to develop sustainable tourism in protected areas (=ecotourism) with the aim to combine the conservation of natural and cultural resources with the improvement of income and living standards for the local people. Sometimes tourism development is also the main reason to establish a protected area because otherwise it could not be financed. However, there are many cases all over the world where the implementation of a protected area or tourism development within this area failed because of a strong resistance by local people or conflicts among local stakeholders. The reason is very often that decision makers ignore the importance of a participatory planning process and the necessity of continuous communication with and among local stakeholders. The success of conservation aims and a sustainable tourism development depend extremely on a good partnership with local people, the tourism sector and other local and regional organisations. But communication is not a one-way process. When embarking on a project for conservation or sustainable tourism, a consultation system is needed to ensure that information is circulated to all the key local organisations and individuals so that their views can be incorporated. There have been attempts to introduce systematic processes or strategies to enhance participation by all sections of the host communities (bottom up approach) as well as partnerships between the formal tourist industry and local communities and partnerships between concerned government departments, NGOs and local communities. Wider promotion will be needed to explain the need for visitor management controls and restrictions within the protected area for local people. Furthermore it is necessary to raise awareness by developing a corporate vision for sustainable tourism development with participation of all relevant stakeholders. An internal Marketing strategy can help to establish an important framework of legitimacy for protected areas and sustainable tourism development. On one hand the presentation is focused on strategies how to communicate and transmit the value and opportunities but also the restrictions of protected areas to the local population in a successful way (=promotion strategy). On the other hand the presentation treats the framework for establishing a participatory tourism planning process to ensure that the main stakeholders can incorporate their views and interests (=communication strategy). For both, the promotion and the communication strategy includes the presentation a theoretical and methodical part as well as a practical part with examples of good practices from different countries.

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MANUEL CESARIO,\*

## **SYNERGY BETWEEN THE CONSERVATION OF NATURAL AND CULTURAL HERITAGE AND HUMAN HEALTH**

The challenge facing professionals working with the conservation of biological and cultural heritage is to find ways of demonstrating that the conservation of biodiversity and culture, as well as its sustainable use, has a fundamental relevance to the daily lives of people. There is also the need to emphasise the purposes of biodiversity and culture as contributing to the quality of life. The hypothesis raised is two-fold: (1) conservation of biodiversity and culture benefits human health, whereas human health is holistically understood as quality of life; and (2) when quality of life is improved, people's perception towards biodiversity and culture is also improved.

Eight ways in which the conservation of biological and cultural heritage can improve human health were developed. Four of these health benefits of protected areas are briefly described and remain as anecdotal evidence, while the other four are better explored through fieldwork in Brazil, Costa Rica, Poland and Kazakstan. These health benefits of biodiversity and culture constitute a contribution to academics, decision-makers and protected-area managers interested in improving the relation between local communities and the conservation of biological and cultural heritage, world-wide.

The example of the Integrated Conservation-Development Project (ICDP) carried-out at the *Serra da Capivara* National Park, Brazil, was chosen to be further scrutinised. A case study was performed, combining qualitative and quantitative data. The village that suffered more impact - both in terms of time and intensity of contact with the conservation-development activities locally performed - was compared with a control-village. Changes in lifestyle, education levels, access to health-care, employment opportunities, and health standards were evidenced by the qualitative data. The quantitative analysis suggested that the improvements in the housing conditions, water supply, storage, and treatment, as well as in the perception of the villagers towards the ICDP activities were more significant in the village affected by the ICDP, than in the control village.

Finally, the assessment of the research findings and the contribution of this work were summarised. What has been discovered, by pulling together the research questions; the achievements, limitations and difficulties; as well as the opportunities for further work were identified.

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**USER ACCEPTANCE AND DEMAND FOR MOBILE TRAVEL SERVICES:  
A CHANCE FOR VISITOR MANAGEMENT IN PROTECTED AREAS?**

Mobile devices and services have developed rapidly in the last few years. This study focuses on the user acceptance and the demand for a electronic cycling tour planner, an application that allows the user to plan his cycling tour, to get orientation and information about tourist attractions while on tour on a Global Positioning System (GPS) capable Personal Digital Assistant (PDA). This service is provided by a German provincial tourism organisation since 2005. Research shows that the necessary mobility in travelling and the high need of information in an unknown area favour the development of mobile travel services. The market shows already many informative mobile travel services, from electronic tour guides to GPS based services for orientation. Mostly mobile phone companies or travel media companies are active in this field while destinations still play a little role.

The analysis of user acceptance and expectations for mobile travel services show an increasing demand and a good market potential for these services, also for the nature oriented traveller. Young male users with a high affinity to technology and a high education show the highest interest in this mobile travel services. Services which provide orientation and current information combined with low costs and simple handling are used mostly and have the best chances on the market.

If the identified success factors - ease to use, attractive price models, intense promotion, reaching early adopters - apply, the market potential is seen as positive.

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## **TOWARD GIS AND MATHEMATICAL MODELING APPLICATIONS FOR SUSTAINABLE DEVELOPMENT OF HISTORICAL CITIES AND PROTECTED AREAS**

Due to increasing anthropogenic burden on the environment and a counter reaction of such changes, ecological problems arise in the environment. They range from global (see SUSTAINABLE DEVELOPMENT concept) to regional and local. One of the important among these problems is the range of problems associated with the cultural and natural heritage saving. The impact of pollution, anthropogenic and other factors itself in various forms – from direct poisoning (e.g. with pesticides and remnant missile fuel components for example) through to far consequences, among which depopulation ones play special role.

Earlier some new concepts for understanding the sustainable development had been proposed [1, 2]. The core idea is considering the stable regimes of large socio-economical systems and its transitions. In principle the concept allows general applications for different real systems. Full investigations of any sustainable development problems require long and involved investigations. Usually SD problems should include the next sub-steps in consideration:

- Monitoring and data collection.
- Simple analysis (statistical and modeling)
- Forecasting
- Scenario analysis
- Computer systems for planning, design and education modules and tools for considering sustainable development of cities and regions.

But just now many tools and investigations had been developed for different sub-steps above. So in proposed report we also describe some our developments of GIS and modeling:

- GIS for radionuclide pollutions of Ukraine
- Electronic Atlas of Ukraine
- Methodology and models of car traffic
- Methodology and models for crowd movement
- Models of large socio-economical and natural systems
- Models for migration and relocation of manufacture from large cities
- Methodologies for controlling agriculture and forests from satellites
- Tools for electronic cadastre of lands

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**ANTHROPOGENIC AND NATURAL ENVIRONMENTAL POLLUTION IN  
SOME REGIONS OF GREECE. NECESSITY OF PRELIMINARY  
PREVENTION OF ENVIRONMENTAL HEALTH HAZARDS**

A large number of anthropogenic activities transfer to the environment quantities of toxic substances and accumulate them. By respiration of polluted air and/or intake of contaminated food, heavy metal may accumulate in organs and tissues of animals. They can be toxic for the animals, the toxicity of these metals depending on animal species, doses and duration of exposure but also they can be transferred to human via the food chain. It seems therefore that there is a necessity of primary prevention of environmental health hazard.

Therefore, the following research program, coordinated by Prof. Dobrowolski, Prof. S. Ermidou-Pollet and Dr. S. Pollet

1. Research fields

- *Pollution of the environment due to anthropogenic activities* in industrial suburban region of Athens. One important problem is the contamination of drinking water by Cd
- *Pollution due to natural environmental exposure*

Due to high level of Mn in the soils (Mn-ore deposit), water sources contaminated by Mn have been detected in the the Northwest Peloponnese (where signs of Mn-intoxication have been observed) and in the North part of Greece.

**2. Research programs:**

- Measurement of individual exposition to pollution due to traffic using the standardised samplers produced in Krakow in relation to group of inhabitants of more or less contaminated residential districts in different regions of Greece and Poland..
- Applications of stimulation of plants cuttings, seeds and other biological materials by irradiation with lasers or laser diodes (according to results of laser biotechnology for environmental management applied in Poland since some years) for acceleration of growth of protective green areas alongside main streets,roads,parking places in regions for recreation,sport activity,residential areas or around old historical buildings.
- Use of XRF techniques for the following of the health status of the inhabitants of the "Mn-contaminated" region
- Studies of the soil composition and of the water mineral content from the "contaminated" regions.

These studies will be completed with practical recommendations to the Authorities of the cities and local society how to improve the quality of the environment and the human life. The results will be published in international Journals and presented in different international meetings or conferences

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ARLIN RICKARD \*

**FORWARD/ PRESENTATION /INTRODUCTION  
UNION DES TERRES DE RIVIERES (U.TdR)  
ASSOCIATION OF RIVERS TRUSTS (ART);  
LEADER, COMPONENT 5, COMMUNICATIONS**

- **Key words:** Communication, Cooperation, Partnership, Sustainable, Networking
- **Partners:** Union des Terres de Rivieres (France), Association of Rivers Trusts (UK), Obcianske Zdruzenie Sosna (Slovakia), Ajuntament de Tortosa (Espana), Rakoczifalva Nagykozseg Onkormanyzata (Hungary)

- **Abstract** (100 words)

Part funded by the EU Interreg IIIC Programme, Union des Terres de Rivieres (U.TdR) is an ambitious networking project of 24 partners across 10 EU Member States. Each country has its own language and distinct culture so ensuring good communications is a key cross-cutting theme.

The partners, who comprise municipalities, development agencies, universities and non governmental organisations (NGO's) have come together to share experience and knowledge on the impacts of society and land use, on water. Using the EU Water Framework Directive and the Ecosystem Approach as key common points of reference, U.TdR partners seek to develop and implement sustainable environmental and economic measures for the benefit of all EU citizens.

- **General Introduction Interreg IIIC, Union des Terres de Rivieres**

**Introduction**

Interreg III is a Community initiative which aims to stimulate interregional cooperation in the EU between 2000 - 2006. It is financed under the European Regional Development Fund (ERDF/ FEDER).

This phase of the INTERREG initiative is designed to strengthen economic and social cohesion throughout the EU, by fostering the balanced development of the continent through cross-border, trans-national and interregional cooperation. Strand C (Interregional cooperation), aims to improve the effectiveness of regional development policies and instruments through large-scale information exchange and sharing of experience (networks).

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United Kingdom, Cornwall (South West England), Tool: U.TdR Component 5, Communications, (Lead Partner: Association of Rivers Trusts)

Promoter: EU Interreg IIIC, U.TdR

Part funded by the EU Interreg III C Programme, Union des Terres de Rivieres (U.TdR) is an ambitious networking project of 24 partners across 10 EU Member States. Each country has its own language and distinct culture, so ensuring good communications is a key cross-cutting theme.

The partners, who comprise municipalities, development agencies, universities and non governmental organisations (NGO's) have come together to share experience and knowledge on the impacts of society and land use, on water. Using the EU Water Framework Directive and the Ecosystem Approach as key common points of reference, U.TdR partners seek to develop and implement sustainable environmental and economic measures for the benefit of all EU citizens.

### **Association of Rivers Trusts (ART) Leader Communications (Component 5)**

The communications component is led by Association of Rivers Trusts (ART), a national environmental NGO covering England and Wales that has wide experience of working in European projects. Although communications is a cross-cutting theme involving all partners, key responsibilities are shared between the Component 5 leader (ART) and the U.TdR secretariat, based in South West France. In addition other Component 5 partners include, Obcianske Zdruzenie Sosna, an NGO based in Kosice, Slovakia, responsible for the projects' website, Ajuntament de Tortosa, Cataluna, responsible for running the "University of Water" conference in the first year of the project and Rakoczifalva Nagykozseg Onkormanyzata, Hungary, responsible for the closing "University of Water" conference toward the end of the project. Key outputs include:

- The development of the Rivers Trust movement and sustainable networks
- Establishment and development of electronic communication (Information Technology)
- "Fact-finding" pro-forma study to establish IT equipment available, "hardware", "software", speed/ capacity and user ability and establish "common working" protocols
- Partners database of contacts and activities
- Production of project publications including electronic newsletters, brochures and reports
- Communications support at meetings
- Creation of common PowerPoint presentations and other media
- The establishment, development and maintenance of the U.TdR website by Sosna (Slovakia), [www.terresderivieres.com](http://www.terresderivieres.com)
- Establishment of European "decision makers and "opinion formers" database for dissemination of project findings and contribution to policy
- The opening "University of Water" in Tortosa (Rio Ebro - Espana)
- The closing "University of Water" Rakoczifalva (River Tisza - Hungary)

### **Language**

French is the official language of the project but English is also widely spoken. There are also a number of partners from Spain and Portugal so wherever possible Spanish

translation has been included giving most partners the chance to communicate in their “second” language of choice if not their first. It has been fortunate that the U.TdR secretariat have French, Spanish and English speaking personnel.

### **Communications Tools**

- Although IT development is to be encouraged it is important to run communications technology to at the pace of the “slowest” to avoid exclusion
- E-mail, telephone and face to face meetings have proven the most successful combination of forms of communication
- The use of electronic language translation software can be very helpful at minimum cost
- Where possible the use of pictures and graphics are preferable to text. E.g. “before & after” photographs, maps, graphs and charts
- Field visits where issues, practical work and activities may be studied at first hand are preferable to presentations
- Demonstration is a powerful communication tool to aid technology and information transfer

For further information, see U.TdR website: [www.terresderivieres.com](http://www.terresderivieres.com)

ART website: [www.associationofrivertrusts.org.uk](http://www.associationofrivertrusts.org.uk)

### **EU Law references:**

32000L0060, Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy *Official Journal L 327, 22/12/2000 P. 0001 - 0073*

Ecosystem Approach is a delivery tool of the Convention on Biological Diversity (CBD)

## **ROLE OF GEO-TOURISM IN THE SUSTAINABLE DEVELOPMENT OF GORNY ALTAI**

Last time world scientific, political and social organizations show interest in problems of mountains. In 1992 at the conference in Rio de Janeiro the conception of sustainable development was accepted. It contains the paragraph dealing the management of delicate mountain ecosystems. Moreover the OUN declared the year 2002 as the International year of mountains and Universal Tourist's Organization declared it as the year of ecological tourism.

Gorny Altai in Russia arouses interest with its nature originality, peculiar and picturesque landscapes. Various nature resources set up favourable conditions for the development of eco-tourism. In era of industrialization and urbanization the rapid growth of such market is determined by the desire of tourists to get to new, little-investigated regions that to enjoy the contact with the nature.

The territory of Gorny Altai is characterized by the interesting geological structure, presence of many unique geological and geographical objects (geo-objects). This sets up the necessary prerequisites for the development of geological tourism (geo-tourism). Geo-tourism is a journey with scientific, cognitive, entertaining and other aims using geological and geographical nature objects. Such type of tourist's activity we can refer to ecological tourism that doesn't harm natural ecosystems, contributes to the safe of environment, educates us to the harmony with the nature and also contributes to common weal.

Despite many disadvantages (Altai is the region which is difficult of access, especially some its separate districts, insufficient infrastructural development, limited investment, weak training of staff) eco-tourism in Altai can become the base of general strategy of sustainable development. Geo-tourism is the one of factors of such development of this territory. Routes provided on the basis of various and unique geo-objects can be the factor of reduction of ecological problems of this region.

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ISTVÁN SZABO\*

## RESTORATION OF “BUDOV KÚT” OXBOW

In municipal areas of villages Čaña, Ždaňa and Gyňov are situated three remnants of former meanders of the Hornád River, disconnected with the river during regulation works in 1950-ies. These meanders changed afterwards in consequence of human miss-management to oxbows, losing water step-by step. Because of these threats this area is losing its natural and environmental value. And still some decades ago it was a popular fishing and recreation site used by local people. The above mentioned threats (especially the pollution) have negative impact on quality of groundwater at this area. This fact has its value not only for people from surrounding villages, but also for U.S.STEEL Košice Company, utilising water from wells found in this area. Adverse effects of directing of the Hornád river in this part causes further negative effects:

- reduction of groundwater level, as a consequence of higher outflow of water from the area
- higher possibility of flood waves in artificially straightened river-bed
- reduced self-cleaning ability of the river, because this process is directly proportional to meandering ability of the river

SOSNA decided to start first to restore the oxbow called Budov kút at village Čaña. The technical project was prepared by the Slovak water-management company, Košice. This project they prepared without financial demand, as their input to River Coalition. In 2004 the first part of restoration works was realized in the field, lead by the SOSNA. During Autumn 2005 all the fieldworks were finished, connection between the oxbow and the Hornád river has been completed. It means, that during higher flows the oxbow will be filled with water and it will function as a wetland, important for water birds, fish, plants, invertebrates and other wetland life forms. Official opening ceremony was on April 20<sup>th</sup>, during the international conference on rivers restoration realised in the frame of Union des Terres de Rivieres INTERREG III project.

This activity was realised in frame of the River Coalition as a common input of several subjects: SOSNA Civic Association, business companies US STEEL Košice and Environcentrum s.r.o., local governments and villages Čaña and Ždaňa. The fieldworks consisted of work on the sluice, connecting the river and the oxbow at its entrance. It was necessary to build a concrete construction in diameter 3x3 m and length 5 m, building of the bridge at upper end of the oxbow, fixing the pipe at lower end of the oxbow and fixing the newly excavated part of the river – bed by stones and by planted willow trees.

We expect, that the period, while the oxbow will be filled with water, will after the restoration last longer and also groundwater levels should increase in the area. All hydrological data will be monitored by the Hornád watershed management institution and all impacts on aquatic ecosystems will be monitored by SOSNA and by our scientific advisors (zoologists, botanists, universities, students, etc.) and by local people from the region.

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## **GIS APPLICATION FOR COMPLEX MONITORING OF PROTECTED TERRITORIES (BY THE EXAMPLE OF RESERVATION “TOMSKY”)**

Reservation “Tomsky” is protected area, which was created to preserve the complex of natural resources, and also to maintain common ecological balance.

The priority tasks in the territory on the given territory consist of:

- Conditions of rare species of plants and animals population observations
- Studying of ecology of rare and disappearing species and ecosystems
- Estimation of direction of natural processes
- Identification of possible negative affect of nearby industrial centers and others.

It is better to do such works with use of GIS technologies, which allow to input, save, update, manipulate, analyse and output all kinds of geographically attached information. Analysis of available data and abilities of modern GIS technologies led to the decision of creation of the informational-analytical system of the reservation “Tomsky”.

The geoinformation system consist of:

1. Database (system of databases)

Factographical database is intended for collection and storage of information. DB consists of two table types: conditionally constant (reference-books) and informational, which are characterizing the territory.

Cartographical database of the territory, which is formed of maps of different themes.

2. Hardware-software complex

3. Methods and technologies of processing of complex monitoring data by means of GIS.

Big numbers of different factors were taken into account during the work. They were digitized and unified relative to the same geographical coordinates.

GIS allows to perform following functions:

- Creation, update and actualization of databases
- Spatial-time analysis and combined interpretation of attributes, fixed in the location; reveal of the correlation between investigated phenomenon.
- Synthesis of thematic, complex and specialized map materials.

GIS of special nature reserve “Tomsky” may be used for:

- Optimal distribution of the points of natural environments testing
- Estimation of the limit possible load
- Making decision in the field of management
- Provision of development of cognitive tourism
- Inventory, estimation and control for the state of natural complex.

Programs ArcView GIS, MS Access, Statistica, Surfer were used for the project.

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