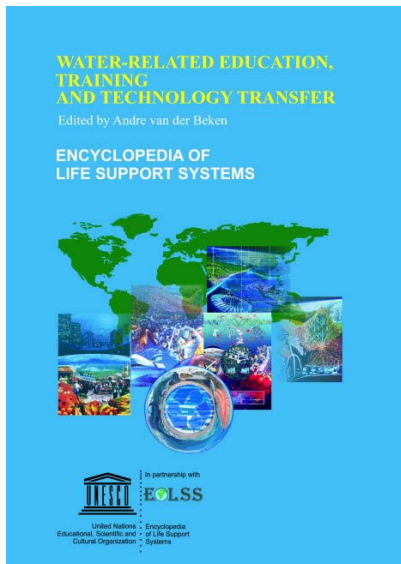


CONTENTS

WATER-RELATED EDUCATION, TRAINING AND TECHNOLOGY TRANSFER



Water-Related Education, Training and Technology Transfer - Volume 1

No. of Pages: 448

ISBN: 978-1-84826-015-3 (eBook)

ISBN: 978-1-84826-465-6 (Print Volume)

For more information of e-book and Print Volume(s) order, please [click here](#)

Or [contact : eolssunesco@gmail.com](mailto:eolssunesco@gmail.com)

CONTENTS

Water-Related Education, Training and Technology Transfer **1**

Andre van der Beken, *Free University Brussels (VUB), Belgium*

1. Introduction: Learning for Everyone
2. Education and Technology Transfer for Water Resources
 - 2.1. About Education
 - 2.2. Technology Transfer
3. Profession and Education in Water Resources
 - 3.1. Relevant Professions and their Activities
 - 3.2. Types of Education
 - 3.3. The Gap Between Education and Profession
4. Educational Curricula for Water Resources
 - 4.1. The Debate
 - 4.2. Trends and Developments in Society
 - 4.3. Trends in Education
 - 4.4. Credit Systems, Internationalization, and Globalization
5. Continuing Education and Training, Professional Development, and Technology Transfer for Water Resources
 - 5.1. Continuing Education and Training
 - 5.2. CET Issues
 - 5.3. Effectiveness Versus Efficiency
 - 5.4. Professional Development
 - 5.5. Transfer of Technology
 - 5.6. Strategy
6. The Paradigm of Integrated Water Resources Management (IWRM)
 - 6.1. Preamble
 - 6.2. Multi-, Inter-, Pluri-, and Trans-Disciplinarity
 - 6.3. Is IWRM a Discipline?
 - 6.4. A Dream: A School of IWRM
7. A Vision and a Strategy

Biographies of Eminent Water Resources Personalities **31**

Robert Sellin, *University of Bristol, UK*

1. Sextus Julius Frontinus, 40 103 A. D., Roman administrator and water commissioner
2. Leonardo da Vinci, 1452 1519, Italian philosopher, painter and inventor
3. Daniel Bernoulli, 1700 1782, Swiss mathematician and educator
4. Antoine Chezy, 1718 1798, French Civil Engineer and water expert
5. De Witt Clinton, 1769-1828, American statesman and entrepreneur
6. Edwin Chadwick, 1800 1890, English social reformer
7. James Leslie, 1801 1889, Scots Water Engineer
8. Robert Manning, 1816 1897, Irish hydraulic engineer
9. William Unwin, 1838 1933, English engineer and educator
10. Osborne Reynolds, 1842 1912, English hydraulic engineer and educator
11. Robert Koch, 1843-1910, German bacteriologist, water filtration innovator and educator
12. Hubert Engels, 1854 1945, German professor of engineering, researcher and educator in hydraulics
13. Sir Alexander Houston, 1865-1933, English physician and bacteriologist, pioneer of the chlorination of water supplies
14. Robert E. Horton, 1875-1945, American engineer and hydrologist
15. Jean Aubert, 1894 1984, French Civil Engineer and inland navigation expert
16. Lon Jean Tison, 1895 1982, Belgian hydrologist and Secretary-General of IAHS
17. Thomas Blench, 1906 1993, Canadian Civil Engineer and river expert
18. Hunter Rouse, 1906 1996, American researcher and educator in hydraulic engineering
19. Howard Penman, 1909 1984, English soil physicist and research hydrologist

20. James Dooge, 1922 , Irish hydrologist, educator and politician
21. J. Eamonn Nash, 1927 2000, Irish hydrologist and educator
22. Philip Monro, 1946 - , English biologist, inventor of water purification process by osmosis

Government Agencies and Institutions **51**

Marcello Benedini, *Water Research Institute, Italy*
 Roberto Passino, *Water Research Institute, Italy*

1. Peculiarities of Water Problems
 - 1.1. A Challenge for the Modern Society
 - 1.2. An Inter-Disciplinary Commitment
2. Necessity of a Responsible Authority
3. The Role of Water in Human Life
4. Connotation of the Water Authority
 - 4.1. The Public Entity
 - 4.2. Territorial Jurisdiction
5. Characteristic Aspects of a Catchment Area
6. The River Authority
7. Institutional Aspects
8. Planning the Water Resources
9. Tools and Steps for Planning
10. Planning at Catchment and Regional Level
11. Opportunities and Duties of a Water Authority
12. Planning Objectives
 - 12.1. Information Requirement
 - 12.2. The Main Water Uses
13. Flood Prevention and Control
14. Water Quality and Environment
15. Internal Structure of the Water Authority
16. Water Authority and Citizens
17. Organization of the Water Authority
18. Water Authority and Government

Water Resources Education and Training **75**

Wilfried H. Gilbrich, *Consultant, France*

1. Introduction
2. Employers
3. Levels of Education
4. Forms, Modes and Educational Systems
5. Degrees and their Hierarchy
6. International Acknowledgement of Diploma
7. Educational Policies
8. Training Needs
9. Quality Assessment
10. Interaction between Researchers and Training
11. Costs of Training
12. Worldwide Needs for Safe Water

Water Resources and Environmental Engineering: Educational Problems at Undergraduate - Graduate Level **93**

Aronne Armanini, *University of Trento, Italy*

1. Introduction
2. From Hydraulic Engineering to Environmental Engineering

3. Possible Structure of an Environmental Engineering Course
4. New and Old Teachings
5. Italian Example
6. Students Reaction to the New Environmental Engineering Courses
 - 6.1. Occupational Openings
7. Conclusions

Continuing Education and Training (CET)

107

Wilfried H. Gilbrich, *Consultant, France*

1. Introduction
2. Reasons for CET
3. Characteristics of CET
4. Methods
5. Execution of CET
6. Quality Assessment
7. Outlook

Education and Training for the Decision Makers

119

Philippe Gourbesville, *University of Nice Sophia - Antipolis, France*

1. Introduction
2. World Water Challenges and Decision Makers
 - 2.1. The Key Position of the Decision Makers
 - 2.2. Awareness Raising by Education and Training
3. Favorable Institutional Context
 - 3.1. Stimulating the Legal Framework
 - 3.2. Developing River Basin Organizations (RBO)
 - 3.3. Setting up a New River Basin Organization: a Bankable Project
 - 3.4. Limits and Problems for River Basin Organizations
 - 3.5. The Support by the International Networks and Organizations
4. Qualification and Knowledge of the Decision Makers
 - 4.1. Basic Data on the World's Water Resources
 - 4.2. Main Uses of Water for Human Purposes
 - 4.3. Tools for a Global and Multi-sectoral Vision: the Master Plans
 - 4.4. The Financial Issue
 - 4.5. Limits of the "Users-Polluters-Pay" Principles
5. Promotion of Tools and Attitudes for a Democratic Process
 - 5.1. Involvement of the Civil Society
 - 5.2. Methodology and Tools for Decision Support
 - 5.3. New Rules for the Decision Makers

Web-Based Water-Related Education and Training

155

K.-Peter Holz, *Brandenburg University of Technology, Germany*

Frank Molkenhain, *Brandenburg University of Technology, Germany*

1. Introduction
 - 1.1. Web Technology and Water-Related Education and Training
 - 1.2. Basic Features of Web Technology
 - 1.3. Innovation by Web Technology in Water-related Disciplines
2. Historical Evolution of Computer-based Education in Hydroscience
3. Web Technology for Education and Training
 - 3.1. Multi-Media Presentation
 - 3.2. Web-Based Software Components
 - 3.3. Web-based Documents

- 3.3.1. Document Properties
- 3.3.2. Technological Concept
- 3.3.3. Authoring and Editing
- 3.3.4. Reading and Navigation
- 3.4. Web-Based Document Management: Virtual Libraries
- 4. Web-Based Collaborative Engineering
 - 4.1. Web-Based Collaboration Tools
 - 4.2. Web-Based Project Platforms
 - 4.3. HydroWeb: A European Internet Course
- 5. New Education and Training Structures
 - 5.1. Virtual Laboratories and Universities
 - 5.2. Continuing Education, Training on the Job
 - 5.3. Open Distance Learning and Virtual Classrooms
 - 5.4. Web-Based Training Centers
- 6. Future Scenario: Education and Training in 2002 2010
- 7. Development of a "Technical Culture"

Water Resources Technology Transfer and Capacity Building

178

Kodwo Andah, *Water Resources Research and Documentation Centre, WARREDOC, Italy*

- 1. Introduction
- 2. Historical development of irrigation canals and water supply technologies in antiquity
 - 2.1. Egypt
 - 2.2. Mesopotamia
 - 2.3. India and China
 - 2.4. Ancient Rome
 - 2.5. Water Raising Technologies and Groundwater Exploitation
 - 2.6. Other Water Related Structures
- 3. Historical Phases of Water Resources Technology Transfer
- 4. Modern concepts of technologies with regard to water resources
 - 4.1. Types of Technologies with Regard to Water Resources
 - 4.2. Data Collection and Management
 - 4.2.1. Remote Sensing
 - 4.2.2. Geographical Information Systems in water and land use planning
 - 4.3. Water Resources Systems Design and Management
 - 4.3.1. Professional oriented water software technologies
 - 4.3.2. Research variety water software
- 5. Problems and Perspectives of Water Technology Transfer
 - 5.1. Socio-Economic Basis of Technology Transfer
 - 5.2. Concepts of technology transfer
- 6. Capacity Building in Water Resources
 - 6.1. Capacity Building within an Enabling Environment
 - 6.1.1. The Enabling Environment
 - 6.1.2. Towards an Effective Institutional Framework for Water Management
 - 6.2. Institutional Capabilities for Integrated Water Resources Management
 - 6.2.1. Data Collection and Management
 - 6.2.2. Water Resources Assessment
 - 6.2.3. Monitoring of Hydroclimatic and Socio-economic Processes
 - 6.2.4. Data Information Management Systems
- 7. The Need for Capacity Building
 - 7.1. Manpower Needs and Skills
 - 7.2. Professional capacity building
 - 7.3. The Special Case of the Developing Countries
- 8. Conclusion

Water Technology Transfer Tools

245

Kodwo Andah, *Water Resources Research and Documentation Centre, WARREDOC, Italy*

1. Introduction
2. Education and Training
 - 2.1. Formal Education
 - 2.2. Continuing Education Programmes
3. Research and Development
 - 3.1. The International Water Management Institute (IWMI)
 - 3.2. The GLOWA Research Cooperation Programme
4. Software Transfer Pool Systems
 - 4.1. WMO Hydrological Operational Multipurpose System
 - 4.2. Global Water Partnership Toolbox
5. Professional Bodies
6. Scientific and Technical Publications
 - 6.1. Constraints on Intellectual Rights
7. Networking of Water Sector Institutions
 - 7.1. The Global Water Partnership - GWP (Website:<http://www.gwpforum.org>)
 - 7.2. International Network for Capacity Building on Integrated Water resources Management (CAP-NET)
 - 7.3. Network of UNESCO Chairs
 - 7.4. TECHWARE (TECHnology for WAter REsources)
 - 7.5. ETNET Environment – Water
 - 7.6. Other networking systems
8. Conclusion

Water Technology Transfer and Information Dissemination in Developing Countries

270

Kodwo Andah, *Water Resources Research and Documentation Centre, WARREDOC, Italy*

1. Introduction
2. The Specific Outlook of Water Technology Transfer to Developing Countries
 - 2.1. Appropriate Technology or Effective Technology
 - 2.2. Manpower Needs and Skills
 - 2.3. International Cooperation
3. Modalities of Information Dissemination as a Process of Continuing Education
 - 3.1. Capacity Building Networking of Water Institutions
 - 3.2. Regional and National Networks
 - 3.2.1. West Africa Capacity Building Network (WA-Net)
 - 3.2.2. Network for Building Capacity for Water Resources Management in Southern Africa (WaterNet)
 - 3.2.3. Nile Basin Capacity Building Network for River Engineering (NBCBN-RE)
 - 3.2.4. Indonesian Capacity Building Network (InaCapNet)
 - 3.2.5. Malaysian Capacity Building Network for IWRM (MyCapNet)
 - 3.2.6. Latin America Water, Education and Training Network (LA-WETnet)
 - 3.2.7. Arab Integrated Water Resources Management Network (AWARENET)
 - 3.3. The Role of UNESCO Chairs in Developing Countries
 - 3.4. Water-related Periodical Campaigns
 - 3.5. Factors Affecting Information Transfer to Developing Countries
4. The Role of Relevant United Nations and Non-Governmental Organisations
 - 4.1. United Nations Educational, Scientific and Cultural Organisation
 - 4.2. World Meteorological Organisation
 - 4.3. Food and Agricultural Organisation
 - 4.4. United Nations Environmental Programme
 - 4.4.1. UNEP Activities in Freshwater
 - 4.4.2. The Global Environment Facility – GEF
 - 4.5. Internet – Information Highways
 - 4.5.1. UNESCO Water Portal(www.unesco.org/water/)
 - 4.5.2. FAO Water related Portals
5. Conclusion

Finding Information

299

Paul Nieuwenhuysen, *Free University of Brussels, Belgium*

1. Introduction
2. Relations with Other Articles of this Encyclopedia
 - 2.1. Relation with the Articles on Teaching
 - 2.2. Relation with Providing Access to Information
3. The Concept of "Information"
 - 3.1. Information in our World
 - 3.2. Some Strange Properties of "Information"
 - 3.3. Formats of Information Sources
 - 3.4. Criteria to Evaluate the Quality of Information Sources
 - 3.5. The Flow of Documentary Information
 - 3.6. Categories of Information Sources
 - 3.7. Retrospective Searching versus Current Awareness
 - 3.8. The Evolution of Storage and Distribution Media
 - 3.9. End Users versus Information Intermediaries
 - 3.10. Some Publication Media Compared
 - 3.11. Convergence of Information Media
 - 3.12. Basic Difficulties in Accessing Information
 - 3.13. Browsing and Searching: the Basic Methods to Retrieve Information
4. Information on CD-ROM
 - 4.1. CD-ROM Technology
 - 4.2. Information Published on CD-ROM
 - 4.3. Future Trends Related to CD-ROM
5. Multimedia and Hypermedia
 - 5.1. Multimedia
 - 5.2. Hypermedia
6. Computer Data Networks and the Internet
7. The World-Wide Web
8. Online Access Information Sources and Services
 - 8.1. Introduction
 - 8.2. Internet Directories for Browsing
 - 8.3. Searchable Internet Indexes
 - 8.4. Finding Multimedia Files on the Internet
 - 8.5. Current Awareness Services Focusing on WWW Pages
 - 8.6. Fee-Based Databases
 - 8.7. Online Access Information: Future Trends
9. Dictionaries and Encyclopedias
10. Finding Books
11. Finding Journal Articles
12. Electronic Newsletters and Journals
13. Citation Searching
14. Computer Network Interest Groups
15. Interlibrary Lending and Document Supply
16. Finding Information in the Subject Domain "Water"

Making Information Available

317

Paul Nieuwenhuysen, *Free University of Brussels, Belgium*

1. Introduction
2. Relations with Other Articles of this Encyclopedia
3. Variations on the Theme of "Information Centers"
4. Activities of Information Centers: an Overview
5. Access to the Services Provided by Information Centers
6. Collection Development in Information Centers
7. Assessing the Impact of Scientific Journals

8. Organizing Access to Information in Information Centers
 - 8.1. Introduction
 - 8.2. Organizing Access to Hard-Copy Documents in Information Centers
 - 8.3. Organizing Access to Computer-Based Information in Information Centers
 - 8.4. Integrating Access to all Types of Information in Information Centers
9. Applying Information and Communication Technology
 - 9.1. General Considerations
 - 9.2. Using General Office Application Software
 - 9.3. Using an Integrated Online Library Management System
 - 9.4. Methods to Make Databases Accessible through the Internet
 - 9.5. Web Site Development
 - 9.6. Digital, Virtual, Electronic Libraries
10. Educating Users in Finding and Managing Information
11. Marketing, Promotion, Public Relations in Information centers
12. Cooperation, Networking, and Interaction among Information Centers
13. Future Trends in Libraries and Information Centers
14. Information Sources about Library and Information Science
15. Making Information Available in the Domain of "Water"

The Patent System: A Driving Force to Promote Innovation **331**

Maria Lorenza González Arias, *European Patent Organization, DGI, The Netherlands*

1. What is a Patent?
2. The Advantages of Patents
3. What is Patentable?
4. Infringement
5. License
6. Patents and Water Resources Technology

Increasing Effectiveness of Higher Education **338**

Radu Mircea Damian, *Technical University of Civil Engineering, Romania*

1. Introduction
2. The Concept of Effectiveness
3. The Relationship Between Undergraduate, Postgraduate and Continuing Education. Role of Practical Training in Higher Education.
4. Study Exchanges and Mobility. Positive Effects and Side Effects.
5. Role of Resource Based Learning (RBL) and Information Technology (IT) in Increasing Effectiveness of Higher Education. Are there Limits?
6. Conclusions

Public Policy and Role of Law **353**

Mitaji Brilly, *University of Ljubljana, Slovenia*

1. Introduction
2. Development from Ancient Time to Today
3. Integrated Water Management
4. Decision Making
5. Ethical Values and Water Management
6. Public Participation
7. Role of Law
8. Further Development
9. Conclusions

Professional Development **367**
Stefania Zaccolo, *HydroControl, Italy*

1. Professional Development in a Capacity Building Project
 - 1.1. What is Professional Development?
 - 1.1.1. Using the Categories to Define Professional Areas and Levels
 - 1.1.2. Training Methodologies for Professional Development
 - 1.1.3. Action Learning for Managers' Professional Development
2. Professional Development in Water Sector
 - 2.1. Two European Projects on Training in the Water Sector

Index **385**

About EOLSS **395**