The Water and Environment Centre, WEC
Profile and Experience

Background
The Water and Environment Centre (WEC) is the academic institute in the field of water and environment in Yemen. Studying at the centre provides you with high quality knowledge with focus on indigenous, current and future global water problems.

The WEC is the first water education centre in the region that has taken up an integrated water resources management approach. You are guaranteed privileged orientation to get top competencies, skills and knowledge required for your current and future career.

Besides education and training the WEC carries out practice oriented as well as fundamental research; offers a wide range of advisory services; and is the centre for outreach through networks, partners, facilities and knowledge.

Education and Training
The WEC offers a full time educational Master of Science program in Integrated Water Resources Management (IWRM) based on critical thinking and innovative, creative, solution oriented viewing. The program interlinks different disciplines as agriculture, social sciences, gender, hydrogeology and other topics with water management for a holistic urban and rural sustainable development. The language of instruction is bilingual Arabic-English, demanding two years of hard work study. Major subjects are listed in Annex 1. You may refer to the WEC brochure for more detailed information about the master program.

With its rich history of training experience, WEC bridges the gap between policy makers and water users and managers by offering a wide variety of technical and scientific training courses (Appendix 1) to employees of the public and private water sector. Our interactive training methods in theory and practice is based on the unique expertise of our staff which builds capacities of individual farmers and water user associations, men and women and enhances sharing of knowledge and best practices in water management.

Research and Advisory Services
The WEC provides public and private institutions with a variety of advisory services, supervision and project implementation, and research programs in the domain of water and environment delivered by a wide range of high qualified professionals.

Research
The major role of WEC is to investigate the reasons for water and environment associated problems and find solutions for its related issues. The Research and Consultancy Unit is designated to take the lead for well orienting WEC researches within appropriate academic methods and practical approaches.
Since the beginning, the WEC supervises many diploma projects, MSc (Appendix 2) and pilot researches in collaboration with the water sector (Appendix 3). The aim of the researches touches crucial topics as sanitation, wastewater treatment and usage, desalination, surface and subsurface water hydrology, water availability versus water demand, community participation and the exchange of local water management experiences, water policies and water sector performances and many other related topics.

Advisory Services
The WEC is well recognized by international agencies, water authorities and collaborative partners in leading and implementing many consultancy/advisory projects in water and environment fields in Yemen.

For feasibility studies economic and financial experts at WEC as well as in other water domains as water structures designing and implementation, spate irrigation, sustainable agricultural techniques, water policies and strategies, water extension and social role, water conflicts and justice.

WEC expertise and experience of completed or ongoing projects is illustrated in in appendix 4.

Outreach
The WEC has a wealth of experience reflecting outstanding water education and research and aiming to be a centre for excellence. We are excited to bring our experience and outreach to researchers, communities, extension professionals and policy makers. This outreach is transferred via our outstanding website www.yemenwater.org, public seminars, workshops and conferences. We are in partnership with local and national relevant development sectors, authorities, departments and offices and with related regional and international research centres, universities and organizations. It is our mission to share local expertise with international ones and exchange knowledge among different actors working in water management on all societal political and educational levels. Detailed information can be found in the knowledge and outreach leaflet of the WEC.
Appendices

1. IWRM courses

Semester 1

1.1 Integrated water management
1.1.1 Introduction to IWRM
1.1.2 Water issues in Yemen and the Arab Region
1.1.3 Hydrogeology and Water Resources in Yemen

1.2 Urban water management
1.2.1 Water use in Urban and Rural Areas
1.2.2 Sanitation and Waste Water Treatment
1.2.3 IWRM Case Study

1.3 Water use in agriculture
1.3.1 Water Use in Agriculture
1.3.2 Water and Environment

1.4 Water Governance
1.4.1 Water Rights and Policies
1.4.2 Gender and Water

1.5 Basic Skills

Semester 2

2.1 Integrated Watershed Management (compulsory)
2.1.1 Introduction
2.1.2 Hydrology and Water Balance of a Watershed
2.1.3 Spate Irrigation within the Context of IWSM
2.1.4 Management Options and Tools to Solve IWSM Issues
2.1.5 Group Work Project

2.2 Integrated Waterchain Management (Optional)
2.2.1 Introductory: Explanations of the Water Chain concept
2.2.2 Review of conceptualisations of UWM from the past up to present
2.2.3 Urban Water Management in Yemen region
2.2.4 Possible integrated urban water management (IUWM) options in newly build areas

2.3 Integrated Groundwater Management (Optional)
2.3.1 Introduction to IGWM
2.3.2 Technical Aspects on Groundwater Management
2.3.3 The Role of the Government in IGWM
2.3.4 IGWM Aspects
2.3.5 Sana'a Basin Case Study

2.4 Integrated Coastal Zone Management (Optional)
2.4.1 General Introduction
2.4.2 User Functions and Processes in Coastal Zones of Yemen
2.4.3 The Need for an Integrated Approach in Coastal Zone
2.4.4 Sustainable Development of Coastal Zones in Yemen

2.5 Environmental Impact Assessment (Compulsory)
2.5.1 Environmental Impact Assessment
2.5.2 The EIA Process
2.5.3 The Context of Environmental Analysis
2.5.4 EIA Project Evaluation and Decision Making
2.5.5 Post Project EIA Activities
2.5.6 World Bank Project Classification
2.5.7 Preparation of EIA Terms of References

Semester 3

3.1 Diploma Project

Semester 4

4.1 MSc Thesis

3 Short training courses
1. Crop irrigation and yield
2. Basic evaluation of EIA
3. Communities management, awareness and establishment
4. Dams: design, rehabilitation, M&O
5. Decentralized awareness program on wastewater management
6. Design, O&M of rural wastewater treatment technologies using simplified computer programs
7. EIA for different sectors-case studies
8. Environmental management plan
9. Flood harvesting and spate irrigation
10. Gender and water
11. GIS/RS, advanced
12. GIS/RS, introduction
13. Groundwater fundamentals
14. Groundwater modelling (advanced)
15. Groundwater modelling (introduction)
16. Hydrochemistry and water quality
17. Introduction to IWRM (part 1)
18. Introduction to IWRM (part 2)
19. Modern irrigation systems (sprinkler and drip irrigation)
20. O & M of dams and farms modern irrigation networks system (for WUAs)
21. Rainwater harvesting projects: awareness, operation and maintenance
22. Rural water supply projects: operation and maintenance
23. Sanitation inside and outside buildings
24. Socio-economic surveys
25. Supervising drilling
26. ToR and review for EIA studies
27. Unaccounted for water
28. Wadi hydrology and hydrogeology
29. Wastewater characteristics and its role in the operation of treatment plants
30. Wastewater collection systems
31. Wastewater management
32. Wastewater treatment systems
33. Water quality control
34. Water resources management
35. Water saving from agricultural irrigation

4 MSc researches

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<th>Research Topic</th>
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<td>Abdullah Abdulmalik Ibrahim</td>
<td>Crop Water Productivity from the Field Level to the National Scale within the IWRM Framework, Case study: Qa’a Jahran</td>
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<tr>
<td>Abdullah Mohammed A. Al-Saidi</td>
<td>Analysing the Potential of Roof Rainwater Harvesting System for Water Supply in Manaka Town and Surrounding Area</td>
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<td>Abdulmoghihi Algafari</td>
<td>Assessment of the October 24th 2008 Flood in Wadi Doan, Hadramout Towards Realization of IWRM</td>
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<td>Adel Mohamed Zoleil</td>
<td>Assessing Ground Water Recharge Potential in Wadi Zabid and its Impact on Supplementary Irrigation of Crops in Spate Irrigation Areas</td>
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<td>Ahmad Mahmoud Al-Qubati</td>
<td>Assessment of Sources of Elevated Nitrate in Groundwater in Wadi Siham within IWRM Perspective</td>
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<td>Akram Awad Abdulla Al-Namory</td>
<td>Assessment of Water Resources Situation of Ghayl Bawazir Area in Hadramout Governorate from IWRM Perspective with Special Emphasis on Indigenous Traditional Practices</td>
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<td>Amna Ali Al-Awlaki</td>
<td>Evaluation of the Benefits of Hammam Ali’s Thermal Springs and their Sustainability from IWRM Perspectives</td>
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<td>Bashir Yahya Hezam Al-Nasiri</td>
<td>The Health and Socioeconomic Impacts of Silver Impregnated Ceramic Filters in Four Villages in Amran Governorate</td>
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<td>Fahd Mohsin Almaghribi</td>
<td>Water User’s Associations Evolution &amp; Strengthening in Spate Areas within IWRM Approach, Case Study: Wadi Zabid – Tihama Plain</td>
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<tr>
<td>Hanan Shams E Deen Al-Dubai</td>
<td>Assessing Climate Change Trend and its Effects on Field Crop Water Requirements and Productivities, Dhamar as a Case Study</td>
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<td>Jamal Almunqithi</td>
<td>Assessment of Introducing Water Saving Irrigation Technologies for Sustaining and Enhancing Crop Production in Jahran Area</td>
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<td>Khalid Hassan Al-Bar</td>
<td>Exploitation of Rainfall and Treated Wastewater as Alternatives for Groundwater Use in Sana’s Basin</td>
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<td>Mohamed Abdulla Alabbyadh</td>
<td>Evaluating the potential of Road Rainwater Harvesting in Yemen, A case study of the Maghrabah Manakah Bab Bahil Road, Sana’a Governorate</td>
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<tr>
<td>Mona Mohamed Nagi</td>
<td>The Impact of Al-Azraqain Landfill on the Vicinity Groundwater</td>
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<tr>
<td>Nabil Ali Abdulla Al-Kubati</td>
<td>Quality within IWRM Perspective</td>
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<td>Omar Abdulaziz Al-Sabaee</td>
<td>Integrated Disposal Water Management in Oil Production, Case Study: Block 14 Al-Masila</td>
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<td>Omar Mohamed Zain Bin Shehab</td>
<td>Assessment of Water Demand Management in Wadi Hadhramaut Using IWRM Perspective, Case Study: Tarim Area</td>
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<td>Qaid Husseen Alsedreh</td>
<td>Implementing Integrated Water Resources Management in Water Projects in Rural Areas in Al-Mahweet Governorate, Case Study: Yelaan, Sawaan, and Al-Dahabisha Villages</td>
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<td>Saba Wais Hachem Al-Muselhi</td>
<td>Wastewater Reuse in Irrigation through Applying the IWRM Concept, Effluent of Sana’a Treatment Plant as a Case Study</td>
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<td>Samira Muhsen Al Thari</td>
<td>The Impact of Sana’a Waste Water Treatment Plant on the Drinking Water Quality in Bani Al-Harith District /Sana’a City</td>
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<td>Sarmad Sabah Hussein Al-Ojeily</td>
<td>Water Demand Management in Sana’a through applying the IWRM Concepts, Impact and Constraints of Grey Water Reuse in Agriculture at Sana’a City</td>
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<td>Wael Ishaq Alderwish</td>
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### 5 Pilot researches

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<th>Researcher</th>
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<tr>
<td>Dr. Fadhl Al-Nozaily, Dr. Abdulla Tahish</td>
<td>Phytoremediation By Some Plants To Clean Polluted Soil With Heavy Metals in Bani Al-Harith- Sana’a</td>
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<td>Eng. Abdulwahab Salah</td>
<td>Rainwater Harvesting from Rooftop in Urban Areas, Case study: Sana’a City</td>
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<td>Dr. Abdulwali Alsharjbe, Dr. Abdulla Noaman Eng. Jamil Ali</td>
<td>Using Distilled Water from Thermal Power Plants as an Additional Source for Drinking Water (Al-Heswa Power Station Plant)</td>
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<td>Dr. Ahamed Al-Tawki</td>
<td>Evaluation of the Current and Potential Wastewater Reuse, A pilot plant at Sana’a WWTP</td>
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<tr>
<td>Eng. Abdulwahab Salah</td>
<td>3R manual for Sana’a Basin, 3R Rainwater Harvesting Case Study: Sana’a Basin (Al-Saylah)</td>
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<tr>
<td>Dr. Sharafaddin Saleh, Dr. Al-khteeb Al-kibi</td>
<td>Analysing Rain Water Harvesting and Groundwater Recharge Potential from Roads in Yemen, its Social and Economic Benefits on Local, Regional and National Scale A Case Study of Wadi Al-Ahjar, as Part of Al-Mahweet Road</td>
</tr>
<tr>
<td>Dr. Fadhl Al-Nozaily, Eng. Mohamed Al-Abyadh</td>
<td>Production, Optimization and Characterization of Activated Carbon Derived from Sewage Sludge for Adsorption of Pesticides from Wastewater</td>
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6 Projects

- A comprehensive study on the utilization of five Wadis [Wadi Moure, Rima, Siham, Bana, and Ahwar] in the “Rapid Assessment of Wadis to be selected for IIP Phase II Project”. April-June 2006.
- Adapting to water security for Yemen’s vulnerable communities – Sana’a, Sada’h and Aden areas, 2007-2008.
- Africa to Asia and back again: testing adaptation in flood-based farming systems, April 2015 - March 2018.
- Analysis for a Study Reuse of Treated Effluent and Sludge in Aden, Amran, Hajjah, Ibb and Yarim, September 2003 – November 2010.
- Appropriate low cost Waste Water Treatment (WWT) Technology for Yemen rural areas – Sada’h, Abs, Damt. 2006-2008.
- Climate change effects on agriculture in Yemen. 2009.
- Facilitating the rural communities in the process towards the creation /reactivation of farmers associations in four sub basins of the Sana’a basin. December 2014-December 2015.
- Groundwater and Soil Conservation Project (GSCP) – Beneficiary Impact Assessment (BIA), January - June 2012.
- Groundwater in the Political Domain (CoCoon Project), October 2010 – October 2014.
Hydro-geological and water resources monitoring and investigations in the Sana’a basin, April 2005 – March 2007.


Investigation and selection of the proposed main line to serve the southern area of Sana’a capital city (Stage #4), May 2010 – January 2011.

Open and accessible data platform on irrigation for Yemen. 1 November 2013 - 31 October 2017.

Options for changing the economic incentive structures for groundwater extraction in Yemen. 2008.


Private water providers in urban and peri-urban areas in Sana’a; part a: a field survey of service providers, December 2009-March 2010.

Rainwater Harvesting Technics for drinking water availability in rural areas in Yemen, February - April 2013.

Rural water quality study in three areas in Yemen (Abyan, Ibb and Hajjah). 2006-2008

Sana’a basin well inventory project, April 2001 – May 2002.

Sana’a water supply and sanitation project. 2000-2001


Strengthening research capacity in Yemen’s water sector for policy formulation education and awareness rising. NICHE/YEM/027, January 2011-December 2015.

The irrigation improvement project in Wadi Bana, Wadi Hassan, Wadi Tuban, Wadi Zabid and Mawr”, 1999.

The political economy of water management in Yemen: conflict analysis and recommendations

Traditional Yemeni rural diets and local food systems: enhancing contributions to health and the environment supporting, March 2006 – March 2007.


Water from roads in Yemen - a guidance note, October 2014 – February 2015.

Conflict and Cooperation over Natural Resources in Developing Countries -Groundwater in the Political Domain, November 2010 - December 2014)

Watershed management and waste water re-use in semi-urban areas of Yemen, July 2005.

7 Publications


- Alabyadh, Evaluating the Potential of Road Rain Water Harvesting in Yemen, A Case Study of the Maghrabah Manakah Bab Bahil Road, Sana’a Governorate


- Noaman, Abdulla & Swarts, Chris (2009), Modelling water resources in the Sana’a basin, Yemen, using a WEAP model , IAHS Publ. 330, 84-89.


- Reducing the vulnerability of societies to water related risks at the basin scale, Bochum, Germany, IAHS, Publ. 317, 2007, 186-190

- Saleh, Sharafaddin; Al-Maswari A.; Al-Nozaily, Fadhil and Al-Abyadh, Mohamed (2015) “Evaluating the Potential of Road Rain Water Harvesting in Yemen”, A Case Study of the Maghrabah Manakah Bab Bahil Road, Sana’a Governorate
Sedimentation problems in marine cooling channel of Mukha, Power Station, Yemen, University of Aden Journal of Natural and Applied Sciences 7(1) 2003: 151-159

Traditional spate irrigation system, Wadi Hadramout – Wadi Dow’an, 2013.

Water security in Yemen, 2013.


8 Major Events hosted/organized by WEC

The Water and Environment Centre at Sana’a University has ample experience in hosting workshops, conferences and seminars as listed below.

Hosted and organized events by or in collaboration with WEC

- Introduction of GIS/RS in agriculture water demand, Sana’a, Yemen 23 April 2014.
- Spate irrigation for rural economic growth and poverty alleviation project regional WUA – workshop, Sana’a, Yemen, 16-22 MAY 2013.
- Strengthening research capacity in Yemen’s water sector for policy formulation, education and awareness raising, inception workshop – NICHE/YEM/O27, Wageningen, the Netherlands 30 May – 1 June 2012.
- Community Water Management Project (CWMP) closing workshop, Sana’a, Yemen 24 June 2009.
- Adapting to water scarcity due to the climate change for Yemeni’s vulnerability communities, Sana’a, Yemen 17 June 2009.
- Political Economy of Water Demand Management in the MENA Region; the Case of Yemen, Sana’a, Yemen 7-8 July 2008.
- Evaluation of the health and socioeconomic impact of the silver impregnated ceramic filters in four villages in Amran governorate, Sana’a, Yemen 21 June 2008.
- Options for changing the economic incentive structures for groundwater extraction in Yemen (LEI, the Netherlands and WEC), 27 May 2008.
- A GDLN training and capacity development on water demand management: Savings and South-South Learning with China (Video Conference), Sana’a, Yemen, 31 March-2 April 2008.
- 7th Arab Region Ecotechnie (AREN) meeting, Sana’a, Yemen 4-6 November 2007.
- Application of indicators and indices for water quality management in the ESCWA Region (Expert group meeting), Sana’a, Yemen 17-19 July 2007.
- Expert meeting on municipal waste water use for irrigation, Sana’a, Yemen 4-7 November 2006.
- Some anthropological perspective on issues of water in Yemen (seminar), Sana’a, Yemen 26 June 2006.
• Desalination of seawater for Sana’a Basin drinking water using concentrated solar power, Sana’a, Yemen 28 May 2006.
9 Collaborating international partners

Birzeit University, Palestinian Authority, [http://www.birzeit.edu/](http://www.birzeit.edu/)
Cairo University, Egypt, [http://www.cu.edu.eg/](http://www.cu.edu.eg/)
FAO
Gender and Water Alliance, [http://genderandwater.org/](http://genderandwater.org/)
Hohai University, China P.R., [http://www.hhu.edu.cn/](http://www.hhu.edu.cn/)
Instituto Tecnológico y de Estudios Superiores de Monterrey, Mexico, [http://www.sistema.itesm.mx/](http://www.sistema.itesm.mx/)
Kwame Nkrumah University of Science & Technology, Ghana, [http://www.knust.edu.gh](http://www.knust.edu.gh)
Makerere University, Uganda, [http://www.makerere.ac.ug/](http://www.makerere.ac.ug/)
Nanjing Hydraulic Research Institute, China P.R., [http://www.njhri.edu.cn/](http://www.njhri.edu.cn/)
Technical University Delft, the Netherlands, [http://www.tudelft.nl](http://www.tudelft.nl)
Universidad del Valle, Colombia, [http://www.univalle.edu.co/](http://www.univalle.edu.co/)
Universitas Katolik Parahyangan, Indonesia, [http://www.unpar.ac.id/](http://www.unpar.ac.id/)
University of Zimbabwe/Department for Civil Engineering, Zimbabwe, [http://www.uz.ac.zw/](http://www.uz.ac.zw/)
Wageningen University, the Netherlands, [http://www.wur.nl](http://www.wur.nl)