

**Format for Biennial Reports by UNESCO's Water-related Centres on activities related to the IHP in the period (June 2014 – May 2016)**

**1. Basic information on the centre**

|   |                       |   |
|---|-----------------------|---|
| Name of the Centre                                  |                       | <b>European Regional Center for Ecohydrology of the Polish Academy of Sciences</b>  |
| Name of Director                                    |                       | Maciej Zalewski   |
| Name and title of contact person (for cooperation)  |                       | Paweł Jarosiewicz   |
| E-mail  |                       | erce@erce.unesco.lodz.pl  |
| Address   |                       | 3 Tylna Str., 90-364 Lodz, Poland<br>Phone: +48 42 681-70-07<br>Fax: +48 42 681-30-69   |
| Website   |                       | <a href="http://www.erce.unesco.lodz.pl">www.erce.unesco.lodz.pl</a>  |
| Location of centre                                  |                       | city/town Lodz country Poland   |
| Geographic orientation *                            |                       | <input type="checkbox"/> global <input checked="" type="checkbox"/> regional  |
| Region(s) (for regional centres)                    |                       | European  |
| Year of establishment                               |                       | 2006  |
| Year of renewal assessment                          |                       | --  |
| Signature date of most recent Agreement             |                       | 2006  |
| <b>Themes of activities during reporting period</b> | Focal Areas ·         | <input checked="" type="checkbox"/> groundwater<br><input checked="" type="checkbox"/> urban water management<br><input checked="" type="checkbox"/> rural water management<br><input type="checkbox"/> arid / semi-arid zones<br><input type="checkbox"/> humid tropics<br><input type="checkbox"/> cryosphere (snow, ice, glaciers)<br><input checked="" type="checkbox"/> water related disasters (drought/floods)<br><input type="checkbox"/> Erosion/sedimentation, and landslides<br><input checked="" type="checkbox"/> ecohydrology/ecosystems<br><input type="checkbox"/> water law and policy<br><input checked="" type="checkbox"/> social/cultural/gender dimension of water<br><input type="checkbox"/> transboundary river basins/ aquifers<br><input type="checkbox"/> hydroinformatics<br><input type="checkbox"/> remote sensing/GIS<br><input checked="" type="checkbox"/> IWRM<br><input checked="" type="checkbox"/> Watershed processes/management<br><input type="checkbox"/> global and change and impact assessment<br><input checked="" type="checkbox"/> mathematical modelling<br><input checked="" type="checkbox"/> water education<br><input checked="" type="checkbox"/> water quality<br><input type="checkbox"/> nano-technology<br><input type="checkbox"/> waste water management/re-use<br><input type="checkbox"/> water/energy/food nexus<br><input type="checkbox"/> water systems and infrastructure<br><input checked="" type="checkbox"/> other: (please specify):<br>ecohydrological biotechnologies |
|   | Scope of Activities · | <input type="checkbox"/> vocational training<br><input checked="" type="checkbox"/> postgraduate education<br><input checked="" type="checkbox"/> continuing education<br><input checked="" type="checkbox"/> public outreach<br><input checked="" type="checkbox"/> research<br><input checked="" type="checkbox"/> institutional capacity-building<br><input checked="" type="checkbox"/> advising/ consulting<br><input type="checkbox"/> software development   |

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\* check on appropriate box  
· check all that apply

|  |  |  |
|--|--|--|
|  |  | <input type="checkbox"/> data-sets/data-bases development<br><input type="checkbox"/> other: (please specify) _____  |
| Support bodies <sup>1</sup>                    |  | Government of Republic of Poland   |
| Hosting organization <sup>2</sup>              |  | Polish Academy of Sciences   |
| Sources of financial support <sup>3</sup>      |  | Main:<br>Ministry of Science and Higher Education<br><br>Additional:<br>- EU H2020 projects<br>- Life+ EU Projects<br>- National Funding Agencies projects (NCN, NCBiR)<br>- UNESCO Activity-Financing Contracts<br>- Consulting   |
| Existing networks and cooperation <sup>4</sup> |  | <u>International Networks:</u><br>- UNESCO IHP – member of the Special Task Force for IHP-VIII, Maciej Zalewski<br>- UNESCO IHP Ecohydrology Programme - member of the Scientific Steering Committee, Maciej Zalewski<br>- European Commission Joint Programming Initiative “Water Challenges for a Changing World” – Maciej Zalewski, Kinga Krauze, Polish representative<br>- ILTER (International Long Term Ecological Research), Kinga Krauze, Scientific Committee<br>- LTER Europe (A Long Term Ecological Research Network) – Kinga Krauze vice-chair of LTER.<br>- ALTER-Net (A Long-Term Biodiversity, Ecosystem and Awareness Research Network) - Kinga Krauze, member of Council,<br>- European Innovation Partnership on Water EIP Water AG RiverRes: Community of Practice on River Restoration – Kinga Krauze<br>- Science for Environmental Policy - Advisory Group members for newsletter – Joanna Mankiewicz-Boczek<br><br><u>International Projects:</u><br>- EU FP7 EXPEER: Distributed Infrastructure for EXPERimentation in Ecosystem Research. FP7-INFRASTRUCTURES-2010-1, Kinga Krauze<br>- EU Life+ EKOROB: Ecotones for reducing diffusion pollution. LIFE08 ENV/PL/000519, Maciej Zalewski, Katarzyna Izydorczyk<br>- EU life+ ENVEUROPE: Environmental quality and pressures assessment across Europe: the LTER network as an integrated and shared system for ecosystem monitoring. LIFE08 ENV/IT/000399; Kinga Krauze<br>- eLTER H2020: European Long-Term Ecosystem and Socio-Ecological Research Infrastructure. GA: 654359 – H2020-INFRAIA-2014-2015, Kinga Krauze |

<sup>1</sup> please specify bodies that cover the operational costs of the centre, and other essential costs such as salaries and utility bills, and that provide institutional support to ensure centre’s sustainability

<sup>2</sup> if different from support bodies

<sup>3</sup> please specify sources of main budgetary and extra budgetary funds to implement projects

<sup>4</sup> please write international networks, consortiums or projects that the centre is part of, or any other close links that the centre has with international organizations or programmes, which are not already mentioned above

|                                       |   |
|---------------------------------------|---|
|                                       | <ul style="list-style-type: none"> <li>- ESSEM COST Action ES1105 - CYANOCOST: Cyanobacterial blooms and toxins in water resources: Occurrence, impacts and management, Joanna Mankiewicz-Boczek</li> <li>- Testing the cascading thresholds approach for management alternatives in water-food-energy nexus – developing framework for dealing with wicked problems- University of Colorado, US, Kosciuszko Foundation, Kinga Krauze</li> <li>- Polish – French Project “Sustainable development and management of river catchments at the example of Rhone and Loire river in France”, Edyta Kiedrzyńska.</li> <li>- Polish - Czech project “Horizontal beaming as an element of acoustical fish stock estimation in lakes”, Małgorzata Godlewska</li> <li>- Polish – China project “Spatial-temporal distribution patterns of fishes and their relationship with algae bloom in large lakes, Małgorzata Godlewska</li> </ul> |
| Governance                            | <p>X director and governing board<br/> <input type="checkbox"/> other: (please specify) _____</p> <p>Link to election of board members to the IHP Intergovernmental Council (IGC) and hosting country IHP National Committee _____</p> <p>Frequency of meetings: once every 2 year(s)<br/> X Existence of UNESCO presence at meetings</p>   |
| Institutional affiliation of director | European Regional Center for Ecohydrology of the Polish Academy of Sciences   |
| Number of staff and types of staff    | total number of staff (full-time, or equivalent): 18<br>number of staff who are water experts: 11<br>number of visiting scientists and postgraduate students: 4   |
| Annual turnover budget in USD         | 0,53 million  |

## 2. Activities undertaken in the framework of IHP in the period June 2014 – May 2016

- 2.1 Educational activities (i.e., those with accreditation) that directly contributed to the IHP-VIII (Appendix 1) and WWAP  
*Please include here those activities which led to accreditation of degrees, or those held in formal school settings.*

On the basis of Cooperation Agreement between ERCE PAS and University of Lodz in a field Ecohydrology, ERCE PAS participated in research of the following **master thesis in cooperation with Department of Applied Ecology University of Lodz**, in 2014-2016:

- Bartłomiej Szejn 2014. The role of buffer zones in reducing diffuse pollution, including analysis of surface runoff in the buffer zones in agricultural areas
- Kiszakiewicz Agata, 2014. Hydrological regulation of succession and self-purification of urban rivers
- Kolate Elina, 2014. Denitrifying barrier as an effective method to reduce the nitrogen load in groundwater
- Lewandowska Justyna, 2015. Influence of urban green areas on ecological, economic and social capital of the city of Lodz
- Magdalena Kobus 2015. Analysis of the effectiveness of ecotones constructed on the shoreline of Sulejow Reservoir
- Pałkin Ewa, 2015. Comparative analysis of the possibilities of using sewage sludge and sediment as soil fertilizers

- Pietrasik Joanna, 2014. Comparison of denitrifying bioreactors in nitrogen removal from agricultural waste water
- Sobociński Adam, 2015. Comparison of the efficiency of removal of nitrogen compounds in the denitrification beds activated and non activated microbiological
- Tygielska Adrianna, 2014. Spatio-temporal dynamics of selected micropollutants in the urban river on the example of the Sokolowka
- Walaszkiwicz Marta, 2015. The efficiency of wastewater treatment in the Sequential Biofiltering Model System in the wastewater treatment plant in Rozprza
- Wiązek Michał, 2014. Characteristics of populations of denitrifying bacteria colonizing beds to reduce nitrate compounds,

### **Participation in the ERASMUS MUNDUS Master of Science in Ecohydrology**

ECOHYD is a unique international master course focusing on a new perspective on aquatic ecosystems restoration and long-term sustainability. The Ecohydrology Master Course is supported by a consortium build on highly experienced Higher Education Institution (HEI) in this field, as the UNESCO Institute for Water Education (Delft, Netherlands), the University of Lodz (Poland), the University of Algarve (Portugal), the Christian Albrecht University of Kiel (Germany) and the National University of La Plata (Argentina). Several institutions, as Research and UNESCO Centers, from Europe, Latin America, Asia and Australia are Associate Members of this course, contributing with their expertise in particular scientific areas, with offering advanced study courses and students exchange. The programme is facilitated by the European Commission for Education and Training and its ERASMUS MUNDUS Programme.

- 2.2 Research activities that directly contributed to the IHP-VIII activities  
*Please include research/applied projects outputs such as publications that directly contributed to the IHP-VIII and WWAP objectives*

#### **Research projects:**

- EU FP7 EXPEER: Distributed Infrastructure for EXPERimentation in Ecosystem Research. FP7-INFRASTRUCTURES-2010-1.
- EU Life+ EKOROB: Ecotones for reducing diffusion pollution. LIFE08 ENV/PL/000519.
- EU Life+ ENVEUROPE: Environmental quality and pressures assessment across Europe: the LTER network as an integrated and shared system for ecosystem monitoring. LIFE08 ENV/IT/000399
- eLTER H2020: European Long-Term Ecosystem and Socio-Ecological Research Infrastructure. GA: 654359 – H2020-INFRAIA-2014-2015
- CYANOCOST: Cyanobacterial blooms and toxins in water resources: Occurrence, impacts and management
- Testing the cascading thresholds approach for management alternatives in water-food-energy nexus – developing framework for dealing with wicked problems- University of Colorado, US, Kosciuszko Foundation, Kinga Krauze
- Polish – French Project “Sustainable development and management of river catchments at the example of Rhone and Loire river in France”. Edyta Kiedrzyńska.
- Polish - Czech project “Horizontal beaming as an element of acoustical fish stock estimation in lakes”, Małgorzata Godlewska
- Polish – China project “Spatial-temporal distribution patterns of fishes and their relationship with algae bloom in large lakes, Małgorzata Godlewska
- Do fish adapt to cyanobacterial blooms?, UMO-2012/05/B/NZ9/00980, Małgorzata Godlewska

- Application of reporter cell biosensors in ecotoxicology of cyanobacteria: new targets for bioactivity, UMO-2012/07/B/NZ8/03991, Joanna Mankiewicz-Boczek
- Microbial activators in denitrification deposits used for the treatment of nitrate pollution for the implementation of the Water Framework Directive and the Nitrates Directive PBS1/A8/0/2012, Maciej Zalewski, Joanna Mankiewicz-Boczek
- Assessment of the interaction between hepatotoxic cyanobacterium *Microcystis aeruginosa* and pathogenic bacteria of the genus *Aeromonas*, UMO-2012/07/N/NZ8/00599, Ilona Gagała
- Impact of sludge originated PCDDs/PCDFs on soil contamination and *Salix* sp. metabolism. Project financed by NCS no. UMO-2013/09/D/ST10/04043. Magdalena Urbaniak.
- The role of rhizosphere bacteria and plants of the family Cucurbitaceae in the process of removing of toxic compounds of PCDD/PCDF. Project financed by MSHE no. 0492/IP1/2015/73. Magdalena Urbaniak.

E. Kiedrzyńska - the winner of the competition for scientific-research internship and research stay (BGF Scientific Research Stay Scholarship) in the French Center of Science, announced by Ambassade de France en Pologne and Institut Francais en Polone). Scholarship funded by the Government of the Republic of France. Scientific stay took place at the University of François Rabelais in Tours, France, 8-30.08.2015, Chambéry-Tours, France.

**List of publications** attached in annex 8.1.

- 2.3 Training activities that directly contributed to the IHP-VIII and WWAP objectives

**Courses prepared and delivered within the ECOHYD - Erasmus Mundus Master of Science in Ecohydrology, developed in the collaboration with the University of Lodz**

1. Ecohydrology
2. Ecotoxicology
3. Environmental / Landscape Planning
4. Ecological Risk Assessment
5. Urban Ecohydrology
6. Phytotechnologies & Phytoremediation
7. Wetlands & Land-Water Ecotones

The target audience for the courses were the students accepted for the Erasmus Mundus course 2014-2015. The training involves classes, practicals and field work. The group included both students continuing their academic experience as well as professionals, who targeted at enhancing their knowledge, completing their education or reaching proficiency in broadly understood ecohydrology. The number of participants ranged from 10 to 15, depending on the course and the gender balance was maintained throughout the course.

**Course prepared and delivered within the ECOHYD - Erasmus Mundus Master of Science in Ecohydrology, Summer School 2014, led by the University of Algarve and the International Centre for Coastal Ecohydrology:**

- **Long-term research in ecosystem management**

The course has been delivered on 4-6th August 2014 as a part of the Summer School. It included lectures, discussion groups and practicals. The target audience was the group of Erasmus Mundus students. The group included students continuing their academic experience, professionals, who targeted at enhancing their knowledge, completing their education or reaching proficiency in broadly understood ecohydrology. It has been attended by 15 people, with maintained gender balance (9 women, 6 men).

## **Course prepared and delivered in collaboration with the University of Algarve and the International Centre for Coastal Ecohydrology:**

### **- Urban ecohydrology**

The course has been delivered on 5-6 and 13-14 March 2015. The target audience were professionals completing their specialist education in ecohydrological solutions to water management in cities. The group included 9 people, half of them were women.

### **- Long-Term Socio-Ecological Research for solving wicked problems in water management.**

The course has been delivered on 4-6 August 2014, at the Federal University of Vitoria, Vitoria, Brazil. The target audience was the group of Erasmus Mundus students attending Winter Course. It has been attended by 15 people continuing their academic experience and education.

### **- Nature for the water management in the city.**

Workshops organized within the International Water Days in collaboration with the Centre of Ecological Education "Źródła", in August 2013, in Łódź. The target audience were city inhabitants interested in implementation of ecohydrology in the City and the role of nature based solutions in integrated water management. The workshops has been attended by 40 people, both adults of different professional backgrounds and children.

## **Interships:**

### **- Ecohydrology for protection and sustainable use of water in rural-urban environment.**

The 8 - month intership for the alumnus of the Instituto Internacional de Ecologia, São Carlos, Brazil - MSc Pedro Gatti Junior.

### **- Molecular methods for tracking presence, variability and the specificity of organisms**

The 3-month intership for the alumnus of the ECOHYD - Erasmus Mundus Master of Science in Ecohydrology - Mr. Ruben Roc Pamies

### **- Application of biochemical and genetic tool in determination of threats and elaboration of solution of ecological biotechnology**

The 3-week intership for the student of the Faculty of Process and Environmental Engineering, Lodz University of Technology, Poland - MSc Martyna Olczak.

The 3-week intership for the student of the Faculty of Biology and Environmental Protection, University of Silesia, Poland - MSc Alexander Kowalczyk.

## Activities supported by the LIFE+ EKOROB project:

### **International Workshops Innovative and system solutions for mitigation of diffuse pollution: demonstration catchments in Europe under patronage of the Ministry of Environment for stakeholders of LIFE+EKOROB Project**

On 2 - 4 June 2014, in Bronisławow, International Workshops 'Innovative and system solutions for mitigation of diffuse pollution: demonstration catchments in Europe' were held. They were organised under LIFE+ EKOROB Project 'Ecotones for reducing diffuse pollution' (LIFE08 ENV/PL/000519), under honorary patronage the Ministry of Environment, by the Regional Water Management Authority in Warsaw and the European Regional Centre for Ecohydrology of the PAS.

The workshops were organised to present and discuss proposed solutions to reduce diffuse pollution, which were developed under EKOROB Project and compiled as the Action Programme, which listed the proposals consulted during meetings of the Platform of Stakeholders. The Polish experience and tools elaborated under EKOROB Project implementation

were presented in the context of actions delivered to reduce diffuse pollution in other European states.

The conference was attended by 98 participants representing 7 foreign institutes and 37 institutions involved in environmental protection, water management and agriculture, scientific institutions, personnel of agricultural consultation centres, representatives of local governments, ecology-oriented organisations, and chambers of agriculture.

**Specialist Training for Personnel of the Regional Boards of Melioration and Water Devices: Buffer zones and other measures to reduce diffuse pollution from agricultural areas, and improvement of the water condition**

On 2-3 July 2014, in Smardzewice, a specialist training 'Buffer zones and other measures to reduce diffuse pollution from agricultural areas, and improvement of the water condition' was delivered. The training was developed for personnel of the Regional Boards of Melioration and Water Devices from the territory covered by EKOROB Project – Lodzkie, Silesia, and Swietokrzyskie Provinces.

42 participants representing the following institutions took part in the training: Board of Melioration and Water Devices in Katowice; Board of Melioration and Water Devices in Kielce; Board of Melioration and Water Devices in Lodz; Regional Directorate for Environmental Protection in Lodz; Institute of Technology and Life Sciences; Department of Applied Ecology of the University of Lodz; Polish Angling Society, branch in Piotrkow Trybunalski.

**Specialist training for nature and biology teachers: Buffer Zones to Reduce Diffuse Pollution in School Education**

On 21 - 22 October 2014, in Smardzewice a specialist training entitled 'Buffer Zones to Reduce Diffuse Pollution in School Education' was delivered. This training was developed for life science and biology teachers from the area covered by EKOROB Project, and addressed to teachers of schools located on Sulejow Reservoir in particular.

35 participants, including 29 teachers – life science and biology teachers representing the elementary and lower secondary schools, and an academic teacher of the Department of Applied Ecology of the University of Lodz, took part in the training.

Participants of the workshops also took part in simulation games, exercises and learning activities proposed by Ms. Marta Jermaczek-Sitak of the 'Zrodla' Centre for Ecological Activities. Teachers who took part in the workshops played the roles of students, and participated in fragments of demonstration lessons or modelling of teachers' work with students in terms of the topics of agricultural pollution, circulation of nitrogen and phosphorus, eutrophication processes and ecotones.

**Specialist Training for Employees of the Swietokrzyskie Agricultural Consultation Centre: Buffer Zones and Other Measures for Reducing Diffuse Pollution from Agricultural Areas**

On 18-19 June 2015, in Modliszewice, in the headoffice of the Swietokrzyskie Agricultural Consultation Centre, a 2-day specialist training entitled 'Buffer Zones and Other Measures for Reducing Diffuse Pollution from Agricultural Areas' was held for 28 employees of the Swietokrzyskie Agricultural Consultation Centre.

**Specialist Training for Employees of the Silesia Agricultural Consultation Centre: Buffer Zones and Other Measures for Reducing Diffuse Pollution from Agricultural Areas**

On 15-16 September 2015, in Zawada Pilicka, a 2-day specialist training entitled 'Buffer Zones and Other Measures for Reducing Diffuse Pollution from Agricultural Areas' was held for 29 employees of the Silesia Agricultural Consultation Centre.

**Information and educational meeting within EKOROB Project**

6 Educational Meetings to raise ecological awareness of local communities in the field of causes and effects of the pollution from agricultural areas, and methods of its reduction. Presentation of ecotonic zone activity, including the use of denitrification wall as a solution for sustainable prevention of pollution influx coming with groundwater from intensively used land.

### **3. Collaboration and linkages**

- 3.1 Participation in major international networks, programmes, partnerships with other UN or other International Agencies, media and professional bodies

#### **UNESCO IHP**

- Maciej Zalewski – member of the Special Task Force for IHP-VIII
- Maciej Zalewski – member of the Scientific Steering Committee of the UNESCO IHP Ecohydrology Programme;

#### **Other International Programmes:**

- European Commission Joint Programming Initiative “Water Challenges for a Changing World” – Maciej Zalewski, Kinga Krauze, Polish representatives

#### **International Networks:**

- ILTER (International Long Term Ecological Research), Kinga Krauze, Scientific Committee
- LTER Europe (A Long Term Ecological Research Network) – Kinga Krauze vice-chair of LTER.
- ALTER-Net (A Long-Term Biodiversity, Ecosystem and Awareness Research Network) - Kinga Krauze, member of Council,
- CYANOCOST: Cyanobacterial blooms and toxins in water resources: Occurrence, impacts and management -Joanna Mankiewicz-Boczek
- European Innovation Partnership on Water, EIP Water AG RiverRes: Community of Practice on River Restoration- Kinga Krauze
- Science for Environmental Policy - Advisory Group members for newsletter, Joanna Mankiewicz-Boczek, member of Advisory Group

- 3.2 Participation in meetings related to the IHP and UNESCO (e.g. the UNESCO General Conference, the UNESCO Executive Board, the IHP Intergovernmental Council and/or other meetings organized by IHP)

- 21<sup>st</sup> session of the IHP Intergovernmental Council, 18 – 20 June 2014, Paris, France, Maciej Zalewski
- Meeting of water related UNESCO Category II Centres, 15-17 December 2014, Koblenz, Germany, Katarzyna Izydorczyk
- World’s Large Rivers Initiative UNESCO International Hydrological Programme (IHP), 25-26 June 2015, Vienna, Austria, Maciej Zalewski
- Scientific seminary in the Mission Val de Loire of UNESCO, 18 August 2015, Tours, France. Edyta Kiedrzyńska
- Ecohydrology’ 2015 Measuring, Modeling and Managing of the natural processes related to water flows, Social values of the linked ecosystem services, 21 - 23 September 2015, Lyon (France). Honorary patronage of UNESCO IHP VIII., Maciej Zalewski, Kamila Belka, Kinga Krauze, Edyta Kiedrzyńska
- UNESCO-IHP European Regional Consultation Meeting, 1-4 December 2015, Koblenz, Germany, Agnieszka Bednarek
- Meeting of water related UNESCO Category II Centres and UNESCO Chairs, and COP21, “Water, People and Cooperation: regional perspectives in a context of climate change”, 2-3 December 2015, Paris, France, Kinga Krauze
- UNESCO Ecohydrology Scientific Advisory Committee, 25 February 2016, Paris, France, Maciej Zalewski

3.3 Collaboration and networking with other UNESCO category 1 or 2 institutes/ centres

3.3.1 cross-appointment of directors of the category 1 or 2 institutes or centres on the governing board

Maciej Zalewski - member of ICCE (Portugal) Governing Board  
Iwona Wagner - Chair of the UNESCO-IHE Governing Board

3.3.2 exchange of information on activities such as training/educational materials, and funding opportunities

website: [WWW.erce.unesco.lodz.pl](http://WWW.erce.unesco.lodz.pl)

3.3.3 exchange of staff, most notably professionals and students

Visit of Prof. Demin Zhou from Capital Normal University, China; Vice-chair of the UNESCO Committee on Hydroinformatics in Ecohydrology and International Steering Committee of Ecohydrology Programme UNESCO-IHP, May 2014, Lodz, Poland.

3.3.4 implementation of joint activities, such as workshops, conferences, training programmes, joint projects, field visits, software and data sharing, knowledge exchange and publications

European Regional Centre for Ecohydrology of the Polish Academy of Sciences was the focal point in conception and up-till-now actions towards establishing **the African Regional Centre for Ecohydrology u/a UNESCO** (ARCE) in Addis Ababa, Ethiopia, the new regional Category 2 Centre for dissemination of Ecohydrology in Africa. The input at establishing this Centre begun from staff education through many years traineeships (UNESCO) and study programmes (Erasmus Mundus) and 5 years of implementation projects through governmental Polish Aid Programme (2008-2012) where, among others, specific ecohydrological solutions were developed and implemented in demonstration sites. The last two years were devoted to formal and organisational activities at the Ethiopian side in the hosting-to-be institution – the Ministry of Water, Energy and Irrigation – for the establishment of the African Regional Centre for Ecohydrology u/a UNESCO. Simultaneously, the preparations for International Launching Conference of the African Regional Centre for Ecohydrology u/a UNESCO and Advanced Study Course on Ecohydrology to be held in November 2016 are under way with the leading role of the Ethiopian party. ERCE role is the support through experience sharing and mentoring, as well as the input into conceptual and scientific side of the conference and the study course. Ecohydrology developments in Ethiopia were presented by Yohannes Zerihun Negussie, Ethiopian Ministry for Water, Energy and Irrigation, Office for Ecohydrology internationally, e.g. at EcoHydrology' 2015, Lyon, France, 21 to 23 September 2015, supported by UNESOCO-IHP.

The Centre also supports (as a scientific partner) the aspirations of the Sokoine University of Agriculture to launch **Ecohydrology dissemination and demonstration centre in Morogoro, Tanzania.**

Knowledge exchange with:

- International Center for Coastal Ecohydrology & Algarve University, Portugal,
- UNESCO-IHE Institute for Water Education in Delft, the Netherlands,
- Asia-Pacific Center for Ecohydrology, Indonesia,

3.4 Relationships with the UNESCO field and regional office whose jurisdiction covers the country of location

None

- 3.5 Relationship with the UNESCO National Commission and the IHP National Committee in the country of location and with other organizations of other countries

Maciej Zalewski – chairman of Polish Committee IHP UNESCO

- 3.6 Relationship with other UNESCO-related networks, such as UNESCO Clubs, ASPnet, and UNESCO chairs

**Collaboration on the establishing of the UNESCO Chair in Ecohydrology**

UNESCO Chair in "Ecohydrology: water for ecosystems and societies" at the University of Algarve, Portugal - joint initiative of University of Algarve, ICCE, ERCE, UNESCO IHE, and other UNESCO Centres and Chairs

**4. Communication**

- 4.1 Communication and knowledge dissemination activities undertaken in the framework of IHP

**Meetings/conferences/courses organized & co-organized by ERCE:**

- Ecohydrology' 2015 Measuring, Modeling and Managing of the natural processes related to water flows, Social values of the linked ecosystem services 21 - 23 September 2015, Lyon (France), M. Zalewski, E. Kiedrzyńska - Members of the Scientific Committee of the International Conference  
Ecohydrology & Hydrobiology journal will publish special issue containing best selected papers concerning the aims and scope of the conference.
- European Ecological Federation Congress, Workshop on Ecohydrology andILTER Days, 21- 25 September 2015, Rome, Italy.
- Cyclic National Conference Bioindication "Practical use of bioindication systems to assess the quality and toxicity of the environment and chemicals." (28-30 May 2014, Olsztyn, 27-29 May 2015 Lublin, 20-22 April 2016 Szczecin)

**Participation in meetings/conferences:**

- International Workshop on "River Restoration: towards an agenda for research, action, and teaching". 22 - 23 May 2014, Chinon (France) M.Zalewski
- 7th World Water Forum, 15 April 2015, Daegau Gyeongbuk (Korea):
  - M. Zalewski. Establishing the foundations for success: the science, benefits and relevance of ecohydrology
  - M. Zalewski. Setting the scene: reviewing and assessing the current state of ecosystems and risks to water security.
  - M. Zalewski. Role of STI (Science, Technology and Innovation) for ensuring ecosystem services
  - M. Zalewski. Panelist - Concluding Session 3.2: Managing and Restoring Ecosystems for Water Services and Biodiversity
- International Symposium for 23rd Anniversary of World Water Day 2015, 16 April 2015, Daegau Gyeongbuk (Korea). M. Zalewski. Integration of ecohydrology, biotechnology and engineering for sustainable aquatic ecosystem services. Invited Lecture
- Ecohydrology 2015. 21-23 September 2015, Lyon (France) M. Zalewski. Dual regulation and ecosystemic biotechnologies for enhancement ecohydrological potential of the catchments, opening lecture
- 3rd Symposium on health rivers and Sustainable Water Resource Management, 21-23 October 2015, Chongging (China) M. Zalewski.

- Blue Green Interplay for Sustainable River Basins and Water Resources Management. Plenary, opening lecture
- Environmental Risk - Assessing and Managing Multiple Risks in a Changing World, 16-18 November 2015, Roskilde (Denmark) M. Zalewski. Reduction of Environmental risk and amplification opportunities for sustainable future. Invited Lecture
  - II International Scientific Conference OXYGENALIA – Water the molecule of life, 7-8 November, Poznań. Zalewski M., Mankiewicz-Boczek J. Ecohydrology, molecular biology and biotechnology for the harmonization of biogeosphere potential with the needs of societies, Invited Lecture
  - 15th World Lake Conference 31.08.-05.09.2014, Perugia (Italy), K. Izydorczyk
  - Konferencja: Ochrona i rekultywacja jezior. 9-13.06.2015, Przesiek-Toruń (Polska), K. Izydorczyk
  - Konferencja: Sposoby ochrony i rekultywacji jezior poznańskich, 22.09.2015 r, Poznań (Polska), K. Izydorczyk
  - UNESCO IHP Day at COP21, "Water, People and Cooperation: regional perspectives in a context of climate change", Paris, 2-3 December 2015, K. Krauze
  - JPI-Water as a framework for Research and Innovation Actions. Polish and Norwegian research on climate and environment, Strategies and actions – polar research – climate change – technology, 19-20 November 2015, Sopot, Poland, K. Krauze
  - International Conference "Transport of Water, Chemicals and Energy in the Soil – Plant – Atmosphere System", 2.11.2015, Bratislava, Slovakia. E. Kiedrzyńska and Zalewski M. "Ecohydrology - regulation of processes for enhancement ecological potential on the catchment", Invited Lecture
  - 58th Annual Symposium of the International Association for Vegetation Science. 19–24.07.2015, Brno, Republika Czeska, E. Kiedrzyńska
  - The national conference: Transformation of pollutants in the environment. 11-12 December 2014, AGH, Cracow (Poland), E. Kiedrzyńska
  - International Multidisciplinary Scientific GeoConference SGEM 2014, 14th Goeconference. on Water resources, forest, marine and ocean ecosystems. 17-26 June, Albena Resort (Bulgaria) M. Urbaniak
  - 6th Bioremediation Conference. 29 June-2 July 2015, Chania, Crete, (Greece) M. Urbaniak
  - 51st Congress of the European Societies of Toxicology Bridging Sciences for Safety. 13 - 16 September 2015, Porto (Portugal), M. Urbaniak
  - Scientific conference: Evaluation of agricultural soils. 26-27 June, Puławy (Poland), M. Urbaniak
  - The national conference: Transformation of pollutants in the environment. 11-12 December 2014, AGH, Cracow (Poland) M. Urbaniak
  - XII Symposium: Trace elements in the environment. 17 - 19 November 2015, Puławy, Poland M. Urbaniak.
  - VIII Ogólnopolska Konferencja Hydromikrobiologiczna Mikroorganizmy - Człowiek – Środowisko, 14-16 września 2015, Gliwice, Joanna Mankiewicz-Boczek , Agnieszka Bednarek A., Ilona Gągała , Liliana Serwecińska
  - Global Biotechnology Congress 2015, 22 - 25 July, 2015, Boston, MA, USA, Joanna Mankiewicz-Boczek, Agnieszka Bednarek,
  - 9th Symposium for European Freshwater Sciences, 5-10 July 2015, Geneva, Switzerland, Joanna Mankiewicz-Boczek, Ilona Gągała, Aleksandra Jaskulska
  - 34th International Conference of the Polish Phycological Society "Algae an Indicators of Environmental Changes", 18-21 May 2015, Rzeszów – Polańczy, Joanna Mankiewicz-Boczek, Ilona Gągała, Aleksandra Jaskulska
  - 8th Shallow Lakes Conference: Shallow Lakes in a Fast-Changing World, 12-17 October, Antalya, Turkey. Małgorzata Godlewska

- 17th Workshop of The International Association of Phytoplankton Taxonomy And Ecology (IAP), 14 - 21 September, Kastoria, Greece. Ilona Gaęała
- Conference of the Polish Phycological Society, Cyanobacterial and algal blooms – effects on water management and human health, 19 - 22 May, Gdynia – Cetniewo, Poland. Ilona Gaęała
- Kongresie technicznym WOD-KAN-EKO, 6-7 November 2014, Iwona Wagner, invited lecture

#### 4.2 Policy documents and advice

Opinion for the second stages of the work "Developing methodologies for assessing the state of pollution of bottom sediments of rivers, lakes, reservoirs and river channels in Poland" made for the Chief Inspectorate of Environmental Protection in Warsaw;

Comprehensive analysis of the condition of Lake Wielgie Dobiegniewskie based on the physicochemical and biological parameters of water and sediment monitored in the period June - October 2014 – a report for the Micronature Environment

Comparative analysis of the condition of Lake Wielgie Dobiegniewskie based on physico-chemical and biological water parameters and sediment monitored in May 2014 and 2015 - a report for the Foundation in Harmony with Nature

Diagnosis of the current state of the ecological processes and the hydrological conditions of the direct catchment of the planned water reservoir "Zajaczek" on the Pisia River in Łask as a preparatory step to the conception, design and construction of the mentioned reservoir using ecohydrological solutions (biotechnologies) to prevent negative effects of damming the river and showing possible ways of their elimination. Made for Łask Commune

### 5. Update on Centre Operations

- 5.1 Membership of the Board of Governors between designated period
- 5.2 Key decisions made (attach minutes of meetings)

### 6. Evidence of the Centre's Impacts

- 6.1 Science Impacts (Major contributions to the science, technology, education, and regional and/or international cooperation in the field of water)

**List of publications** attached in annex 8.1.

#### **Demonstration Activities:**

- UNESCO EH Global Reference Project Ecohydrology based urban water management and city planning for human health and sustainable development in City of Lodz, POLAND.
- UNESCO IHP Demonstration Projects on Ecohydrology Pilica River Catchment - "Application of Ecohydrology and Phytotechnology for Water Resources Management and Sustainable Development"
- ILTER Task Force on Ecohydrology, initiated during the Annual ILTER Conference in October 2015, Rome, Italy
- ILTER based collaboration with ICSU PECS on Changes in biodiversity and tradeoffs among ecosystem services, stakeholders and components of well-being

- 6.2 Knowledge Transfer Impacts (Major achievements in the dissemination of knowledge and technology transfer)

European Regional Centre for Ecohydrology, PAS has been publishing the **international journal Ecohydrology & Hydrobiology** since 2001. From 2013 on, the journal entered a new phase of development, when it started to be published under Elsevier imprint and joined the Scopus and ScienceDirect platforms. This stimulated the visibility of the published scientific work in the journal's aims and scope, reflected in the rise in some basic journal matrices, for example simulated Impact Factor equaled for  $IF(2015) = 1,071$  against simulated for 2014  $IF(2014) = 0,879$ , and the Hirsh Index  $h = 15$ . The next step would be applying for official Impact Factor calculation which should be completed this year.

Beginning from 2016 the journal has launched a strategic co-operation in publishing partnering with Key Laboratory of Reservoir Aquatic Environment, Chinese Academy of Sciences which is expected to boost dissemination of Ecohydrology across China and accelerate the development of integrative sustainability science in South-East Asia. On the hand, the scientific knowledge, understanding and experience of Chinese colleges will accelerate the new and creative development and application of Ecohydrology science and methods for achieving the common goal-sustainable future we want.

The first two issues of 2016 are devoted to the theme "New Challenges and Dimensions of Ecohydrology" consisting of short synthetic articles aimed at fostering new research directions and strengthening the existing ones, based on identified gaps and current sustainability challenges. The list of authors consists of the high quality scientists of various environmental fields who over their scientific curricula contributed to the development of Ecohydrology, especially the members of the UNESCO's Scientific Advisory Committee on Ecohydrology.

#### **Lectures for international bodies and organizations:**

- Invited lecture, Maciej Zalewski: Restoring the world's river's and watersheds with ecohydrology. 'Moonlight of the March'- series of lectures . Florida (USA), 26 February 2014,
- Invited lecture, Małgorzata Godlewska: Do fish and cyanobacteria blooms coexist in space and time? Example of Sulejów Reservoir, Poland. University in Nanchang (Chiny), November 2014
- Invited lecture, Dr Kinga Krauze: The wicked problems of water sustainability - from concept to implementation, ILTER Scientific Conference, December 2014, Chile

#### **Visits in ERCE:**

- Visit of prof. Ruben Lara, Argentine Institute of Oceanography, Argentina; a long-term collaborator in the field of Coastal Ecohydrology. Lectures on: Ecohydrological adaptive approach and management perspectives in a rapidly changing semiarid environment. May 2014,
- Visits of Akashah Majizat, Rahman from Putrajaya Corporation's Head of Environment, Lake and Wetland Section and the Principal of a Civil Engineering Consulting and Services firm in Kuala Lumpur, Malaysia. 11 September 2014,
- One-month Trainship of Prof. Azime Tezer, Urban and Regional Planning Department, Istanbul Technical University (ITU). 7 August - 4 September 2015,
- Visit of Elena Kolate, 4-6 April 2016 representing the municipality of Salacgriva, Latvia. Working meeting aiming at the commencement of cooperation on the introduction, application of ecohydrological biotechnologies, developed in ERCE, to reduce pollution from agriculture areas in Latvia

- 6.3 Policy Impacts (advice sought by government and other bodies and evidence of inputs into policy arena)

#### **The interdisciplinary research group for sustainable city development**

A platform of collaboration between academics and the city of Lodz authorities targeted at development of demand-driven research, filling the knowledge gaps in the areas of environment, sociology, economics and geography in the management system of the city and development of fast feedback loop between scientists and governors for better navigation of city projects.

#### **Multi-Stakeholders' Platform within EKOROB Project**

Stakeholders (regional authorities, local authorities, NGO, universities) has been identified and integrated through development of a multi-stakeholders' platform in order to share experience, transfer know-how and make decisions in accordance with the concept of public participation in the decision making process for sustainable development.

#### **Development "Actions Plan to reduce diffuse pollution in the Pilica catchment"**

It is a comprehensive document concerning the diffuse pollution formation and prevention in the Pilica catchment. It starts with a description of the catchment's characteristics, identifies agricultural and municipal pressures, prescribes tools, and identifies the areas in a way to ensure that the proposed solutions in terms of reducing pressures coming from agriculture and municipal management are adapted to the local needs, both in the field of the environment and community.

### **7. Future activities that will contribute directly to IHP and/or to WWAP**

- 7.1 Operational Plan (attach if available)

ERCE recently focused on:

- a. project which are implementing EH biotechnologies & systemic solutions
- b. dissemination by E&H journal.

Ecohydrology & Hydrobiology is a supporting journal of Ecosummit 2016.

Ecological Sustainability: Engineering Change conference that will take place 29 August - 1 September 2016 in Montpellier, France.

- 7.2 Strategic Plan linked with IHP-VIII (Appendix 1). Focal areas within IHP-VIII the centre plans to contribute to and specific actions the centre will undertake to align its activities with the strategic plan for IHP-VIII

### **8. Annexes**

- 8.1 List of publications released by the centre (there can be overlap with those listed in 2.3 above)

Anthony, C., Beskow, S., Dornelles, F., Fushita, A., Galharte, C., Galvão, P., Gatti Junior, P., Gücker, B., Hildebrandt, A., Karthe, D., Knillmann, S., Kotsila, P., Krauze, K., Kledson, A., Silva, L., Lehmann, P., Moura, P., Periotto, N., Rodrigues Filho, J.L., Lopes dos Santos, D., Selge, F., Silva, T., Soares, R.M., Strohbach, M., Suhogusoff, A., Wahnfried, I., Zandonà, E., Zasada, I., (eds), 2014. Water in Urban Regions: Building Future Knowledge to Integrate Land Use, Ecosystem Services and Human Health. Policy Report 2014. Publishers: German National Academy of Sciences Leopoldina and Brazilian Academy of Sciences.

Bednarek A., Zalewski M., Mankiewicz-Boczek J. 2014. Denitrification ditches as a bioremediation tool for the removal of the nitrogen pollution and protection of groundwater in rural area. In: Skowronek J. [ed.] Innovative solutions for

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([http://www.uaconferences.org/docs/proceedings/UA2014\\_79.pdf](http://www.uaconferences.org/docs/proceedings/UA2014_79.pdf))
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- Frączak W. Izydorczyk K. (eds) 2015. Program działań dla ograniczenia zanieczyszczeń obszarowych w zlewni Pilicy. ERCE PAN
- Frączak W., Izydorczyk K., Courseau L., Zalewski M. 2014. Identyfikacja presji ze źródeł komunalnych i rolniczych w zlewni Pilicy jako punkt wyjścia dla ograniczenia zanieczyszczeń obszarowych. *Gospodarka Wodna* 3 Kwartalnik WODA 37: 1-4.
- Gagała I., Izydorczyk K., Jurczak T., Pawełczyk J., Dziadek J., Wojtal-Frankiewicz A., Józwiak A., Jaskulska A., Mankiewicz-Boczek J. 2014. Role of Environmental Factors and Toxic Genotypes in The Regulation of Microcystins-Producing Cyanobacterial Blooms. *Microbial Ecology* 67(2): 465-479.
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- Izydorczyk K., Michalska-Hejduk D., Frączak W., Bednarek A., Łapińska M., Jarosiewicz P., Kosińska A., Zalewski M.. 2015. Strefy buforowe i biotechnologie ekohydrologiczne w ograniczaniu zanieczyszczeń obszarowych. ERCE PAN, ISBN 978-83-928245-1-0
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- Kiedrzyńska E., Regional climate and geology affecting habitat availability for a relict plant in a plain landscape: the case of *Festuca amethystina* L. in Poland 2015. *Plant Ecology and Diversity* 8: 331-341.
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**8.2** List of training courses conducted (there can be overlap with those listed in 2.1 above)

## **Appendix 1**

### **Overview of the Core Programme Themes of the Eighth Phase of the IHP (2014-2021) WATER SECURITY: ADDRESSING LOCAL, REGIONAL, AND GLOBAL CHALLENGES**

#### **THEME 1: WATER-RELATED DISASTERS AND HYDROLOGICAL CHANGE**

- Focal area 1.1 - Risk management as adaptation to global changes
- Focal area 1.2 - Understanding coupled human and natural processes
- Focal area 1.3 - Benefiting from global and local Earth observation systems
- Focal area 1.4 - Addressing uncertainty and improving its communication
- Focal area 1.5 - Improve scientific basis for hydrology and water sciences for preparation and response to extreme hydrological events

#### **THEME 2: GROUNDWATER IN A CHANGING ENVIRONMENT**

- Focal area 2.1 - Enhancing sustainable groundwater resources management
- Focal area 2.2 - Addressing strategies for management of aquifers recharge
- Focal area 2.3 - Adapting to the impacts of climate change on aquifer systems
- Focal area 2.4 - Promoting groundwater quality protection
- Focal area 2.5 - Promoting management of transboundary aquifers

#### **THEME 3: ADDRESSING WATER SCARCITY AND QUALITY**

- Focal area 3.1 - Improving governance, planning, management, allocation, and efficient use of water resources
- Focal area 3.2 - Dealing with present water scarcity and developing foresight to prevent undesirable trends
- Focal area 3.3 - Promoting tools for stakeholders involvement and awareness and conflict resolution
- Focal area 3.4 - Addressing water quality and pollution issues within an IWRM framework - improving legal, policy, institutional, and human capacity
- Focal area 3.5 - Promoting innovative tools for safety of water supplies and controlling pollution

#### **THEME 4: WATER AND HUMAN SETTLEMENTS OF THE FUTURE**

- Focal area 4.1 - Game changing approaches and technologies
- Focal area 4.2 - System wide changes for integrated management approaches
- Focal area 4.3 - Institution and leadership for beneficitation and integration
- Focal area 4.4 - Opportunities in emerging cities in developing countries
- Focal area 4.5 - Integrated development in rural human settlement

#### **THEME 5: ECOHYDROLOGY, ENGINEERING HARMONY FOR A SUSTAINABLE WORLD**

- Focal area 5.1 - Hydrological dimension of a catchment– identification of potential threats and opportunities for a sustainable development
- Focal area 5.2 - Shaping of the catchment ecological structure for ecosystem potential enhancement – biological productivity and biodiversity
- Focal area 5.3 - Ecohydrology system solution and ecological engineering for the enhancement of water and ecosystem resilience and ecosystem services
- Focal area 5.4 - Urban Ecohydrology – storm water purification and retention in the city landscape, potential for improvement of health and quality of life
- Focal area 5.5 - Ecohydrological regulation for sustaining and restoring continental to coastal connectivity and ecosystem functioning

#### **THEME 6: WATER EDUCATION, KEY FOR WATER SECURITY**

- Focal area 6.1 - Enhancing tertiary water education and professional capabilities in the water sector
- Focal area 6.2 - Addressing vocational education and training of water technicians
- Focal area 6.3 - Water education for children and youth
- Focal area 6.4 - Promoting awareness of water issues through informal water education
- Focal area 6.5 - Education for transboundary water cooperation and governance